

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-001\_Mod1 CY3

**Task Order Title:** Long-term, Upper Atmospheric Data Set Management, Processing and Analysis

**1.0 Technical POC (TPOC):**

Name: gloria.hernandez  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: gloria.hernandez@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide data processing support for the Stratospheric Aerosol and Gas Experiment (SAGE) II/III, similar occultation sensors, i.e. Atmospheric Chemistry Experiment (ACE) – Fourier Transform Spectrometer (FTS), ACE – Solar Imager, ACE – Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation (MAESTRO), and other instruments that shall contribute to the long-term, upper atmospheric data set, which includes but is not limited to ozone, aerosol, water vapor, and nitrogen dioxide. Data processing support shall include the development, implementation and testing of algorithms necessary to combine sensor data with spacecraft ephemeris data to produce scientific data products defined by the lead NASA scientist. The contractor shall develop production software to run on the Science Computing Facility at the NASA Langley Research Center Atmospheric Data Center (ASDC) with data product archival at the NASA LaRC ASDC and the LaRC SAGE web-site <http://sage.nasa.gov/SAGE3ISS/>. The contractor shall be provided details of how to access these systems and facilities by the NASA TM. Specific task components are derived in concert with the lead NASA scientist to support meeting established science goals and include product definitions; software design, planning and development; configuration management; documentation; data processing operation; software integration; testing and maintenance; debugging; and quality assurance.

Performance standards include:

- Algorithm approaches are demonstrated and documented within agreed upon schedules (schedules designated in monthly reports)
- Demonstrate that algorithms have been implemented properly within agreed upon schedules (schedules designated in monthly reports)

- Designated operation algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed timeframe (timeframe designated in monthly reports)
- Analysis and interpretations of science data are documented and presented within agreed upon schedules (schedules designated in monthly reports)
- Measurements are successfully processed and archived within agreed upon schedules (Product delivery schedules shall be designated in monthly reports)
- Websites/databases/archives are updated within an agreed to timeframe (timeframe designated in monthly reports)
- Required documents delivered within agreed to schedules (schedules designated in monthly reports)
- Agreed-to processing products are provided to defined user within an agreed to timeframe (products and timeframe designated in monthly reports)

**Mod 1:** The purpose of this Modification is to extend the period of performance of the task order in order to provide additional data processing support and development of production run software for the SAGE II/III program.

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify):

Meetings or conference support shall be determined by the TM.

### 4.0 Schedule/Milestones/Period of Performance

4.1 Schedule: As established by the NASA TM and agreed to by the contractor, standard and agreed to data products are available within agreed upon schedule (between NASA TM and contractor) of receiving input data required for processing (timeframe designated in monthly reports are appropriate).

4.2 Milestones: As established by the TM and agreed to by the contractor in monthly meetings.

4.3 Period of Performance: February 1, 2013 to September 30, 2013.

**MOD 1: The purpose of Mod 1 is to extend the period of performance end date for the entire Task:**

**4.3 Period of Performance: February 1, 2013 to September 30, 2014.**

### 5.0 Deliverables/Reporting Requirements

- Upper atmospheric data products as specified by the NASA TM.
- Science & production code developed to produce data products to be delivered within 3 months of data product acceptance by the NASA TM. All supporting documentation for

algorithms and code shall be delivered within 6 months following completion of code development phase. Interim documentation shall be provided as requested by the NASA TM.

- Scientific publications and papers as appropriate to report results to the scientific community.
- The contractor shall provide a written report in microsoft Word the status of ongoing tasks, results, and issues to the NASA TM by the last business day of each month.

## **6.0 Other Information Needed for Performance of Task**

Travel (1 trip/year) for technical interchange may be required.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-002\_Mod6 CY3

**Task Order Title:** CALIPSO Support

### **1.0 Technical POC (TPOC):**

Name: ali.omar  
Organization: E304:Atmospheric Composition Branch  
Email Address: Ali.h.omar@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

#### **2.0 Description of Work to be Performed and Performance Standards**

The CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Observations) satellite mission is jointly sponsored by NASA and Centre National d'Etudes Spatiales (CNES) and provides global measurements of aerosols and clouds that are needed to better understand their role in the climate and to improve our ability to predict long-term climate change as well as operational weather and air quality forecasts. The contractor shall provide support to the CALIPSO mission in four functional areas: Project Management; Science, Algorithm Development and Quality Assurance; Missions Operations and Engineering Support; and Data Production and Management. The contractor shall manage and track each functional area.

1. CALIPSO Project Management:

- a. Support for CALIPSO Project management activities shall be responsive to requirements established by the Task Monitor (TM). Tasks shall include, but are not limited to, logistical and administrative support for planning CALIPSO Science meetings and/or workshops as well as CALIPSO Educational/Outreach activities. The contractor shall provide documentation allowing the TM to review the expenses for logistical and administrative support for all CALIPSO meetings, workshops, and Education/Outreach activities. In support of CALIPSO Science meetings, the contractor shall provide travel support for non-NASA participants for Project, Science Team or Technical Interface meetings as determined by the TM. The contractor shall provide, as a deliverable, a document that allows the TM to approve the cost of these travel expenses prior to commitment.



- b. The contractor shall develop and provide for TM review and approval a document/schedule that, when approved and accepted, shall include the requirements with which the contractor shall comply. The requirements listed in the document/schedule may be updated or revised as needed, but shall require additional TM approval and acceptance.
- c. The contractor shall perform a study on the development of a strategy to identify and inform non-traditional user groups of CALIPSO data. The contractor shall provide a report with specific recommendations on ways that the CALIPSO project can use to identify and contact these groups.
- d. The contractor shall produce a list of specific recommendations on how to reach out to non-traditional user communities (non-traditional users are considered groups not focused on climate studies) such the insurance and commodities trading industries; identify and provide a list of non-traditional user groups that can utilize the CALIPSO data products; and produce a report describing recommend actions for the CALIPSO project to take in order to contact the new groups.
- e. Deliverables:
  - i. The contractor shall provide consulting, outreach, website, logistical and language (French) translation support for CALIPSO-related activities as determined by the TM.
  - ii. The contractor shall provide logistical and administrative support for visiting academic scientists and engineers that are collaborating on CALIPSO related research and data production activities. Support shall include providing accommodations necessary to conduct normal business activities within specifications and schedules agreed upon between the contractor and the TM.
  - iii. The contractor shall provide logistical and administrative support for the preparation and production of CALIPSO project proposals, reports, and presentations.
- f. The contractor shall meet the following performance standards in providing CALIPSO project management support:
  - i. Provide requests for travel support to CALIPSO related project/science team/technical interface meetings and workshops with a list of non-NASA participants and expected expenses for approval by the TM prior to commitment,
  - ii. Provide reimbursement for travel from non-NASA participants to CALIPSO Project Science or Technical Interface meetings previously approved by the TM within 45 days of the submission of an expense report,
  - iii. Required documents and software comply with all contract requirements, are delivered within schedules agreed upon between the contractor and the TM, and are archived at the NASA Langley Research Center's Atmospheric Sciences Data Center (ASDC),
  - iv. Websites/databases/archives are developed and updated within schedules agreed upon between the contractor and the TM,

v. Provide and maintain a document that lists requirements and schedules that have been approved, accepted, and/or modified under this task.

2. CALIPSO Science, Algorithm Development and Quality Assurance:

- a. Science, Algorithm Development and Quality Assurance functions shall be responsive to requirements established by the TM. The contractor shall provide science analysis support for the CALIPSO mission which includes, but is not limited to, investigations of aerosol and cloud properties and their effects on climate, weather and air quality using the CALIPSO data products and other data sets as determined by the NASA TM. The contractor shall also support scientific and measurement validation studies with data from other atmospheric measurement and modeling systems as determined by the TM. Science and engineering analysis shall further support algorithm development, implementation, and maintenance as well as provide operational, data reduction, and database archive support for CALIPSO related aircraft and field correlative measurement activities. In support of algorithm and data quality assurance efforts, the contractor shall ensure that the following core processes are implemented: software development, code verification and review, test product analysis, and configuration management.
- b. The contractor shall develop and provide for TM review and approval a document/schedule that, when approved and accepted, shall include the requirements with which the contractor shall comply. The requirements listed in the document/schedule may be updated or revised as needed, but shall require additional TM approval and acceptance.
- c. The contractor shall support error analysis of Orbiting Carbon Observatory (OCO)-2 carbon dioxide (CO<sub>2</sub>) retrievals and development of an advanced aerosol absorption retrievals using OCO-2 oxygen A-Band spectrometer measurements and the Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) lidar profile measurements.
- d. The contractor shall investigate the sensitivity of CALIOP surface return area estimates to changes in the magnitude of the solar background signal during daylight operations.
- e. Deliverables:
  - i. The contractor shall provide data, graphics, and other inputs for documenting technical, scientific or validation studies. The contractor shall perform quick-turnaround requests (less than 2 weeks response time) for special multidisciplinary tasks, unanticipated technical problems, and system malfunctions as determined by the TM.
- f. The contractor shall meet the following performance standards in providing CALIPSO algorithm development and quality assurance support:
  - i. Analysis and interpretations of science data are documented and/or presented within schedules agreed upon between the contractor and the TM,

- ii. Required documents and software comply with all contract requirements, are delivered within schedules agreed upon between the contractor and the TM, and are archived at ASDC,
- iii. Websites/databases/archives are updated within schedules agreed upon between the contractor and the TM,
- iv. Analysis and the display of science data or validation results are documented and archived at ASDC using software tools developed within schedules agreed upon between the contractor and the TM
- v. Results of studies, investigations, and design activities are delivered within schedules agreed upon between the contractor and the TM,
- vi. Algorithm approaches are demonstrated and documented within schedules agreed upon between the contractor and the TM,
- vii. Demonstrate that algorithms have been implemented properly as verified through code reviews and designed test activities within schedules agreed upon between the contractor and the TM,
- viii. Provide and maintain a document that lists requirements and schedules that have been approved, accepted, and/or modified under this task.

3. CALIPSO Mission Operations and Engineering Support:

- a. The contractor shall provide overall mission operations support for the CALIPSO mission and shall be responsive to requirements established by the TM. Mission operations support shall include, but is not limited to, payload instrument operations; mission planning; development, validation, and execution of on-orbit payload instrument commands; maintenance and enhancement of flight and ground payload processing software; documentation; characterization of CALIPSO lidar performance, trend analyses of significant payload and ground-system parameters; payload and ground system trouble-shooting activities; Hubble Space Telescope (HST) overpass and orbital debris conjunction analysis, and operation of the CALIPSO mission operations data processing system.
- b. The contractor shall develop and provide for TM review and approval a document/schedule that, when approved and accepted, shall include the requirements with which the contractor shall comply. The requirements listed in the document/schedule may be updated or revised as needed, but shall require additional TM approval and acceptance.
- c. Deliverables:
  - i. The contractor shall perform quick-turnaround requests (2 weeks or less response time) for special multidisciplinary tasks, unanticipated technical problems, and on-orbit and ground system malfunctions.

ii. The contractor shall provide engineering support for the CALIPSO mission. Engineering support shall include, but is not limited to, system and component characterization and testing; data acquisition; algorithm development and maintenance of flight software qualification facilities.

iii. The contractor shall provide support to extract engineering and scientific data from the science data downlink stream and perform analysis on engineering parameters, instrument performance, and science data.

iv. The contractor shall provide the necessary communications devices in order to execute appropriate mission operation activities as determined by the TM.

v. In the performance of these CALIPSO mission operations tasks, the contractor shall ensure that the following core processes are implemented: systems engineering, systems development, software development, quality assurance, and software and document configuration management, archival and testing.

vi. The contractor shall provide support in the preparation, organization, collection, reproduction, electronic capture, and archival of CALIPSO documentation as determined by the TM and archived at ASDC.

vii. The contractor shall monitor and support the maintenance of the ground system network to meet daily communication and processing requirements as identified in the CALIPSO Project Plan (PC-AGR-504) provided by the NASA TM and documents listed therein.

viii. The contractor shall provide a backup data collection and processing facility for CALIPSO mission operations, including level 0 and payload health and status data. A set of requirements for this backup data collection and processing facility are listed below:

1. Data storage and processing facility with at least 750 Gbytes of on-line storage,
2. Incremental daily backup of on-line data holdings,
3. Full backup each week of data holding,
4. Retention of data backup – 1 year for weekly backups, 2 weeks for daily incremental backups,
5. Static IP allocation,
6. Firewall protection with configuration and monitoring options,
7. Compatible with Windows 2003 Standard 32 bit operating system,
8. Rapid deployment of critical Operating System (OS) security patches,
9. Provide managed anti-virus software,
10. Design flexibility to expand system resources,
11. 1 hour facility access guarantee from off-site location,

12. Ticketing system for problem reporting and resolution,
  13. Maintenance notification system,
  14. On-line account administration system
  15. Data traffic monitoring system for incoming and outgoing transmissions (daily, weekly, monthly, and yearly increments),
  16. Facility located at least 500 miles away from NASA LaRC to avoid outages, from the same event that may cause an interruption of services at the primary data facility,
  17. 24 hour, 365 day expertise response team
    - a. Provide a record of demonstrated experience in hosting data storage facilities that provide power and network redundancy, regular monitoring and maintenance of resources, and system and facility security.
- d. The contractor shall meet the following performance standards in providing CALIPSO mission operations support:
- i. Payload command loads shall be fully validated and delivered per schedules agreed upon between the contractor and the TM,
  - ii. Daily payload health, status, and limit monitoring checks and routine ground system network checks performed according to schedules agreed upon between the contractor and the TM,
  - iii. Support technical interface meetings as determined by the TM,
  - iv. Requested data products are provided to specified users within schedules agreed upon between the contractor and the TM,
  - v. All external datasets required for production processing shall be captured and archived within schedules agreed upon between the contractor and the TM and stored at facilities specified in the CALIPSO Project Plan provided by the TM,
  - vi. Provide and maintain a document that lists requirements and schedules that have been approved, accepted and/or modified under this task,
  - vii. Required documents and software comply with all contract requirements, are delivered within schedules agreed upon between the contractor and the TM, and are archived at the facilities specified in the CALIPSO Project Plan and provided by the TM.

4. CALIPSO Data Production and Management:

- a. The contractor shall provide overall support for CALIPSO data production and management activities and shall be responsive to requirements established by the TM. Data management support includes, but is not limited to, the development, implementation, testing and maintenance of algorithms necessary to combine CALIPSO instrument data with spacecraft ephemeris data to produce standard, expedited and research data products. The contractor shall develop and maintain production software to run at ASDC and conduct

necessary data production operations to produce and archive CALIPSO data products in a timely manner. The contractor shall also support software development activities that enhance the distribution and utilization of data through the ASDC data distribution system.

- b. The contractor shall develop and provide for TM review and approval a document/schedule that, when approved and accepted, shall include the requirements with which the contractor shall comply. The requirements listed in the document/schedule may be updated or revised as needed, but shall require additional TM approval and acceptance.
- c. In support of the Southeast Asia Composition, Cloud, Climate Coupling Regional Study (SEAC4RS) field campaigns, the contractor shall provide satellite imager data from ancillary satellite missions as determined by the NASA TM with reduced latency for the SEAC4RS airborne field mission through the Man computer Interactive Data Access System (McIDAS) ingest, processing and display system provided by the Space Sciences and Engineering Center (SSEC) at the University of Wisconsin. The contractor shall develop and install a McIDAS Abstract Data Distribution Environment (ADDE) server for the acquisition of ancillary satellite missions' data. Ingestion of ancillary satellite mission data shall allow the ADDE server to process data scan line by scan line.
- d. The contractor shall provide detailed simulated meteorological analyses using a non-hydrostatic numerical weather prediction model to aid interpretation of CALIPSO observations for validation and science analysis. Comprehensive thermodynamic, kinematic and microphysical model fields are to be produced with simulations extending at least 48 hours in duration. Dates and geographical areas to be simulated and delivery schedules shall be agreed upon by the contractor and the TM.
- e. Deliverables:
  - i. The contractor shall perform quick-turnaround requests (less than 2 weeks response time) for special multidisciplinary tasks, unanticipated technical problems, and system malfunctions as determined by the NASA TM.
  - ii. The contractor shall provide monthly summary reports of the status of processing and archival activities and the status of the processing, archival, and local data storage system at ASDC as well as a report on the transfer of CALIPSO data products to the French data center in Lille, France.
  - iii. In the performance of these CALIPSO data management tasks, the contractor shall ensure that the following core processes are implemented: systems engineering; systems development; and software development, quality assurance, configuration management, testing and code archival.
  - iv. The contractor shall provide updates, as determined by the NASA TM, to the CALIPSO data processing system Operations Guide which will be provided to the contractor by the TM.

- f. The contractor shall meet the following performance standards in providing CALIPSO data management support:
- i. Designated operational code that implements algorithms, once promoted to operational status, are maintained under configuration management procedures as stated in the CALIPSO Project Plan provided by the TM and can be reproduced (if lost) within a timeframe agreed upon between the contractor and the TM,
  - ii. Products are successfully captured and archived within schedules agreed upon between the contractor and the TM,
  - iii. Required documents and software comply with all contract requirements, are delivered within schedules agreed upon between the contractor and the TM, and are archived following requirements specified in the CALIPSO Project Plan provided by the TM,
  - iv. CALIPSO standard, expedited, and reprocessed data products shall be produced and delivered to specified users, as determined by the TM, within schedules agreed to upon between the contractor and the TM,
  - v. All external data sets required for production processing shall be captured and archived within schedules agreed upon between the contractor and the TM and stored at the facilities specified in the CALIPSO Project Plan provided by the TM,
  - vi. A summary report on data collection, production, archival and processing system status and data transferred to the French Data Center in Lille, France is produced on a schedule agreed to upon between the contractor as by the TM,
  - vii. Transition of the CALIPSO data processing software system to a new cluster-based computer architecture including the porting of code and complete verification testing of the system within schedules agreed upon between the contractor and the TM,
  - viii. Updates, as needed, to the CALIPSO data processing system Operations Guide, which will be provided to the contractor by the TM,
  - ix. Development and maintenance of enhanced CALIPSO data access software tools shall be supported within schedules agreed upon between the contractor and the TM,
  - x. Provide and maintain a document that lists requirements and schedules that have been approved, accepted, and/or modified under this task.
  - xi. Provide numerical weather prediction model output data products and software and visualization tools used to interpret CALIPSO data sets.

**Mod 1: The purpose of this modification is to add an additional subcontractor who was not included in the contractors Task Order Plan (TOP); therefore the subcontractor's cost was not included in the original task order award value.**

**Mod 2: The purpose of this modification is to change the TM from Kathleen Powell to Ali Omar as of May 25, 2013.**

**Mod 3: The purpose of this modification is to augment current CALIPSO staff allocations enabling summer students to perform analytical and clerical duties under Section 2.0, 2. CALIPSO Science, Algorithm Development and Quality Assurance above:**

**g. Over 800 publications are available that used CALIPSO data in their studies. The CALIPSO project seeks to understand the nature of these studies. The contractor shall conduct a search of selected Keywords in the publications and compile statistics on them. A copy of the archived publications to be searched and a list of the Keywords to be used will be provided to the contractor at task award.**

**i. The contractor shall conduct a search of selected Keywords in the CALIPSO publications provided;**

**ii. The contractor shall construct a relational database of the Keyword analysis using off-the-shelf software, compile statistics, and present findings in the form of a report;**



**iii. The contractor shall scan paper documentation into electronic PDF documents.**

**Mod 4: The purpose of this modification is to include the assessment of uncertainties in the ocean surface calibration technique under Section 2.0, 2. CALIPSO Science, Algorithm Development and Quality Assurance above:**

**h. The contractor shall assess the quantification of contributions to the calibration error budget including: signal saturation, negative noise anomalies, index of refraction of sea water, foam, bubbles, whitecaps, non-ideal detector response at 532nm, and subsurface backscatter.**

**i. The contractor shall assess and quantify the performance of the surface calibration technique with respect to the error sources;**

**ii. The contractor shall develop and document a set of automated data screening procedures that ensure the derived surface calibrations fall within well defined error limits;**

**iii. The contractor shall conduct validation studies for the CALIOP surface calibration technique using measurements made by the LaRC Airborne High Spectral Resolution Lidar.**

**Mod 5: The purpose of this mod is to include the development of a new Level 3 cloud data products and a Level 3 stratospheric aerosol product in response to the Earth Science Division Senior Review, as well as balloon profile measurements under Section 2.0, 2. CALIPSO Science, Algorithm Development and Quality Assurance, as set forth below:**

- i) The contractor shall support the design, development and implementation of a new CALIPSO lidar Level 3 cloud data product, including analysis of existing satellite, airborne and ground based cloud measurement records; preparation and assessment of prototype algorithms; sensitivity and impact analysis on selection of CALIOP and IIR parameters for constructing the Level 3 algorithm; and comparison and validation of the new CALIPSO Level 3 data set with a co-located A-Train based data set.**

**j) The contractor shall design and develop Graphical User Interface (GUI) displays for the CALIPSO and the LaRC High Spectral Resolution Lidar (HSRL) instrument simulators and translate existing simulator code into a common software system. The task shall also support the design, development, and implementation of GUI displays of the CALIPSO Level 3 data products accessible through the Atmospheric Sciences Data Center's website.**

**k) The contractor shall support the development and implementation of a multi-display visualization 'hyperwall' computer resource to support CALIPSO and CERES data diagnostic and analysis studies.**

**l) The contractor shall support the design, development, and production of an operational CALIOP Level 3 stratospheric aerosol data product. The task shall also support the validation of this data product.**

**m) The contractor shall support algorithm analysis studies for ocean retrievals using CALIPSO and HSRL data.**

**n) The contractor shall acquire and deliver balloon profile measurements of the upper troposphere and lower stratosphere aerosol particle size distribution and backscatter optical properties, ozone, temperature, pressure-altitude, and wind velocity.**

**i. Measurements shall be conducted from northern Australia, from near the surface to above 25 km to sample the volcanic aerosol plume from the eruption of Mt. Kelud in February 2014.**

**ii. To permit comparison with a 30-year record of observations, the contractor shall use the University of Wyoming's Optical Particle Counter instrument to assess both the volatile and non-volatile components of the aerosol distribution.**

iii. The contractor shall use a two-wavelength backscatter sonde to gain insight on backscatter wavelength dependency.

iv. The contractor shall provide the necessary logistical support for traveling to and from the balloon facility, acquire the necessary permits for balloon operations, and procure and ship the necessary equipment and services for balloon operations.

Mod 6: The purpose of this mod is to include additional analyses from the SEAC4RS field mission under Section 2.0, 2. CALIPSO Science, Algorithm Development and Quality Assurance, as set forth below:

o. The contractor shall conduct analyses of airborne and ground based measurements from the SEAC4RS field mission to aid in the refinement of algorithms for the CALIPSO lidar and Infrared Imaging Radiometer (IIR) retrievals of cloud optical depth (COD) and ice water content (IWC).

i. The contractor shall conduct trade studies on cloud retrievals from constrained and unconstrained retrievals and provide an assessment on performance of the different techniques.

ii. The study shall include airborne measurements from the Cloud Physics Lidar (CPL) and the Enhanced MODIS Airborne Simulator

**(eMAS) to simulate CALIPSO-like observations and comparisons with in situ particle observations acquired by other aircraft.**

**iii. Statistical distributions of particle size and habit shall be compiled and correlations between particle distributions and measured and derived cloud properties from CPL and eMAS shall be investigated, with particular attention paid to variations in lidar backscatter color ratio that may occur in response to changes in particle size and/or habit.**

### **3.0 Special Requirements**

1. Access to Sensitive or ITAR Data: Yes
2. Access to CALIPSO instrument designs and payload processing capabilities is needed at times to help interpret the health of the payload instrument and subsystems and resolve anomalous situations with them. This information is also used to help refine instrument calibration and data processing algorithms.
3. Other (Specify):
  - a. Mission Operations technical team members are required to monitor mission performance outside of normal business hours on a rotating on-call basis and to complete on-line checklists twice daily (morning and evening) seven days per week. In order to maintain after hours limit violation notification capabilities and contact the mission partner, CNES, outside of normal working hours, the contractor shall provide to its technical team members cell phones capable of receiving e-mail messages.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2016.



Schedules shall be agreed upon during monthly meetings held during the first week of each month with the TM.

**Mod 3: The period of performance for Mod 3 only is June 25, 2013 through January 31, 2014.**

## **5.0 Deliverables/Reporting Requirements**

1. The contractor shall provide monthly reports (Microsoft Word document delivered to the TM via email) which include completed and projected accomplishments, significant issues, and metrics reflecting the contractor's success in meeting the CALIPSO performance standards described in Section 2.
2. The contractor shall prepare, deliver and maintain a document that lists requirements and schedule once it has been approved/accepted by the TM. The document shall be delivered within a month of the start of the performance period and reviewed on a monthly basis with the TM.
3. The contractor shall provide oral or written status reports as determined by the TM.
4. The contractor shall provide CALIPSO code and supporting documentation as determined by the TM.
5. The contractor shall provide CALIPSO software tools and supporting documentation for the analysis and display of CALIPSO data as determined by the TM.
6. The contractor shall produce CALIPSO publications and presentations for the CALIPSO Science Team and other technical meetings as determined by the TM.
7. The contractor shall support the production of CALIPSO standard and expedited data products as determined by the TM.  
The contractor shall provide CALIPSO standard and expedited data products with a delivery schedule as determined by the TM.

**Mod 3: The following additional deliverables are required for Mod 3 only:**

**8. Monthly electronic progress reports which detail the status of ongoing activities by the 5<sup>th</sup> of each month.**

**9. Copy of all products and databases produced (CD rom) by 1/31/2014.**

**Mod 4: The following additional deliverables are required for Mod 4 only and should be electronically delivered to the TM in Microsoft Office (or compatible) format:**

**10. Detailed report(s) describing the analyses conducted and conclusions reached by 1/31/2016.**

**11. All documentation, including both design and implementation details, of the data screening procedures by 1/31/2016.**

**12. Report describing results of the validation studies by 1/31/2016 by 1/31/2016.**

**13. Monthly electronic progress reports which detail the status of ongoing activities by the 5<sup>th</sup> of each month.**

**Mod 5: The following additional deliverables are required for Mod 5 only and should be electronically delivered to the TM in Microsoft Office (or compatible) format:**

**14. The contractor shall submit a plan, for approval, for the design and development of GUI display systems for the CALIPSO and HSRL instrument simulators.**

**15. The contractor shall submit a plan, for approval, for the design and development of a Hyperwall display system for diagnostic studies and analysis studies of CALIPSO and CERES data.**

**16. The contractor shall submit a plan, for approval, for the design and development of a CALIPSO Level 3 stratospheric aerosol data product.**

**17. The contractor shall submit a plan, for approval, for the design and development of a CALIPSO Level 3 Cloud data product.**

**18. The contractor shall prepare and submit a report on the measurement campaign including an analysis of the measurements and prevailing meteorology. Data acquired from the campaign shall be submitted to the LaRC Atmospheric Sciences Data Center for archival.**

**Mod 6: The following additional deliverables are required for Mod 6 only and should be electronically delivered to the TM in Microsoft Office (or compatible) format:**

**19. The contractor shall submit a final report summarizing the analysis approach, findings, and recommendations for revisions to the CALIPSO retrieval algorithms.**

### **6.0 Other Information Needed for Performance of Task**

1. The contractor shall travel to international and domestic meetings and conferences. The exact locations and timing of the travel shall evolve over the course of each year with duration of approximately 5 business days per travel. The required travel shall include, but are not limited to CALIPSO Science Team meetings, which are held once per year; scientific conferences, which shall be attended upon review by TM; Calibration/Validation meetings, which are held four times a year; LaRC/CNES Technical Interchange Meetings, which are held twice a year; Mission Operations Working Group meetings, which are held twice a year; the Annual REVEX (French acronym for Revue d'Exploitation) Reviews; and Educational and Public Outreach meetings, which shall be attended upon review by TM.
2. Typical scientific conferences include:
  1. American Geophysical Union conference, first week of December annually in San Francisco, CA.
  2. The International Lidar Radar Conferences, held biannually during summer months.
  3. International Radiation Symposium, held annually during summer months.

**Mod 6: The following is additional travel required for this mod:**

**3. The contractor shall travel to LaRC on two separate occasions to meet with the CALIPSO team to discuss the progress/findings of the analysis, as well as present to the Lidar Science Working Group. Dates and duration are TBD.**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-003\_Mod1 CY3

**Task Order Title:** Data Acquisition Support for Suborbital Research Platforms

### **1.0 Technical POC (TPOC):**

Name: Mei.Ying.Yang  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: mei.y.yang@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide technical, computer, and overall cognizance to supporting measurement activities in the laboratory and onboard atmospheric research aircraft in support of sub-orbital flight experiments. This support shall entail computer hardware configuration and software development for laboratory and airborne applications. The contractor shall develop all the necessary software tools and applications required to meet data acquisition, analyses, and archival processes and utilize the latest developments in software and hardware to upgrade and enhance present capabilities.

*The contractor shall perform the following task requirements:*

1. Analysis support for the P-3B Data System (PDS) for data collected during the Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality (DISCOVER-AQ) campaign.
2. Laboratory testing and debugging of the data acquisition hardware and software prior to integration of Atmospheric Vertical Observations of CO<sub>2</sub> in the Earth's Troposphere (AVOCET) on the NASA Dryden DC-8 aircraft for the upcoming Active Sensing of CO<sub>2</sub> Emissions over Nights, Days, and Seasons (ASCENDS) and Southeast Asia Composition, Cloud, Climate Coupling Regional Study (SEAC4RS) campaigns.
3. Laboratory testing and debugging of the data acquisition hardware and software prior to integration of PICARRO on the NASA Dryden DC-8 aircraft for the upcoming ASCENDS campaign.
4. Field support at the Dryden Aircraft Operating Facility (DAOF) during the integration and test flight phase of ASCENDS and SEAC4RS to ensure the AVOCET data acquisition system is mission ready.

5. Capture aircraft facility instrument data distributed by the Research Environment for Vehicle-Embedded Analysis on Linux (REVEAL) system onboard the DC-8 on the AVOCET DAQ system.
6. Laboratory testing and debugging of the data acquisition hardware and software prior to integration of AVOCET on the NASA Wallops P3B for the upcoming Discover-AQ campaigns.
7. Field support at NASA Wallops during the integration of Discover-AQ to ensure the AVOCET data acquisition system is mission ready.
8. Hardware and software to accommodate real-time plotting of CO<sub>2</sub> signals on CO<sub>2</sub> monitor.
9. Software development and support for AVOCET data archival tasks.
10. Assist TM with any related or remaining DISCOVER-AQ items such as uploading the binaries, data, documentations, S/W, etc. onto the LaRC ASDC servers, and saving these files onto DVDs.

*Performance elements specific to this task are as follows:*

1. Integration and deployment of instrument hardware and software systems are accomplished within schedules agreed on between the contractor and the TM and consistent with field deployment requirements.
2. Measurements are captured according to the experiment plans provided by the TM.
3. Government furnished equipment and property is properly utilized, maintained, tracked and accounted for.

**Mod 1: The purpose of this modification is (1) to extend the period of performance end date to include the ASCENDS and DISCOVER-AQ flights scheduled through 2016; (2) to change the TM from Andreas Beyersdorf to Melissa Yang, and (3) to add the following requirement under Section 2.1 above:**

**11. The contractor shall provide software development, data archiving, and overall cognizance for supporting measurements activities on board atmospheric research platforms in support of NASA sponsored sub-orbital flight experiments.**

**12. The contractor shall provide all support needed for integration and deployment of the PDS, AVOCET and SPAMCO<sub>2</sub> operating system in the field for the DISCOVER-AQ 2014, ACES and ASCENDS field campaigns. The contractor shall be responsible for upgrading the operating system for AVOCET as per the requirements of the Center.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): none.

Travel to Dryden Aircraft Operating Facility (DAOF) and NASA Wallops Flight Facility during integration of AVOCET and P-3 Data System during the DISCOVER AQ, SEAC4RS, and ASCENDS flight campaigns:

A. Approximately 4-6 days of integration will be required.

Because flight schedules are subject to change, the NASA TM will communicate with the contractor the specific dates of the field campaigns.

**Mod 1: The following travel requirements are added to Section 3.0 above:**

**B. Approximately 6 days of integration is required for each campaign as follows: Two field campaigns in 2014; 6 days of travel is required at NASA Wallops Flight Facility for DISCOVER-AQ integration, followed by 6 days of travel to the deployment site in Colorado (if needed); 10 days of travel is required at NASA DAOF for ASCENDS integration, and deployment.**

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance is February 1, 2013 to January 31, 2014.

**Mod 1: The new period of performance is February 1, 2013 to January 31, 2016.**

Major milestones are driven by the Discover-AQ, ASCENDS and SEAC4RS mission schedule:

1. Integration/test flights on DC-8 for ASCENDS in February 2013
2. Integration/test flights on DC-8 for SEAC4RS in July 2013



3. Integration/test flights on P3 for Discover-AQ in August 2013
4. Software development to modernize data archival system work by July 2013

**Mod 1: The additional milestones are as follows:**

- 5. Integration/test flights on P3 for DISCOVER-AQ in June 2014 at NASA WFF**
- 6. Integration/test flights on DC8 for ASCENDS in July 2014 at NASA DAOF**
- 7. AVOCET field computer upgrades to be completed by September 30, 2015**
- 8. Software development for integration of new PICARRO requirements for ground based field deployment by June 30, 2014**

## **5.0 Deliverables/Reporting Requirements**

The contractor shall provide a semi-annual status and accomplishment report for the task electronically to the NASA Technical Monitor.

Informal oral meetings shall be held between the contractor and the NASA Technical Monitor at the request of the Technical Monitor as required.

## **6.0 Other Information Needed for Performance of Task**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-004\_Mod3 CY3

**Task Order Title:** Infrared Spectral Science

### **1.0 Technical POC (TPOC):**

Name: david.kratz  
Organization: E302:Climate Science Branch  
Email Address: David.P.Kratz@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

A. The purpose of this task is to conduct research in a number of areas relative to using infrared spectral data for the assessment of climate change. The task will involve analysis of existing data sets from infrared instruments such as IRIS, AIRS, IASI, LIMS, SABER, CERES, MODIS, FIRST, and INFLAME (Acronyms listed below). The task will also involve testing new concepts for using infrared data to assess climate variability and change. Specific elements of climate processes will also be investigated through comparison of infrared measurements and models including one-dimensional radiative transfer models up to multidimensional climate models.

B. A second purpose of this task is to provide support to update the calibration of existing infrared spectral sensors such as FIRST and INFLAME instruments. The task will include calibrating the instruments with existing blackbody radiance sources, analyzing the data, and updating the instrument's calibration record. The task will include reprocessing existing data from the FIRST instrument recorded in prior field campaigns and publishing journal articles on the data quality.

IRIS = Infrared Interferometer Spectrometer

AIRS = Atmospheric Infrared Sounder

IASI = Infrared Atmospheric Sounding Interferometer

LIMS = Limb Infrared Monitor of the Stratosphere

SABER = Sounding of the Atmosphere using Broadband Emission Radiometry

CERES = Clouds and the Earth's Radiant Energy System

MODIS = Moderate Resolution Imaging Spectroradiometer

FIRST = Far-Infrared Spectroscopy of the Troposphere

INFLAME = In-situ Net Flux within the Atmosphere of the Earth

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through July 31, 2014 to provide continuing research using infrared spectral data for all projects as required in Section 2.0 above.**

**Mod 2: The purpose of this modification is to extend the period of performance through October 31, 2014 and add new requirements as set forth below:**

- C. Travel to Moscow Russia and test the Mini-cell On-orbit Temperature Recalibration (MOTR) cells at the *Russian Academy of Sciences' Institute of Biomedical Problems (IBMP)*.**
  - i. Collect the data cards from the units and conduct an initial analysis of the data collected while on orbit.**
  - ii. Power up both units at the same time and repeat the space experiment on the ground to provide an initial post flight reference data set (a preflight data set was collected in October 2013). This will provide pre-, during, and post-flight data comparisons on the melt repeatability.**
- D. Return to SDL for more detailed analysis:**
  - i. Hold a technical interchange meeting (TIM) telecom with NASA Langley to review testing designs, drawings, plans, etc., prior to initiating detailed analysis at SDL.**
  - ii. Rerun experiment cycles to determine the cause of any “anomalies” observed in the hardware or data sets while on-orbit.**

iii. Calibrate the MOTR unit temperature sensors against the same NIST-traceable standards at SDL that were used for calibration prior to shipped the units to Moscow in 2010.

E. The contractor shall prepare FIRST and deployment container for return shipment to NASA Langley.

**Mod 3: The purpose of this modification is to extend the period of performance through November 30, 2014 and add new requirements as set forth below:**

**C. The contractor shall support a design study for the Middle Atmosphere Sounder and thermal Emission Radiometer (MASTER). The objective of this study is to develop a design/concept of a thermal emission limb sounder, based on the successful SABER and HIRDLS instruments, as specified below:**

- i. The instrument concept shall be suitable for flying in space as a hosted payload, or on a free-flying satellite launched by a small launch vehicle such as a Pegasus.**
- ii. The instrument shall be one-half the mass of the current SABER instrument and shall require one-half the power to operate.**
- iii. The instrument shall retain the same optical performance as the current SABER instrument in terms of radiometric precision and accuracy.**
- iv. LaRC**
- v. Specific areas that are to be addressed in the design/concept study:**

## **1. Optical Design**

- **Stray light analysis including impact of changing to polished Al mirrors**

- **Include dual optical filtering (second focal plane) to substantially reduce out of band contributions**

- **Assess impact of reduced baffling on stray light design**

## **2. Telescope Design**

- **Assess impact of using light-weight materials on overall mass of instrument**

- **Stray light analyses of shortened scan mirror baffle**

## **3. Instrument Electronics**

- **Develop electronics design incorporating modern electronics to reduce power and mass**

## **4. Instrument thermal design**

- **Revise thermal system layout**

- **Assess capability of current mini cryo-coolers relative to SABER's cooler, and assess power savings, and thermal savings with lower power cooler**

## **5. Optical chopping**

- **Assess vendors for providing suitable optical choppers**

- **Develop a chopper concept if no suitable choppers are commercially available**

## **6. Detector survey**

- **Conduct a survey of COTS detector technology to be sure that available detectors meet or exceed the SABER performance specifications.**

## **7. Potential hosted spacecraft options**

- **Conduct survey of potential hosted spacecraft options keeping in mind the thermal environment that the MASTER instrument will need to operate in.**

## **8. Prepare a preliminary cost estimate for the MASTER instrument.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 through January 31, 2014.

**Mod 1: The new period of performance is February 1, 2013 through July 31, 2014.**

**Mod 2: The new period of performance is February 1, 2013 through October 31, 2014.**

**Mod 3: The new period of performance is February 1, 2013 through November 30, 2014.**

#### **5.0 Deliverables/Reporting Requirements**

A. The contractor shall provide a written report in a Microsoft Word document to the technical monitor on a monthly basis on the progress of the task. The contractor shall meet with the technical monitor on a monthly basis to discuss task requirements, ensure clarity of task objectives, and for the technical monitor to answer questions that arise in a timely manner.

**Mod 2: The following deliverables are required:**

B. The contractor shall also provide reports to NASA Langley and the NASA Earth Science Technology Office (ESTO) summarizing calibration results, documenting in-space MOTR cell performance, and discussing possible transition of this technology to TRL-7 as set forth below:

**Progress Report – 18 July 2014**

**Final Report Draft– 17 October 2014**

**Final Report – 31 October 2014**



**C. The contractor shall return FIRST and container to NASA Langley no later than May 30, 2014.**

## **Mod 3: The following deliverables are required relating to the MASTER design study:**

**Monthly technical progress report due by the 5th of each month;**

**Mid Term Progress Report due 22 August 2014;**

**Final Progress Report due 14 November 2014;**

**Technical Interchange Meetings with Langley to discuss progress as requested;**

**Technical Interchange Meeting with Langley near end of task by teleconference to present final design (before November 30, 2014).**

**All reports shall be provided electronically to the Technical POC, in a mutually agreed-upon format, compatible with Microsoft Office or in PDF format.**

### **6.0 Other Information Needed for Performance of Task**

#### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

#### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-005\_Mod0 CY3

**Task Order Title:** Light Detection and Ranging (LIDAR)

**1.0 Technical POC (TPOC):**

Name: johnathan.hair  
Organization: E304:Atmospheric Composition Branch  
Email Address: johnathan.w.hair@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall develop software for conducting experiment simulations, analytical studies, and data reduction associated with atmospheric lidar remote sensing programs. The contractor shall develop hardware and software for data acquisition and real-time analysis systems for airborne lidar atmospheric investigations. The contractor shall develop, operate, and maintain lasers, detectors, and control systems in integrated airborne lidar systems. The contractor shall provide on-site and off-site (field campaigns) operations, systems, networks, and configuration support to the lidar program. The contractor shall provide hardware support for lasers, detectors, and control systems for these lidar systems. The contractor shall document the analysis and interpretations of science data in informal reports, papers, or journal articles. The contractor shall provide additional support for the airborne High Spectral Resolution Lidar (HSRL) lidar systems as determined by the NASA TM.

Performance standards are as follows:

- Analysis and interpretations of science data are documented and/or presented within schedules agreed to between the Contractor and NASA Technical Monitor.
- Measurements are successfully captured and archived within schedules agreed to between the Contractor and NASA Technical Monitor. (archives vary by field campaign/mission and will be determined and communicated to the contractor by the NASA TM).
- Laser and lidar system components and subsystems are successfully developed and operated within schedules agreed to between the Contractor and NASA Technical Monitor.
- Computer/Network functionality shall be restored within one shift of failure contingent upon availability of parts.
- Develop, integrate, and test lidar components and subsystems, including autonomous control and data acquisition systems, for the Uninhabited Aerial Vehicle (UAV)-based Global Ozone Lidar Demonstrator (GOLD) project.

- Generate backups as specified by each point of contact within schedules agreed to between the Contractor and NASA Technical Monitor.
- Purchase specialized software and hardware for advanced data analyses associated with new HSRL and Differential Absorption Lidar (DIAL) systems as determined by the TM.

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### 4.0 Schedule/Milestones/Period of Performance

- Period of performance: February 1, 2013 – January 31, 2016
- Milestones and schedules are as agreed to in monthly planning and coordination meetings between the Contractor and NASA Technical Monitor.

### 5.0 Deliverables/Reporting Requirements

Contractor shall deliver the following to NASA Technical Monitor at agreed upon intervals and in formats specified by the NASA TM:

- Lidar standard data products.
- Lidar experiment simulation results.
- Lidar, in situ, and satellite data analysis products.
- Resolution of all systems and configuration problems.
- Backup of all units on a prioritized schedule.
- Updates of system and standard products.
- Informal meetings as needed at the request of the customer.
- Contractor shall provide quarterly reports on progress, results, and issues electronically to NASA Technical Monitor
- Papers and journal articles as appropriate.

### 6.0 Other Information Needed for Performance of Task

The contractor must be able to travel to participate in domestic and foreign field experiments and domestic and foreign conferences/science meetings/workshops. This will include travel to support the SEAC4RS field campaign. Destinations and dates are still uncertain, but will include travel for scientist/engineers to Palmdale, California and a SEAC4RS destination TBD by NASA. Travel may also include trips to international and domestic meetings and conferences as determined by the TM. For the purposes of estimating, 1-2 domestic conferences no more than 5 days in length.

Additional travel requirements may be necessary and will be determined by the TM.

### 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for

fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-006\_Mod0 CY3

**Task Order Title:** Hyperspectral Remote Sensing Support

### **1.0 Technical POC (TPOC):**

Name: daniel.zhou  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Daniel.K.Zhou@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide software and analysis support for hyperspectral remote sensing research as follows:

1. Test National Polar-orbiting Operational Environmental Satellite System (NPOESS) Cross-track Infrared and Microwave Sensor Suite (CrIMSS) algorithm and provide support to NPOESS Integrated Office.
2. Provide software programming support on radiative transfer model development, and retrieval inversion codes for Joint Polar Satellite System (JPSS) CrISSEM.
3. Support algorithm development for the hyperspectral remote sensing group at NASA Langley Research Center (LaRC).
4. Support data analysis and validation on radiative transfer models' inter-comparison, error analysis, and retrieved geophysical parameters validation using in-situ measurements and Numerical Weather Prediction (NWP) model analysis.
5. Develop radiative transfer model for hyperspectral sensors
6. Develop methods for hyperspectral sensors for weather and climate applications.
7. Generate proxy data for hyperspectral sensors.

Performance Standards:

- Algorithms are demonstrated to function as designed on a local computer system.
- Software is developed and tested on schedules agreed upon between the contractor and the Task Monitor (TM).
- Analyses to support algorithm development are completed within schedules agreed upon between the contractor and the TM.

- Data analysis and validation activities are accurate and completed within schedules agreed upon between the contractor and the TM.

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance: February 1, 2013 through January 31, 2016.

The contractor shall meet with the Technical Monitor to report on the work progress monthly at an agreed upon schedule between the NASA TM and the contractor.

### 5.0 Deliverables/Reporting Requirements

- Monthly report in electronic format submitted to the TM detailing the work progress, significant results, issues, and plans. Report shall be submitted at the end of each calendar month.
- Software and related documentation shall be delivered via electronic media to the TM when completed.
- Analysis results, data sets, and plots shall be delivered to the TM per agreed upon schedule between the contractor and the TM.
- Monthly financial management report in electronic form shall be received from the Contractor.

### 6.0 Other Information Needed for Performance of Task

no travel is required in support of this task.

### 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### 8.0 Safety

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### 9.0 Risk

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-008\_Mod2 CY3

**Task Order Title:** Retrieving Physical Properties of Subvisual Clouds with a Synergy of Glory and CALIPSO Measurements

**1.0 Technical POC (TPOC):**

Name: constantine.lukashin  
Organization: E302:Climate Science Branch  
Email Address: constantine.lukashin-1@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall perform the tasks as described in the NASA-selected proposal entitled, "Retrieving Physical Properties of Subvisual Clouds with a Synergy of Glory and CALIPSO Measurements." The primary goal of these tasks is to examine the clear domain for subvisual clouds and retrieve the physical properties of subvisual clouds to help the Glory mission reduce the uncertainty in the retrieved aerosol properties.

The tasks include, but are not limited to:

1. Use Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) and Moderate Resolution Imaging Spectroradiometer (MODIS) data to study the global distribution and vertical distribution of the super-thin clouds
2. Study the sensitivity of the top-of-atmosphere (TOA) 1.37- $\mu\text{m}$  polarized reflectance to the surface condition and the aerosol amount below the subvisual cloud layer through modeling.
3. Analyze Research Scanning Polarimeter (RSP) data with coincident and collocated data from MODIS and CALIPSO to get the measured invisible cloud physical properties.
4. Develop an algorithm which can be directly applied to the future Glory Aerosol Polarimetry Sensor (APS) data for removing the invisible cloud effect from Glory aerosol product.

The contractor shall contribute to and participate in Glory Science Team meetings by presenting research results.

**Mod 1: The purpose of this mod is to add a study to Section 2.0 above. The need of this additional study is a direct result from an on-going investigation which revealed that a study to improve aerosol retrieval algorithms is now required:**

**5. Develop light-scattering models and simulate heterogeneous single-scattering properties of heterogeneous ice crystals to enhance radiative transfer calculations**

**Mod 2: The purpose of this mod is to allow the contractor to complete Items 4 and 5 in Section 2.0 above, as set forth below; this extension will also provide additional time for validation of results, comparison with other models and satellite observations, and allow for publication and delivery of results.**

**For item 4. The algorithm has been completed but additional time is required to quantify the performance of the retrieval method implemented in the algorithm.**

**For item 5. Light scattering models and simulations have been completed but additional time is required to assess the results and improve accuracy for operational applications.**

### **3.0 Special Requirements**

none

### **4.0 Schedule/Milestones/Period of Performance**

PoP February 1, 2013 - June 30, 2014

## **Mod 2: The new period of performance is February 1, 2013 through January 31, 2015**

1. Develop model of sensitivity of Top-of-Atmosphere (TOA) 1.37 micron radiation to surface roughness and aerosol amount
2. Refine and expand adding-doubling model to incorporate results of prior studies
3. Use model to produce systematic analysis of sub-visual clouds effect on 1.37 micron polarized radiance over both oceans and land.
4. Acquire and prepare RSP data for analysis
5. Analyze RSP data with collocated MODIS and CALIPSO data to refine sub-visual cloud properties.
6. Develop a Glory retrieval algorithm that incorporates sub-visual clouds
- 7) Develop Bidirectional Polarization Reflectance Functions (BPDF) using RSP data and radiative transfer models

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide algorithm approaches, computer code, and scientific results are demonstrated and documented within schedules as agreed to between the contractor and the TM.

The contractor shall provide analysis and interpretation of science data are documented in peer-reviewed journal papers , conference presentations and proceedings, and Glory science team meetings.

### **6.0 Other Information Needed for Performance of Task**

Travel, domestic and international, may be required for this tasks. However no trips are currently identified.

Additional information regarding travel requirements shall be provided to the contractor by the NASA TM.

**Mod 1: The purpose of this mod is to identify two anticipated travel requirements; both pending internal NASA approval and the final approval status will be communicated by the NASA TM before commencement of travel:**

**a. One trip to American Geophysical Union (AGU) conference in**

## **December 2013 (San Francisco, CA - 5 days)**

### **b. One trip to CLARREO Science Definition Team Meeting in Spring 2014 (Domestic trip TBD - 3 days)**

#### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

#### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

#### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

#### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-011\_Mod6 CY2

**Task Order Title:** In Situ Aerosol Measurements

### **1.0 Technical POC (TPOC):**

Name: bruce.anderson  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Bruce.E.Anderson@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

#### Description of Work

The contractor shall:

- Provide mission planning; instrument development, testing and checkout, and improvement; and execution of experiments to collect and analyze gaseous and particulate emissions from combustors and aircraft engines.
- Provide instrument set up and calibration, field operations, data acquisition, analysis and archiving for tropospheric chemistry field missions.
- Participate in making in situ measurements from aircraft as part of tropospheric chemistry field studies.
- Provide support in assimilating data from a variety of sources to create merged data sets and public-assessable data-bases for engine and combustor emission experiments.
- Provide support in creating and maintaining a web page.
- Provide computer graphics for presentations and journal publications.
- Provide calibration, pre-mission preparation, testing, and integration of the DACOM instrument.
- Provide assistance in generating reports and journal articles.
- Provide assistance in collecting and analyzing aerosol samples using a variety of laboratory equipment such as ion chromatography, thermal optical analysis, and GC/MS.
  
- Provide base measurement and data distribution support aboard the NASA P-3B.
- Incorporate and test newly available modifications to DACOM optical and flow systems.

#### Mod 2

- In coordination with the NASA TM, design and fabricate a modified Hi-CAS for improved performance in cloud systems
  
- Perform CFD modeling of modified inlet performance

- Analyze of aircraft data to examine the performance of the modified Hi-CAS

#### Performance Standards

The contractor performance shall be evaluated on:

- Calibration, integration and deployment of instrument suites are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Measurements are captured and archived before agreed upon deadlines between the NASA Technical Monitor and contractor
- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor.

Mod 4: The government has extended the length of field missions in January 2013 requiring additional contractor support for software engineering, instrument integration and calibration, and mission field support.

**Mod 5: The purpose of this modification is to extend the period of performance for Clarkson University ONLY, a subcontractor on this task, in order to complete the following unfinished CY 2 tasks:**

- **Analyze of aircraft data to examine the performance of the modified Hi-CAS**

**Mod 6: The purpose of this modification is to extend the period of performance for Clarkson University ONLY, a subcontractor on this task, in order to complete the following unfinished CY 2 tasks due to the change in schedule of the SEAC4RS mission:**

- **Analyze of aircraft data to examine the performance of the modified Hi-CAS**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other(Specify): Instrument engineer must have security clearance in order to participate in DOD sponsored laboratory and field studies.

All personnel must be able to travel to participate in domestic and foreign field experiments. This will include travel to support the NASA DC3 (Kansas) and SEAC4RS (Thailand) field campaigns and ACCRI laboratory study (Cleveland). Destinations and dates are still uncertain, but will include travel for 2 scientist/engineers to Palmdale California for 21 days; for 1 scientist to Salina Kansas for 30 days; for

1 scientist/engineer to Thailand for 30 days; and for 1 scientist/engineer to Cleveland Ohio for 14 days. Additional travel may be required which will be determined by the TM.

#### 4.0 Schedule/Milestones/Period of Performance

Period of performance is February 1, 2012 through January 31, 2013.

Mod 2: Period of Performance is May 7, 2012 through January 31, 2013.

Mod 3: Period of performance from October 15, 2012 to January 31, 2013.

**Mod 5: New Period of Performance for Clarkson University ONLY is: February 1, 2012 through January 31, 2014.**

**Mod 6: New Period of Performance for Clarkson University ONLY is: February 1, 2012 through January 31, 2015.**

#### 5.0 Deliverables/Reporting Requirements

Contractor shall provide a written progress report of status and accomplishments on a semi-annual time basis electronically to the NASA Technical Monitor.

Contractor shall deliver scanner system by the schedule agreed to by the NASA Technical Monitor and the contractor.

##### Mod 2

- Contractor shall deliver a new sleeve that fits over the existing flowtube implementing the re-designed airflow
- Contractor shall deliver a report on the CFD modeling results.
- Contractor shall deliver a report describing the performance of the modified sampler.
- Contractor shall deliver a short final report summarizing project results on completion of the work.

**Mod 5: The following final CY 2 deliverables are outstanding and are due to the NASA TM as specified below:**

- Contractor shall deliver a report describing the performance of the modified sampler.
- Contractor shall deliver a short final report summarizing project results on completion of the work.

**Mod 6: The following final CY 2 deliverables are outstanding and are due to the NASA TM as specified below:**

- **Contractor shall deliver a report describing the performance of the modified sampler.**
- **Contractor shall deliver a short final report summarizing project results on completion of the work.**

### **6.0 Other Information Needed for Performance of Task**

A number of DOD-sponsored laboratory and field studies shall be supported by the contractor over the course of this task. Data acquired during the course of these experiments is classified, and requires a security clearance for access, as does the acquisition software itself.

Shipping of materials and purchase of supplies may be required to support laboratory instrument development.

Mod 1: Purchase of some miscellaneous items to support airborne field missions, instrument development, and laboratory processes may be required, as directed by the TM. These items include, but are not limited to, circuit boards, microprocessor boards, data storage devices, electronic memory devices, electrical/electronic connectors, test devices, electro-optical components, laser optical components, diodes, software programs, computing equipment, interface devices, and other similar miscellaneous items. Other items include training costs, publication costs, and conference fees, as directed by the TM.

Mod 2: Purchase of quantity one, HIMIL aerosol probe to support ACCESS airborne field mission aboard the LaRC HU-25 aircraft. The probe is a non-heated diffusing inlet with the same design as NCAR PN 102309, without the ni-chrome wire heated nose and 3-wire RTD.

Mod 3: Purchase of quantity one central data acquisition system, to support ACCESS airborne field mission aboard the LaRC HU-25 aircraft. Requirements for the data acquisition system including the following:

RSD requires a Data Acquisition/Monitoring Unit qualified to DO-160, Environmental Conditions and Test Procedures for Airborne Equipment with the following capabilities:

- Ability to monitor, record and download a minimum of 12 ARINC 429 data buses, high or low speed.
- Ability to monitor, record and download one channel of MIL-STD-1553 data.
- Ability to monitor, record and download one channel of ARINC 708 data.
- Ability to monitor, record and download one channel of ARINC 717 data.
- Ability to monitor, record a minimum of 12 configurable aircraft discrete signals.



- Ability to communicate to PC and/or server via Ethernet Protocol operating at speeds up to 1GHz.
- Powered via 28 VDC, negative ground.
- Ability to accept and log data synchronized via and IRIG time source.
- Software that provides a GUI-based interface that will allow our researchers to easily monitor, download, configure and plot data based on a menu-driven engine.
- USB capability for peripheral devices.
- MIL-SPEC electrical connectors for I/O and Power.

## 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## 8.0 Safety

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## 9.0 Risk

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## 10.0 Proposed Award Fee

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-012\_Mod1 CY3

**Task Order Title:** Science Communication

## **1.0 Technical POC (TPOC):**

Name: rebecca.bales  
Organization: E3:Science Directorate  
Email Address: Rebecca.W.Bales@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

### **2.1 Communication:**

The contractor shall research and write news releases, fact sheets, video scripts, photo captions and releases, and articles for media consumption that are related to activities and research in the Science Directorate (SD). Topics shall be selected in discussions between the contractor and the Technical Monitor (TM). The contractor shall post TM-approved items on the Science Directorate NASA web portal page (website address and access to the website will be provided by the NASA TM), and work with the NASA portal team to post selected items. The contractor shall research content, write text and oversee production of video news releases, video b-roll, photography, animation, graphic illustrations, and provide on-site consultation on technical content to support television remote live shots. The contractor shall work with NASA Langley Research Center (LaRC) Public Affairs Office to respond to news media inquiries concerning the Science Directorate, help arrange interviews with LaRC personnel and provide requested media products such as fact sheets, news releases, and other media products as required by the NASA TM. The contractor shall develop and maintain NASA and non-NASA contacts to accomplish the above. The contractor shall provide feedback via email to LaRC personnel including but not limited to program/project personnel and senior staff on the daily record of news media outcomes as tracked by LaRC Public Affairs.

The contractor shall maintain an awareness of new media options and target SD content as appropriate for such new media outlets including but not limited to blogs, MySpace, and YouTube.

The contractor shall provide technical writing support for internal Science Directorate communications including but not limited to the annual report, metrics report, and weekly key activities.

The contractor shall provide technical writing assistance to Science Directorate personnel to maintain, update and upgrade web pages containing research and public outreach content, and ensure that the pages meet NASA criteria for security and design.

The contractor shall provide a staff member who can be part of a high-functioning communications team with specialized experience as a multimedia producer and graphic designer with animation experience.

The contractor shall provide a junior level staff member with graphic designer experience to provide additional depth to existing support.

The contractor shall continue participation in local events, including but not limited to Science Cafés, which shall consist of the following: a) Work with the Science Directorate staff and the Langley Research Center staff to identify local events where the Science Directorate or Langley Research Center has a presence; b) Conduct research and provide recommendations on how to use these events to reach out to the local community and invite participation and suggestions on how to promote the podcasts or other form of communication media of these events.

#### Performance Standards:

1. Written products are completed within the agreed upon schedule with the TM.
2. Responses to inquiries are handled within the agreed upon schedule with the TM.
3. Websites are updated and maintained within a timeframe agreed upon with the TM.

#### 2.2 Communication Initiative Facilitation:

The contractor shall provide facilitation expertise for 10 - 15 Science Directorate-related retreats as part of the Communication Initiative. These retreats are meant to assist SD management in maturing their management and communication skills contribute to more effective team within SD and better communicate with other directorates, including but not limited to Flight Projects, Engineering, and Systems Analysis and Concepts, team members, and stakeholders. Retreat objectives include but are not limited to strategic planning efforts, relationship, collaboration, and communication development, definition of roles and responsibilities, and development of problem solving skills. These retreats are approximately 3 days in length and involve preparation and follow-up activities (details of retreat length vary and exact number of days will be communicated to the contractor by the NASA TM). The retreats require approximately 40 - 50 hrs per retreat. The retreat process typically contains the following steps:

1. Meet with the Director of SD to determine desired outcomes and to determine retreat agenda
2. Interview participants, typically via telephone
3. Design and deliver an agenda
4. Facilitate the retreat
5. Prepare and deliver a final report which includes agreements, actions, and next steps

#### Place of Performance:

All retreats are held on-site at Langley Research Center, except for twice yearly retreats at the NASA Management Education Center at NASA Wallops Flight Facility on Wallops Island, Virginia.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015 to provide continuing Science communication and facilitation support for the Science Directorate.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): N/A

#### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2014.

For task 2.1, schedules and priorities shall be agreed upon between the Contractor and the Task Monitor in weekly status meetings.

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2015.**

#### **5.0 Deliverables/Reporting Requirements**

For 2.1:

- The contractor's deliverables shall include news releases, fact sheets, articles, tip sheets for conferences with major LaRC participation, compliant web pages, and the Science Directorate annual report and shall be delivered in an agreed upon timeframe with the NASA TM electronically or other media as determined by the NASA TM.
- The contractor's deliverables for the communication initiative shall be completed based upon the schedule agreed to between the contractor and the Science Directorate in the media that is appropriate for the individual task as determined by the NASA TM.
- Deliverables for the history of the Science Directorate shall be completed based upon the schedule agreed to between the contractor and the Science Director. The actual documents shall be in an electronic format as requested by the NASA TM.

For 2.2:

- Deliverables include initiation of meetings to begin planning the retreat, interviews, documented agendas, on-site facilitation, and a final report of outcomes of each retreat as a Microsoft Word document delivered to the NASA TM via email.

## **6.0 Other Information Needed for Performance of Task**

For 2.1 The contractor shall travel to a number of events, depending on the ongoing work of the Science Directorate. These may include science team meetings and major project events including but not limited to a mission launch. The contractor shall travel to participate in meetings of the NASA public affairs, outreach, and web portal communities. The number of trips will vary depending on need, but about six trips per year may be expected.

For 2.2 The contractor shall travel to Langley Research Center in support of each retreat. Twice a year, travel is required to NASA Wallops Flight Facility.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-014\_Mod1 CY3

**Task Order Title:** CERES Support

## **1.0 Technical POC (TPOC):**

Name: jonathan.gleason  
Organization: E302:Climate Science Branch  
Email Address: Jonathan.L.Gleason@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall perform tasks to support the Clouds and the Earth's Radiant Energy System (CERES) project in five technical/scientific functional areas: 1) Instrument, ERBE-Like (ERBE is the Earth Radiation Budget Experiment) products, and operations; 2) Clouds; 3) Surface and Atmospheric Radiation Budget (SARB); 4) Angular Distribution Models (ADMs and top-of-atmosphere (TOA) fluxes; and 5) Time Interpolation and Spatial Averaging (TISA). In addition, the contractor shall perform tasks associated with Data Management (DM) support. The CERES project is organized in Working Groups (WGs) and the Data Management Team (DMT), each of which has a Civil Service Chairperson (or lead), which receives support from contractor staff. The TM is the CERES DMT lead. The DMT lead works under the direction of the CERES Principal Investigator (PI). The PI leads the overall CERES effort and provides scientific and technical direction for the team and sets priorities for the work performed. The PI works directly with the DMT lead, WG leads and contractor workforce.

2.1 Technical/Science Support. The contractor shall perform analyses to establish accurate calibrations for all CERES instruments. The contractor shall monitor on-orbit instrument operations and provide support for identifying and implementing any required actions including actions associated with spacecraft maneuvers. The contractor shall perform cost, programmatic, and engineering trade analyses utilizing historical CERES and ERBE project data to facilitate development, acquisition and deployment of Earth Radiation Budget instruments/missions. The contractor shall perform tasks associated with development and implementation of the CERES cloud retrieval subsystem; development of angular distribution models and TOA flux subsystem; development of the SARB subsystem including surface-only algorithms; development of TISA algorithms and subsystems; and continued analysis of ERBE data. The contractor shall perform analyses to develop and validate surface ultraviolet radiation and surface photosynthetically active radiation (PAR) products; incorporate PAR into bio-geo-chemical models; investigate fusion of measurements from different instruments to study cloud

3-D effects; and determine the atmospheric response to rapidly changing sea ice cover in polar regions. The contractor shall study the performance of radiometric instruments in low-temperature and low-pressure environments for potential applications in polar regions and on high altitude platforms. The contractor shall develop and apply radiative transfer models to study cloud radiative effects at the top of the atmosphere and the surface. The contractor shall investigate aerosol and cloud interactions using satellite and surface observations. The contractor shall perform tasks associated with algorithm development, computer programming, analysis, validation, and internet-based data display and data dissemination for scientific studies related to the CERES project. The contractor shall perform radiative transfer studies, parametric analyses of radiation processes, cloud algorithm development, verification, and validation, related atmospheric studies, and visualization of results. The contractor shall summarize work/analyses in memos, reports, reviewed scientific journals, or other appropriate avenues. Additional services may be required to support targeted CERES cloud and ice studies – in particular, liaison with Centre National d'Etudes Spatiales (CNES) to facilitate science data interaction with institutions in France. The contractor shall provide asset management, software maintenance and license renewal tracking.

2.2 Data Management Support. The contractor shall provide CERES and ERBE Data Management (DM) support. Provide coordination of contractor data management effort. Provide science data processing codes for implementing ERBE and CERES algorithms into Data Management subsystem software. The operational code must execute correctly at both the Science Computing Facilities (SCF) and the ASDC Modernization through Integration (AMI) system at the Atmospheric Science Data Center (ASDC). The contractor shall provide support for software design, development, implementation, testing, validation, configuration management, and documentation management for processing and analyzing CERES and ERBE data from satellite missions. Provide software and data processing support for Subsystem WG lead data product validation efforts at the Science Computing Facility. Documentation may include data products catalogs, interface requirements, data management plans, ancillary input data, quality assessment plans, coding guidelines, software design documents, validation documents, test plans, operator's manuals, data set collection guides, and other documentation as needed to satisfy project/program requirements. The contractor shall support CERES DM activities as indicated in the subsections below.

2.2.1 Code Development. Consistent with requirements and priorities established by the CERES Subsystem Working Group Chairpersons, the contractor shall perform code development and maintenance for production and analysis codes. The contractor shall support code delivery of production codes to the ASDC for data product production in accordance with the CERES Code Delivery Process (documented at <http://ceres.larc.nasa.gov/docs.php>). The contractor shall develop and support production codes, consistent with the CERES Data Management and Configuration Management Plans, and consistent with requirements established by the WG leads. The requirements are communicated during scheduled Working Group meetings, or as needed, and documented by email. The contractor shall support code and algorithm reviews and evaluations as required by the CERES DMT Lead or CERES Principal Investigator.

2.2.2 Develop and maintain documentation for the CERES Subsystem Codes. In response to the technical requirements of the CERES Working Group Chairpersons and the Data

Management Lead, the contractor shall document all codes and their development activities. The requirements are communicated during scheduled WG meetings, or as needed, and documented by email. The contractor shall record all requirements in the CERES Requirements Logs ([http://ceres.larc.nasa.gov/requirements\\_logs.php](http://ceres.larc.nasa.gov/requirements_logs.php)). The contractor shall provide supporting documentation including, but not limited to, Test Plans, Operators' Manuals and Sample Read Packages for all software deliveries where necessary according to the CERES Configuration Management Plan. The contractor shall maintain working documentation to supplement coding, as required to make implementation understandable to reviewers.

2.2.3 Participate in subsystem working group and CERES Science Team meetings. The contractor task participants shall attend local (within 25 miles of Langley) meetings (without travel reimbursement) as needed for the work requirements established by the Subsystem WG leads. Attendance at non-local meetings shall be through the specific written authorization of the NASA Task Monitor.

2.2.4 Perform Configuration Management processes for the CERES Production Codes and provide configuration management of non-production codes, as appropriate. As specified in the CERES Configuration Management Plan and the CERES Data Management Plan, and as further defined in Section 6.0, the contractor shall follow the requirements contained therein. The contractor shall proactively identify and recommend to the CERES DMT lead, such improvements to the processes and practices that will permit the delivery process to be more efficient (i.e., use less computer or personnel resources) and quicker in turnaround time without risking integrity and reproducibility of the codes delivered to the ASDC.

2.2.5 Define requirements for and monitor data stored in the CERES Science Computing Facility (SCF) at the NASA Langley Atmospheric Sciences Data Center (ASDC). The efficient use of assigned storage capacity is important due to the volumes of data used and created in the SCF. Each working group is allocated dedicated space for their use. The contractor shall work with the CERES SCF Storage Allocation Coordinator, to store CERES data products, both public and non-public, in a single location to avoid duplication of files; working groups shall identify their needs to the Storage Allocation Coordinator, shall accommodate them within the space available. The CERES Storage Allocation Coordinator is a contractor, designated by the CERES Data Management Team Lead, who is responsible for allocating disk storage as appropriate, based on the CERES PI's priorities and the availability of disk space. The Allocation Coordinator is responsible for projecting ahead the need for storage capacity and acquiring it as funding permits. The contractor shall provide recommendations as to future needs and requests for storage for working groups and teams and shall follow the allocations provided.

2.2.6 Provide Software Library Support. The contractor shall maintain the Satellite Tool Kit (STK), cereslib, and perl lib software libraries in order to support CERES software development. The code baselines for STK, cereslib and perl lib reside in the CERES SCF. Changes to the Production version of any of the above referenced software packages shall require CERES DMT lead approval prior to propagation.

2.2.7 Logistical Support for CERES Science Team Meetings. The contractor shall help the PI organize local and non-local CERES science team meetings as well as produce meeting



summary reports and post to the Earth Observer newsletter. Logistical support includes but is not limited to interacting with hotel representatives concerning group accommodations, assisting with making food/beverage arrangements, assisting with web registration site, coordinating invitational travel to CERES meetings for invited speakers, loading meeting speaker presentations for viewing on the overhead projector and posting presentations on CERES website following the meeting. Government funds shall not be used to furnish any food or beverage for meetings.

2.2.8 Production Requests (PR), Scheduling and Monitoring. The contractor shall produce software Production Requests (PRs) to execute CERES code in the ASDC production environment. PRs contain configuration information, output product and date range information to execute a predefined segment of the CERES production code. The contractor shall develop and deliver new and updated PRs for software deliveries. The contractor shall deliver PRs to the ASDC System Integration and Test (SIT) team prior to delivery of the associated software change. PRs shall be accurate (accurate shall be defined as free of errors) when delivered to SIT as to minimize delays due to iteratively applying corrections and redelivering the PR to SIT. The contractor shall monitor CERES production processing at the ASDC and deliver PRs to SIT no later than 1.5 business days prior to the time the PR is needed in the production area as to avoid delays in production processing. The contractor shall develop and deliver PRs as requested by the DMT lead. The contractor shall provide scheduling support to the DMT lead for software delivery, testing and production scheduling.

## 2.3 Performance Standards

2.3.1 Performance Standards for Technical and Scientific support are as follows:

- a. Instrument on-orbit operations are monitored and actions implemented to maintain instrument health and data gathering capability
- b. Instrument calibrations are to the required CERES accuracy standards in accordance with Subsystem Level Documents (documented at <http://ceres.larc.nasa.gov/docs.php>), or as communicated during CERES Science Team meetings, scheduled Working Group meetings, or as needed, and documented by email.
- c. Algorithm approaches are demonstrated and documented within agreed upon schedules
- d. Demonstrate that algorithms have been implemented properly within agreed upon schedules designated in the contractor monthly reports
- e. Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe designated in the contractor monthly reports
- f. Analysis and interpretations of science data are documented and/or presented within agreed upon schedules provided in the contractor monthly reports
- g. Websites/databases/archives are updated within an agreed to timeframe provided in the contractor monthly reports

2.3.2 Performance Standards for Data Management activities are as follows:

- a. Demonstrate that algorithms have been implemented properly within agreed upon schedules designated in the contractor monthly reports
- b. Designated operational algorithms, once developed, are maintained under proper configuration management procedures and can be reproduced (if lost) within an agreed to timeframe designated in the contractor monthly reports
- c. Websites/databases/archives are updated within an agreed to timeframe provided in the contractor monthly reports
- d. Required documents delivered within agreed to schedules designated in the contractor monthly reports
- e. Representation by each data management team subsystem at the Bi-weekly CERES DMT meeting.
- f. PRs delivered to ASDC with accurate content with sufficient time as not to delay SIT testing or production processing.

**Mod 1: The purpose of this modification is to increase the number of hours for one of the subcontractors. The number of hours was incorrectly proposed in the contractor's Task Order Plan (TOP) for the task award.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No

Other (Specify):

#### 3.2.1 Interaction with CERES Working Group Teams

Members of the CERES DMT support the CERES Working Groups and provide data management and software development support in response to work requirements defined by these groups on an ongoing basis, while reporting activities to the DMT Lead.

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance is 02/01/2013 through 01/31/2016.

DMT Biweekly Meetings: 1:00 PM EST on alternating Wednesdays.

## 5.0 Deliverables/Reporting Requirements

5.1 Technical/Scientific - The contractor shall deliver the following items electronically via email to the PI, TM or designated representative.

- a. Mission/instrument status reports provided by the contractor to the instrument working group lead by the end of each month
- b. Monthly calibration status reports provided by the contractor to the instrument working group lead by the end of each month
- c. Standard CERES data products for each subsystem as defined in on-line CERES documentation (documented at <http://ceres.larc.nasa.gov/docs.php>)
- d. Data retrieval and analysis algorithms as established by working group leads and the PI.
- e. Code and supporting documentation as established by working group leads
- f. Publications and presentations as appropriate to report results

### 5.2 Data Management

- a. Informal Monthly Status Report via e-mail within 5 days of the end of the month
- b. Code and Supporting Documentation as requested by the TM and/or PI.
- c. Publications/conference papers as appropriate.
- d. Participation in CERES Bi-weekly DMT Meetings

## 6.0 Other Information Needed for Performance of Task

Access to Government owned computing systems located in Buildings 1250 and 1668C or other designated facility, consistent with the CERES data processing and scientific analysis requirements will be provided, based on appropriate IT Security authorizations and system owner approval. Each user account will be authorized by the SD System Owner, who will coordinate the appropriate approvals for the various machines.

### 6.1 Technical/Scientific

Travel is required to science team meetings, workshops and conferences. Historically, there has been one trip per year for each contractor employee assigned to the task. Ten percent of trips are international. The remaining trips are fairly uniformly distributed across the US. Additional travel information will be provided to the contractor by the TM and/or PI.

### 6.2 Data Management

Travel is required to 1 non-local CERES Science Team meeting each year. Historically, each subsystem area is represented by a Data Management team member working on that subsystem. Additional travel information will be provided to the contractor by the TM and/or PI.

- a. CERES Data Management Team Plans documenting performance requirements and compatibility standards are available at <http://ceres.larc.nasa.gov/docs.php>
- b. Biweekly subsystem and system status reports are posted at <http://ceres.larc.nasa.gov/cpob.php>
- c. DMT internal documentation is posted at [http://ceres.larc.nasa.gov/Internal/intern\\_docs.php](http://ceres.larc.nasa.gov/Internal/intern_docs.php)
- d. CERES/ERBE/CALIPSO Science Computing Facility documentation is posted at <http://ceres-scf.larc.nasa.gov/>
- e. Science Directorate Administrative Tasks are accomplished at the following website: <https://science-atol.larc.nasa.gov/>

6.3 Upon TM approval, the contractor shall travel to the following conferences. American Geophysical Union Spring and Fall meetings (5 days)

- a. American Meteorological Society Annual and Topical meetings (3-4 days)
- b. Society of Photo-optical Instrumentation Engineers (SPIE) (5-6 days)
- c. Gordon Research Conference (Solar Radiation and Climate) (5-6 days)
- d. IEEE Geoscience and Remote Sensing Society (IGARSS) (5-6 days)
- e. European Geophysical Union (EGU) (6 days)
- f. The International Union of Geodesy and Geophysics (IUGG) (5-6 days)
- g. International Radiation Symposium (IRS) (4-5 days)
- h. International Association of Meteorology and Atmospheric Sciences (IAMAS) (4-5 days)
- i. EUMETSAT Meteorological Satellite Conference (4-5 days)

## 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for

fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-015\_Mod0 CY3

**Task Order Title:** Stratospheric Cloud and Aerosol Studies

### **1.0 Technical POC (TPOC):**

Name: Michael.Pitts  
Organization: E304:Atmospheric Composition Branch  
Email Address: michael.c.pitts@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

CALIPSO (Cloud-Aerosol-Lidar and Infrared Pathfinder Observations) is a satellite mission designed to provide global measurements of aerosols and clouds required for a better understanding of their role in the climate system and to improve our abilities to predict long-term climate change and seasonal-interannual variability. One of the unique products of CALIPSO is an extensive database of stratospheric aerosol and polar stratospheric cloud (PSC) observations. PSCs play an important role in stratospheric ozone depletion and the CALIPSO data provide a unique opportunity to improve our understanding of PSC processes and their role in ozone depletion. The CALIPSO data will also be useful for studies of stratospheric aerosol outside of the polar regions. The contractor shall provide support for the scientific analyses of the CALIPSO stratospheric aerosol and PSC data.

The contractor shall be responsive to requirements established by the Task Monitor (TM). Science analyses shall include investigations of PSC processes through advanced analyses of data from CALIPSO and other relevant datasets identified by the TM such as the Aura Microwave Limb Sounder (MLS) and the European Union project RECONCILE (reconciliation of essential process parameters for an enhanced predictability of Arctic stratospheric ozone loss and its climate interactions), as well as optical and microphysical models. The contractor shall perform analyses to evaluate the information content of the CALIPSO PSC observations and improve the characterization of PSC microphysical properties. The contractor shall provide data, graphics, and other inputs for documenting technical analyses and scientific studies.

The contractor shall provide travel support for technical interface meetings for non-NASA participants, including visiting scientists, students, and post-docs, as determined by the TM.

The contractor may be requested to attend Science Team and technical conferences as determined by the TM.

The contractor shall meet the following performance standards in providing CALIPSO stratospheric aerosol and cloud analysis support:

- Data analyses approaches are demonstrated and documented within schedules agreed upon between the contractor and the TM.
- Analysis and interpretations of science data are documented and/or presented within schedules agreed upon between the contractor and TM.
- Results of studies, investigations, and modeling activities are delivered within schedules agreed upon between the contractor and TM.

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

- 4.1 Schedule: Schedules will be agreed upon during biweekly meeting or as requested by the TM.
- 4.2 Milestones: As established by the TM and agreed to by the contractor.
- 4.3 Period of Performance: February 1, 2013 through January 31, 2016.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide Quarterly Reports (electronic files delivered via email) which include completed and projected accomplishments and metrics reflecting the contractor's success in meeting the performance standards described in Section 2.

The contractor shall provide data, graphics, and other inputs for documenting technical analyses and scientific studies as determined by discussion with the TM.

The contractor shall produce scientific publications as appropriate to report results to the scientific community.

The contractor shall produce presentations for CALIPSO science team and other technical meetings as determined by discussion with the TM.

### **6.0 Other Information Needed for Performance of Task**

The contractor shall travel to the following meetings, including but not limited to, RECONCILE final project science meeting in Hungary in February 2013 for 5 days; CALIPSO/CloudSat Science Team meeting in Boulder, CO for 5 days between September and October 2013; additional travel may be required during the contract year and will be communicated to the contractor by the NASA TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-017\_Mod1 CY3

**Task Order Title:** CERES Ocean Validation Experiment (COVE) Support

**1.0 Technical POC (TPOC):**

Name: Donald.Garber  
Organization: E302:Climate Science Branch  
Email Address: Donald.P.Garber@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall perform instrument installation, maintenance, data collection, instrument calibration, and systems upgrades associated with the **Clouds and the Earth's Radiant Energy System (CERES)** Chesapeake Lighthouse site. As part of this support the contractor shall provide, maintain, and operate a facility for COVE instrument characterization. The contractor shall arrange for helicopter transportation to the Chesapeake Lighthouse to conduct on-site operations and maintenance. The contractor shall also arrange for other modes of transportation, such as by boat, as required to complete the work.

The Chesapeake Lighthouse (owned by Department of Energy - DOE) has forbidden NASA access for the winter months of February through April. During this time, the contractor shall maintain the instrumentation remotely. Additionally, the contractor shall arrange for helicopter transportation to remove NASA property from the Chesapeake Lighthouse (during the approximate months of April – August 2013), as mandated by DOE. The contractor shall store the equipment at a location approved by the NASA TM until DOE completes renovations of the lighthouse (~2015) and reinstates NASA access to the lighthouse. The contractor shall investigate new sites for temporarily locating the instrumentation for data collection.

The contractor shall report work analyses in, but not limited to, memos, reports, and peer-reviewed scientific journals.

The contractor shall resolve data quality issues, update World Meteorological Organization/Baseline Surface Radiation Network (WMO/BSRN) archive database in Germany and include newly qualified data into the COVE database for public access.

The contractor shall incorporate algorithms and store results in the COVE database to allow detailed scientific analyses based on cloudiness scenarios and different temporal sampling summaries. The contractor shall implement access on the COVE website.

The contractor shall install sunphotometer instruments at the Mauna Loa Observatory for optical depth calibration purposes, assure high quality observations for calibration purposes.

Performance standards are as follows:

- Measurements are captured and archived within agreed upon schedules (schedules provided in quarterly reports as needed)
- Instrument calibrations are maintained as needed for accurate measurements.
- Analysis and interpretations of science data are documented and/or presented within agreed upon schedules (schedules provided in quarterly reports as needed)
- Websites/databases/archives are updated within an agreed to timeframe (schedules provided in quarterly reports as needed)
- Contractor operations are conducted in accordance with applicable NASA safety rules and regulations and with provisions of an approved Health and Safety Plan developed by the Contractor.

**Mod 1: The purpose of this modification is to extend the period of performance through January 31, 2016, to provide continuing support for COVE.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### 4.0 Schedule/Milestones/Period of Performance

Task award through 01/31/2014

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016**

### 5.0 Deliverables/Reporting Requirements

The primary deliverables are data sets derived from COVE instruments. Other deliverables include reports, papers, and publications related to COVE including COVE reports at all CERES science team meetings. Schedules are as-agreed between the contractor and the TM. An oral or written quarterly report on the status of on-going activities, proposed schedules, and future plans shall be delivered to the Technical Monitor with the first report for this performance period due at the end of February 2013.

Commented [O1]:

The contractor shall deliver a functional COVE database system "snapshot" for development on offsite location.

The contractor shall deliver database elements for incorporation into the primary COVE database.

The contractor shall provide onsite support for calibration process of optical depth instrumentation.

The contractor shall provide documentation, in the form a report delivered to the TM via Word document sent through email, of arrangements made for storage of the equipment that was removed from the Chesapeake Lighthouse including a list of the equipment, condition of the equipment, and location of storage facility.

The contractor shall provide an electronic report (in Microsoft word or powerpoint) outlining the results of the contractor's investigation of new sites for temporarily locating the instrumentation, as described in Section 2.0. This shall be delivered to the NASA TM by June 30, 2013.

#### **6.0 Other Information Needed for Performance of Task**

Government equipment for critical systems is provided for COVE. Travel of 4 trips per year to science team meetings or other technical interchange meetings may be required. Historically, trips are divided between the west coast, Colorado, east coast, and an international destination. Additional travel of 2 trips per year is required for instrument calibration activities, with one of the trips being to Europe or Hawaii.

#### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

#### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

#### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

#### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-018\_Mod1 CY3

**Task Order Title:** Surface Radiation Budget and Energy Applied Science Support

**1.0 Technical POC (TPOC):**

Name: paul.stackhouse  
Organization: E302:Climate Science Branch  
Email Address: Paul.W.Stackhouse@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide scientific and technical support in two primary functional areas: 1) NASA/Global Energy and Water Cycle Exchanges (GEWEX) Surface Radiation Budget (SRB) Studies; and 2) Earth Applied Science applications of SRB and Meteorological Datasets. The contractor shall meet at least monthly with the NASA Technical Monitor to discuss task schedules and status.

A. For SRB studies, the contractor shall validate, improve, analyze, and disseminate SRB algorithms and data products using surface, aircraft, and independent satellite based estimates as follows:

1. The development of the next generation SRB and high resolution solar energy and meteorological data sets. These functions are required to be in concert with goals and objectives of the NASA/Global Energy and Water Cycle Experiment (GEWEX) SRB project and/or other surface radiation data producing projects, such as the CERES (Clouds and Earth's Radiant Energy System) Fast Longwave and Shortwave Radiative Fluxes (FLASHFlux) working group.
2. The contractor shall respond to requests for data and documentation for users of the research data products.
3. The contractor shall compare SRB data sets to other surface radiation data sets.
4. The contractor shall analyze long-term time series of SRB data in conjunction with surface measurement records.

5. The contractor shall analyze SRB measurements in context of other scientific investigations such as in relation to climate processes such as fire meteorology in Siberia; prepare data sets and perform analyses for the GEWEX - Radiative Flux Assessment (GEWEX-RFA) project.

6. The contractor shall summarize work/analyses in memos, reports, peer-reviewed scientific journals, or other appropriate avenues.

B. In the area of applied science:

The contractor shall develop, validate, and disseminate data sets for decision support system needs in government and industry in societal benefit areas such as energy and agriculture. Decision support in these areas require parameters to be adapted from available surface radiation products from scientific projects such as the NASA/GEWEX SRB, CERES, FLASHFlux. Meteorological sources of data will be primarily the Goddard Earth Observing System (GEOS) assimilation project data and when appropriate climate model output as specified by the NASA TM.

C. Under the banner of the Prediction of Worldwide Energy Resource project (POWER), this work shall be completed in concert with the goals and objectives of projects as determined by the NASA TM. The contractor shall be required to address the following specific areas as it relates to the POWER project:

1. Develop/evaluate methods to enhance existing and new data products including the increase of spatial and temporal resolution of both meteorological and solar data products.

2. Contribute to the improvement/assessment of solar irradiance retrievals including direct/diffuse component estimates and new renewable energy related products.

3. Improve dissemination of data through the Surface Meteorological and Solar Energy (SSE) web portal or other web-based interfaces by maintaining and upgrading these capabilities.

4. Complete the evaluation of available NASA assimilation and possibly weather and climate forecast modeling outputs for energy-related products.

5. Other tasks such as supporting the development of new decision tools through streamlining data products, such as the RETScreen Performance Plus, are to be completed as determined by the NASA TM.

D. Reports for each activity shall be submitted by the contractor to the NASA Technical Monitor according to the time frame agreed upon by the contractor and NASA Technical Monitor. It is also anticipated that some of these results shall be submitted as conference papers and presentations and/or peer-reviewed journal articles.

2.1 Performance standards are as follows:

- a) Algorithm and data production approaches are developed, demonstrated, and documented within agreed upon schedules (schedules designated in reports when appropriate)
- b) Designated operational algorithms as determined by the NASA TM (operational algorithms are produced by the contractor and agreed upon with the NASA TM), once developed, are maintained under configuration management procedures (as agreed upon between the NASA TM and the contractor) and can be reproduced (if lost) within an agreed to timeframe (timeframe designated in reports when appropriate)
- c) Using specifications from the operational algorithms, design general production systems that organize input and output data sets to produce data sets with proper configuration management (as determined by the NASA TM) for climate data records. The contractor shall support transition of operational algorithms to other agencies as determined by the NASA TM.
- d) Execute the data production system plan to meet parameter, resolution and format specifications within agreed upon schedules.
- e) Validation and documentation of data sets are provided on agreed upon schedules.
- f) Analysis and interpretations of science/application data are documented and/or presented within agreed upon schedules
- g) After assessment, data products are archived, delivered, and verified to the Atmospheric Science Data Center (and other applicable data centers) within agreed upon schedules (schedules provided in reports as needed)
- h) Websites/databases/archives are updated within an agreed to timeframe (schedules provided in reports as needed). Updating of web sites includes enhancement of web tools to accommodate increasing complexity and volume of data sets. Ensure that resulting data sets and documentation are cross-referenced and mirrored in climate relevant databases and tools to increase access and usage of the data products.
- i) Documentation and/or reports are delivered within agreed upon schedules.
- j) Presentations and/or journal articles are submitted as a result of these activities as determined by the NASA Technical Monitor.

**Mod 1: The purpose of this modification is to (1) extend the period of performance for the entire task through January 31, 2016 to provide continuing algorithm development, analysis, validation, and computer programming**

**required for all projects as required in Section 2.0 above; (2) replace Section 2.A.5; (3) replace Section 2.C.3; and (4) add to Section 2.1 h) as set forth below:**

## **2.A**

**5. The contractor shall analyze SRB measurements in context of other scientific investigations such as in relation to climate processes in regional locations as required.**

## **2.C**

**3. Improve dissemination of data through the Surface Meteorological and Solar Energy (SSE) web portal or other web-based interfaces by maintaining, upgrading, and modernizing these capabilities.**

## **2.1**

**h) Updating of web sites shall also include modernization of web tools to accommodate increasing complexity and volume of data sets.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2014.

Task schedules shall be as determined with the TM in regular meetings, teleconference and/or e-mail communications.

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016.**



## 5.0 Deliverables/Reporting Requirements

Contractor shall provide to the NASA Technical Monitor electronically and as agreed upon with the TM:

- Quarterly highlight and plan reports
- Data products and analysis (e.g., data sets, documentation, etc.)
- Code and supporting documentation
- Web page code and documentation
- Publications and presentations
- The contractor shall attend meetings as requested
- The contractor shall deliver activity reports on agreed upon schedules

Additional requirements should be integrated into existing reporting requirements and deliverables.

## 6.0 Other Information Needed for Performance of Task

Contractor shall be required to travel to, participate in, make presentations and/or posters for meetings inside and outside of the United States in concert with goals and purposes of the projects listed above. Travel may be required to five meetings. Exact locations, numbers of attendees and travel schedule to be determined by the TM.

## 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## 8.0 Safety

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## 9.0 Risk

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## 10.0 Proposed Award Fee

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-021\_Mod0 CY3

**Task Order Title:** Support for Field Campaign Database Management

### **1.0 Technical POC (TPOC):**

Name: gao.chen  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Gao.Chen@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall support data management activities for field campaigns including but not limited to DC3 (Deep Convective Clouds and Chemistry Experiment), TOLNet (Tropospheric Ozone Lidar Network), DISCOVER-AQ (Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality), and SEAC4RS (Southeast Asia Composition, Cloud, Climate Coupling Regional Study). The particular activities include: setting up archives with file scanning software to assure that the submitted airborne data files comply with the required file format, maintaining the archive to ensure seamless data exchange among science team members as well as mission partners, generating standard and custom requested data merge products, providing public access to data after its release, transferring data to ASDC (Atmospheric Science Data Center), and establishing a controlled access archive for intercomparison exercises (as determined by the NASA TM) and conducting analysis to assess measurement consistency. Specific to the TOLNet website, the contractors shall work with the science team to develop CalendarView for easy data file access. In addition to airborne data generated from campaigns (mentioned above), the archive may include satellite, sonde, ground-based, model and other data sets necessary to facilitate research to meet field campaign science objectives. The contractor shall maintain and improve the data file scanning software (e.g., FScan) to comply with the current version of the ICARTT format as posted on Standard Process Group website (<http://earthdata.nasa.gov/esdswg/standards-process-spg>.) All software developed for [www-air.larc.nasa.gov](http://www-air.larc.nasa.gov) shall be archived and maintained at the ASDC repository in accordance with the configuration management and version control practices established at ASDC. Any major addition of the software should follow the ASDC development to production protocols. The file scanning software shall be archived and maintained at the ASDC repository in accordance with the configuration management and version control. The flight planning software shall be properly maintained and be ready for supporting upcoming field campaigns (mentioned above). The contractors

shall provide support to the ESDS SPG's (Earth Science Data System Standard Process Group) by responding to ESDS SPG requests regarding ICARTT data format maintenance. The contractors shall also provide support products to the CCMI (Chemistry-Climate Model Initiative) effort for comparison with aircraft data, particularly providing existing merge data products and developing a central webpage for all merge data products.

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

Contractors shall expect travel to support data management needs for SEAC4RS (August & September, 2013). Travel expenses for this effort shall be charged to separate task created specifically for covering the cost of SEAC4RS and DC3 deployments.

Additional travel may be required and will be determined by the TM and communicated to the NASA TM.

### **4.0 Schedule/Milestones/Period of Performance**

Period of performance for this task is February 1, 2013 through January 31, 2016.

As the nature of the airborne field campaign, the schedule is always changes. The schedule and milestones should be set according to the field study schedule, which will be provided to the contractor by the NASA TM.

The data website for the campaign (e.g. DISCOVER-AQ or DC3) on [www-air.larc.nasa.gov](http://www-air.larc.nasa.gov) shall be setup 15 days prior the starting date of the field campaign. The data merge shall be delivered 10 days after the data due date.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall submit monthly reports in Microsoft Word document delivered to the NASA TM via email on the last business day of the month.

### **6.0 Other Information Needed for Performance of Task**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-022\_Mod1 CY3

**Task Order Title:** Air Quality Applications Analysis and Support

### **1.0 Technical POC (TPOC):**

Name: doreen.neil  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Doreen.O.Neil@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

This task provides scientific computing and analysis capabilities in support of directed and competed activities under NASA's Applied Science Program, and will provide programming, data analysis, and modeling support to evaluate the EPA's (Environmental Protection Agency) models and other models sensitivities and responses to various input parameters measured at experimental sites. The contractor shall:

- a. Perform data processing support to include the development, implementation, and testing of algorithms necessary to combine space-based observations of criteria pollutants and precursors with relevant ground network data to produce meaningful applied science data product demonstrations for use by other Agencies and the public.
- b. Perform multidisciplinary applied science in the form of quick-turnaround of special tasks, inter-Agency meetings, and other expert scientific fora where flexibility, rapid response, and scientific communication are the key criteria.
- c. Provide administrative, consulting, outreach, website, and logistical support for applications-related activities. Details of the website support will be communicated to the contractor by the NASA TM.
- d. Communicate with science and project leads, other applications project leaders, the NASA Langley Research Center Atmospheric Sciences Data Center (ASDC), and others within the government community.
- e. Conduct meeting planning and support as directed by the TM.

#### **2.1 Performance Standards:**

Performance is evaluated based on achieving near term goals established by the NASA Technical Monitor and timely and effective closeout of tasks as they are completed.

- a. Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor.
- b. Required documents are received within time period requested by NASA Technical Monitor.
- c. Data bases, web sites, and graphical products are delivered within time period requested by NASA Technical Monitor.
- d. Field and space mission measurements are documented and archived at the NASA Langley Research Center Atmospheric Sciences Data Center (ASDC) by agreed upon deadlines between the NASA Technical Monitor and contractor.

**Mod 1: The purpose of this mod is to address data process findings from the EPA's initial analysis in Contract Year 2 to include the broader set of conditions to Section 2.0 a. above:**

- 1. Data processing performed shall address assimilation, modeling, and analysis of an expanded data set based on findings from the EPA's initial analysis. The findings will be provided by the NASA TM at the award of this modification (mod 1).**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2016.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide the technical documentation to include but limited to, papers and presentations of task outcomes in support of presentations and journal papers as determined by the NASA TM, which identify the quantitative improvement in partner Decision Support Systems deriving from the use of NASA data and model. This documentation shall be delivered electronically to the NASA TM quarterly via email. Key criteria are the quantified benefit and report clarity and brevity.

The contractor shall participate in the development of peer-reviewed scientific publication and presentation of results as determined by the NASA TM. Data products, software (code), and supporting documentation produced in this task shall be delivered to the NASA Technical Monitor electronically within an agreed upon timeframe with the contractor.

### **6.0 Other Information Needed for Performance of Task**

Some travel is anticipated to support this task, particularly 1 trip annually to US EPA in Durham, NC and 1 trip to a scientific meeting at a US venue. Additional travel may be required and will be communicated to the contractor by the NASA TM.

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-023\_Mod0 CY3

**Task Order Title:** NAST Science

**1.0 Technical POC (TPOC):**

Name: allen.larar  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Allen.M.Larar@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide scientific and technical support for the JPSS and NAST programs; JPSS is the Joint Polar Satellite System (formerly known as NPOESS, the National Polar-orbiting Operational Environmental Satellite System), and NAST is the NASA/NPOESS Airborne Sounder Testbed. This support shall include consultation on science algorithms and data processing concepts for the analysis of field program data, calibration/validation planning, activities associated with NAST-interferometer (NAST-I) instrument performance optimization, and studying improvements for atmospheric sounding to be considered for next generation sounding systems (airborne and space based).

The contractor shall support up to two field deployments per year by participating in identifying science requirements, planning aircraft flight profiles, and analyzing/interpreting near real-time NAST instrument flight science and engineering data. The contractor shall serve as a member of the Sounding Operational Algorithm Team (SOAT) and participate in its meetings by providing NAST flight results and science guidance derived from a knowledge of NAST and JPSS. The contractor shall support NASA/NOAA/JPSS in scientific and technical studies and meetings utilizing NAST data as it relates to the NPOESS Preparatory Project (NPP) and JPSS satellite Cross-track Infrared Sounder (CrIS) instrument development and implementation. The contractor shall also provide technical support and consultation regarding operation and enhancement of the NAST-I instrument performance and associated data processing methodologies.

Performance Standards:



- Attends scheduled SOAT meetings, presents analysis results, and provides scientific guidance for developing algorithms and science criteria.
- Algorithm and data processing concepts are reviewed within schedules agreed upon between the contractor and the Task Monitor (TM).
- Field deployment support is provided per NAST requirements and schedules agreed upon between the contractor and the TM.
- Supports Sensor Data Record (SDR) & Environmental Data Record (EDR) calibration/validation plan execution.
- Supports improvements and optimization of the NAST-I instrument.
- Supports instrument inter-calibration activities.
- Supports improvements to and optimization of NAST-I radiance calibration and retrieval processing.
- Participates in studies addressing improvements for atmospheric sounding to be considered for next generation sounding systems (airborne and space based).

### **3.0 Special Requirements**

**Access to Sensitive or ITAR Data:** Access to industry proprietary data may be required for this task and will be communicated to the contractor by the TM as necessary. Foreign nationals shall not have access to industry proprietary data. The contractor shall have familiarity with heritage and future-planned advanced atmospheric sounders, a working knowledge of thermodynamic parameter retrieval methodology, and significant experience with Fourier Transform Spectrometer (FTS) systems, in particular, those implemented on high-altitude airborne and spaceborne platforms.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance task award through January 31, 2016

- o Scientific analyses shall be conducted throughout period of performance
- o NPP calibration/validation planning shall continue throughout period of performance
- o Field campaign planning and execution shall continue throughout period of performance
- o SOAT meetings are expected every 6 months
- o Several NAST-I sensor testing periods and inter-comparisons are expected
- o Flights are expected to be conducted on the NASA ER-2 aircraft, based out of Palmdale, CA, to checkout and optimize the refurbished NAST-I system

o Suomi NPP calibration/validation field campaign with NAST-I is expected to be conducted during May 2013 based out of Palmdale, CA.

### **5.0 Deliverables/Reporting Requirements**

- Quarterly report written in Microsoft Word and delivered to the TM via email covering accomplishments, issues, and plans.
- Science results shall be presented at SOAT meetings, technical conferences, and published in conference proceedings and journal articles as determined by the TM.
- Engineering results shall be reported to the TM and other team members as needed in an agreed upon format between the contractor and the TM.

### **6.0 Other Information Needed for Performance of Task**

Travel shall be required for participation in instrument flight activities, team meetings, and to report results at conferences. Participation in meetings at LaRC shall be required on a semi-regular basis, as needed, to interact with the LaRC Ultraspectral Remote Sensing team. Historically, on average, there has been one deployment per year for 3 weeks in the US or abroad, two team meetings in the DC area, and 2-3 international conferences.

Scientific meetings of primary interest during this period of performance include the Infrared Atmospheric Sounding Interferometer (IASI) 3rd workshop and the 2013 European Organisation for the Exploitation of Meteorological Satellites(EUMETSAT) Conference, additional travel to these conferences may be required during the period of performance and will be communicated to the contractor by the NASA TM.

Any additional information regarding the details of travel or additional travel requirements shall be provided to the contractor by the TM.

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-025\_Mod1 CY3

**Task Order Title:** Cloud, Atmosphere, and Surface Remote Sensing

### **1.0 Technical POC (TPOC):**

Name: patrick.minnis  
Organization: E302:Climate Science Branch  
Email Address: Patrick.Minnis-1@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall perform tasks associated with algorithm development, computer programming, analysis, validation, and internet-based data display and data dissemination for scientific studies, image processing, and data base development and management related to clouds, radiation, contrails, aerosol, and aircraft icing research. The contractor shall perform analyses and studies in support of atmospheric sciences research projects and field experiments. The contractor shall summarize work/analyses in memos, reports, meeting proceedings and presentations, or peer-reviewed scientific journals. The tasks include, but are not limited to, the following research areas:

1. Real-time satellite analyses for support of aircraft icing condition diagnoses, field program support, and data assimilation studies.
2. Development and documentation of cloud analysis codes for the NOAA GOES-R & JPSS projects
3. Development and testing of cloud property retrieval algorithms for **C**louds and the Earth's Radiant Energy System (CERES), the Atmospheric Radiation Measurement (ARM), and aircraft icing projects
4. Analysis and comparison of CERES and NASA Langley geostationary satellite cloud properties with similar cloud properties derived from the Cloud Aerosol Lidar and Infrared Pathfinder Satellite (CALIPSO) and CloudSat data and data from other lidar sources such as the Geoscience Laser Altimetry System (GLAS) on the NASA Ice, Cloud, and Land Elevation Satellite (ICESat).
5. Development and application of algorithms to estimate contrail properties and radiative forcing from satellite data
6. Development and maintenance of systems to archive and disseminate cloud and radiation products from satellite analyses
7. Construction and application of algorithms to support the NASA Energy and Water System (NEWS) and the MEASURES program (Making Earth System Data Records for Use in Research Environments), and Modeling, Analysis, and Prediction (MAP) program.
8. Calibration of operational and research satellite imagers dedicated to weather and climate problems
9. Validation of satellite-derived cloud and radiation products
10. Development of methods to derive improved ice crystal and non-ice particle information from satellite data.
11. Development, testing, and application of methods for contrail detection and property retrieval using satellite data.

12. Develop satellite cloud climatology from historical Advanced Very High Resolution Radiometer (AVHRR) data.

**Performance Standards:**

- Algorithm approaches and computer code are demonstrated and documented within schedules as agreed to between the contractor and the Technical Monitor (TM).
- Standard data products are delivered within schedules as agreed to between the contractor and the TM.
- Computer software and data files are accurately and seamlessly transferred to the NASA user of those files.
- Analysis and interpretations of science data are documented in presentations and scientific publications and/or presented within agreed upon schedules provided in monthly reports as needed.
- Websites/databases/archives are updated within schedules as agreed to between the contractor and the TM.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016 to provide continuing algorithm development, analysis, validation, and computer programming required for all projects as required in Section 2.0 above.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify):

### 4.0 Schedule/Milestones/Period of Performance

Period of performance: February 1, 2013 - January 31, 2014.

The schedule and milestones will be provided to the Contractor by the NASA Technical Monitor as required.

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016.**

### 5.0 Deliverables/Reporting Requirements

The contractor shall provide:

- Standard data products in digital and image formats for archival, dissemination, and internet access
- Computer code and supporting documentation delivered to the NASA TM electronically via email.
- Publications, as determined by the NASA TM, to document and present methods and results.
- Other deliverables and reports as requested by the NASA Technical Monitor to meet ad hoc requirements. Contractor shall be provided the criteria and acceptable format by the NASA Technical Monitor for these requests.
- Travel as needed to support field programs, present results, and participate in workshops and science team meetings. Additional information is outlined in Section 6.0.

## **6.0 Other Information Needed for Performance of Task**

Travel as needed to support field programs, present results, and participate in workshops and science team meetings. For the purposes of estimating, the contractor shall plan to travel to 2 - 3 domestic and international workshops/science team meetings approximately 3 - 5 days per trip.

Additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-026\_Mod1 CY3

**Task Order Title:** SABER Extended Mission Data Analysis

**1.0 Technical POC (TPOC):**

Name: david.kratz  
Organization: E302:Climate Science Branch  
Email Address: David.P.Kratz@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

Background Information: The Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) Experiment was launched upon the NASA Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED) satellite in December, 2001. SABER is making unprecedented measurements of the Earth's stratosphere, mesosphere, and lower thermosphere.

**2.1 Task Description:**

a. The contractor shall assess the quality of SABER Level 1, Level 2, and Level 3 data products and ascertain their long-term trends. The contractor shall participate in scientific studies of the data and contribute to the development and publication of the results in the scientific literature. The contractor shall modify and test existing algorithms as dictated by comparisons with correlative data or other information as determined by NASA TM.

**2.2 Performance Standards:**

- a. Methodology is demonstrated and documented within agreed upon schedules.
- b. Analysis and interpretation of scientific data are documented within agreed upon schedules.
- c. This task continues the work requirements related to upgrading and evaluating the SABER algorithms for deriving atomic oxygen, atomic hydrogen, and rates of heating due to

exothermic chemical reactions. These algorithms have been delivered and are now incorporated in the operational SABER data processing.

**Mod 1: The purpose of this modification is to add a study for stratospheric water vapor profiling in the far-infrared under Section 2.0 above, as follows:**

**2.1.b. The contractor shall use the thermal emission limb sounding technique in the far-infrared portion of the spectrum to evaluate the potential for making measurements of the vertical profile of stratospheric water vapor in the stratosphere. The goal shall be to produce results as to whether or not, with existing instrument and detector technologies, there is sufficient signal to achieve an accurate retrieval of the profile of water vapor, particularly in the lower stratosphere and extending into the upper troposphere.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2016.

**Mod 1: Period of performance for Mod 1 is from Mod 1 award date through October 31, 2013.**

### **5.0 Deliverables/Reporting Requirements**

- a. The contractor shall provide bi-monthly reports of status and accomplishments for the task electronically to the NASA Technical Monitor.
- b. Informal oral meetings will be held between the contractor and the NASA Technical Monitor at the request of the NASA Technical Monitor as required. Such meetings will be convened when deemed necessary.

**Mod 1 Deliverables:**

- c. **The contractor shall provide one electronic (Microsoft Office) copy as well as two hard copies of the report documenting the radiance simulations and retrievals, the anticipated instrument performance, and suggested alternate concepts for meeting the measurement requirements.**

### **6.0 Other Information Needed for Performance of Task**

Travel: The contractor shall support SABER science team meetings and other technical interchange meetings as required. For planning purposes one meeting per year approximately 5 days in Boulder,



CO should be assumed. Other meetings will likely take place in the Hampton Roads area and require no travel support.

Travel to two domestic workshops/meetings approximately 5 days in length that are related to ongoing analysis of SABER data with regards to solar variability is anticipated.

Additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-027\_Mod2 CY3

**Task Order Title:** Earth Science Education

**1.0 Technical POC (TPOC):**

Name: lin.chambers  
Organization: E3:Science Directorate  
Email Address: Lin.H.Chambers@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

I. The contractor shall perform tasks associated with development and operation of education and outreach projects and activities related to NASA missions including but not limited to:

- Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO),
- Clouds and the Earth's Radiant Energy System (CERES) Students' Cloud Observations Online (S'COOL),
- Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality (DISCOVER-AQ),
- Stratospheric Aerosol and Gas Experiment III on the International Space Station (SAGE III on ISS),
- Tropospheric Emission: Pollution Monitoring (TEMPO);

and non-mission related projects including but not limited to:

- Global Learning and Observation to Benefit the Environment (GLOBE),
- Long Term Engagement in Authentic Research Experiences with NASA (LEARN)
- Mentoring and inquiry using NASA Data on Atmospheric and Earth science for Teachers and Amateurs (MY NASA DATA),
- NASA Innovations in Climate Education (NICE)

II. The contractor shall provide support to include responding to electronic and voice requests and questions, preparing and sending mailings, conducting virtual

presentations and Q&A sessions, and recording information in various databases for educators participating in the education and outreach projects.

III. The contractor shall maintain and update public websites containing information about the education and outreach projects as well as internal websites for use by the S'COOL team and the NICE management team and a workspace for NICE principal investigators. The contractor shall migrate S'COOL project software components from legacy hardware systems at the NASA Langley Research Center Atmospheric Sciences Data Center to new servers, as well as updating the S'COOL observation protocol to more closely align to the GLOBE cloud protocols. The contractor shall update data parameters within the MY NASA DATA Live Access Server (LAS) to include more recent time periods as they become available, and also add new parameters as appropriate to support other NASA missions and educational needs.

IV. The contractor shall develop and update unit and lesson plans and educational activities; populate and maintain a science glossary for an upper elementary level audience; and develop new media products for science education projects exploiting multimedia, social networking, mobile applications, telepresence, and other new media tools.

V. The contractor shall assist in planning and logistics, and be part of the team that conducts 4-5 teacher workshops related to education and outreach projects (including but not limited to defining the agenda, contacting appropriate organizations to publicize the workshops, helping prepare the application forms, reviewing and selecting applicants, preparing materials, developing instructional presentations, delivering instruction, and on-going interaction with workshop alumni). The contractor shall provide follow-up support to workshop alumni including responding to questions, providing materials, and supporting educational research projects.

VI. The contractor shall attend several local and 5-10 regional and national meetings to present the education and outreach projects, as determined and agreed by the project team, or shall support participation at these regional/national meetings by teacher ambassadors (teacher ambassadors are teachers who have previously attended a workshop at NASA Langley on one of our education and outreach projects, are qualified to speak about it, and are geographically closer to the meeting than is our team) as determined by the NASA TM. This includes preparing and sending project materials for handout at the meetings. The number and location of meetings supported shall be determined annually based on the level of funding available and the specific theme of the upcoming meetings and will be communicated to the contractor by the NASA TM.

VII. The contractor shall support the implementation of the ozone garden at the Virginia Living Museum (VLM): providing ozone bio-indicator plant seeds and recommending other plants for VLM to purchase, assisting in developing visual aids for interpreting ozone induced foliar injury, advising on signage and training docents on the basics of identification and observational protocols for measuring the extent of

ozone induced foliar injury to sensitive plants. This may require 1-2 trips to NASA LaRC for meetings.

- a. The contractor shall provide support to prepare the research reports for the Ozone Garden project.

VIII. The contractor shall coordinate an international exchange component for a CubeSat education activity between France and universities in Virginia, working locally through the Virginia Space Grant Consortium. This may consist of Virginia students building a redundant ground communication station, being involved in development of the CubeSat instrument, or participating in international exchanges with students in France.

## 2.1 Performance Standards:

I. Educational materials developed are aligned to national and Virginia educational standards, and meet standards of quality set by the projects. Once released, national common core standards and Next Generation Science Standards shall also be addressed.

II. Education and outreach project participants are registered or assisted within a week.

III. Websites/databases/archives are updated within an agreed timeframe between the contractor and the NASA TM. These times will vary from near-instantaneous for web-connected databases, to less than a week for updates requiring manual intervention, to agreed longer timeframes when major changes to a website or database are planned.

**Mod 1: The purpose of this modification is to add an additional requirement to Section 2.0, paragraph II above:**

**a.** The contractor shall provide Spanish language responses to electronic and voice requests and questions and shall conduct virtual presentations and Q&A sessions for Spanish speaking S'COOL participants.

**Mod 2: The purpose of this modification is to descope the work in Mod 1, since this requirement has been cancelled; and to add additional requirements to Section 2.0, as set forth below:**

**VII.**

**b.** The contractor shall perform site visits to the VLM throughout the ozone season to identify ozone-induced injury on various plants throughout the facility, and to train VLM staff to recognize and explain these symptoms.

**IX.**

**a. The contractor shall conduct evaluations for the TEMPO student collaboration (SC), including constructing a logic model, developing and administering survey instruments, and interviewing all parties involved. The contractor shall further analyze and report findings to the TEMPO SC lead.**

**b. The contractor shall conduct an evaluation of the MY NASA DATA Project, including consultation with an in-person and virtual Teacher Advisory Board, and shall develop options to increase its impact, and implement a selected set of options.**

**X. The contractor shall improve the usability of the GLOBE Teacher's Guide by transitioning the material to a search-optimized web format, and incorporating internal and external links to related content.**

**XI. The contractor shall prototype a cloud-based HTML5 toolkit for the NASA IT Labs.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No

Purchase of miscellaneous items to support education and outreach may be required, as directed by the TM. These items include, but are not limited to, various craft items for educational demonstrations, office supplies for teacher workshops, simple instruments for atmospheric measurement, and mobile devices for use in educational presentations. Other items include publication costs and conference fees, as directed by the TM.

#### **4.0 Schedule/Milestones/Period of Performance**

Period of performance is February 1, 2013 through January 31, 2016.

#### **5.0 Deliverables/Reporting Requirements**

1. The contractor shall report on this task informally, through oral status updates at weekly to monthly team meetings as determined by the Technical POC.
2. The Contractor shall maintain metrics of activities (presentations and web metrics) to be summarized for periodic reports to NASA HQ.
3. Deliverables shall include materials for teacher workshops, content and tools (web forms, databases, etc) for project websites and printed project materials.
4. Deliverables shall be submitted to the NASA SMD-Earth Science Education Products Review where appropriate by the agreed upon dates between the contractor and the Technical POC.

### **Mod 2: The following deliverables are added:**

**5. Prototype Toolkit (due 90 days from award date of Mod 2)**

**6. Improved Globe Teacher's Guide to integrate with the existing globe.gov website (due 12 months from award date of Mod 2)**

**7. TEMPO SC Evaluation**

**8. MY NASA DATA Evaluation**

#### **6.0 Other Information Needed for Performance of Task**

The contractor shall travel to a number of local, regional and national meetings to share information about the projects with the larger education community. Specific venues and dates shall be determined by the NASA TM. It is anticipated that approximately 5-10 out of

town trips may be required each year. Shipping of materials and purchase of supplies may be required to support these events.



### 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### 8.0 Safety

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### 9.0 Risk

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### 10.0 Proposed Award Fee

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-028\_Mod1 CY3

**Task Order Title:** Cloud Object Modeling and Analysis

**1.0 Technical POC (TPOC):**

Name: kuan-man.xu  
Organization: E302:Climate Science Branch  
Email Address: Kuan-Man.Xu-1@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall (items with asterisks are subject to funding availability from the Clouds and the Earth's Radiant Energy System, CERES, project):

1. Develop and improve cloud-resolving model components and perform simulations using various data sets available, including the cloud object data, and test the improvement in the multiscale modeling framework in support of the Center for Multiscale Modeling of Atmospheric Processes (CMMAP) effort.
2. Document methods and results of analysis by providing electronic copy of annotated computer code and a written description of methods and equations. Methodology can be documented via publications or papers.
3. Develop and improve the climate model version of the higher-order turbulence closure scheme for the Community Atmospheric Model Version 5, in support of the Department of Energy (DOE) effort.
4. Test extensively the simplified, less prognostic version of the higher-order turbulence closure scheme in single column model, cloud-resolving model and multiscale modeling framework, in support of the DOE effort.

The performance standards are as follows:

1. Algorithm approaches are demonstrated and documented within agreed upon schedules.
2. Demonstrate that algorithms have been implemented properly within agreed upon schedules designated in monthly reports when appropriate.
3. Websites/databases/archives are updated within an agreed to timeframe between the NASA TM and the contractor provided in detailed monthly reports as needed.
4. Analysis and interpretations of science data are documented in presentations and scientific publications and/or presented within agreed upon schedules provided in monthly reports as needed.
5. Author or substantially contribute to at least one paper or journal article each year for each Ph.D-level FTE.
6. Report cloud model development and improvement results at scientific meetings, workshops, and peer reviewed scientific publications.
7. Complete draft of paper or presentation within 3 months of completing an analysis which yields reportable results.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015, to provide continuing support for the cloud object modeling and analysis requirements in Section 2.0 above.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of performance: February 1, 2013 through January 31, 2014.

- Schedules will be agreed to monthly between the contractor and the TM.
- Present progress and preliminary results in an electronic report at weekly or biweekly meeting with the TM as determined by the TM.

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2015**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall submit the following deliverables:

1. Complete the simulations and analyses of high-resolution MMF Atmospheric Model Intercomparison Project (AMIP)-type (10 years) simulations by January 31, 2014.
2. Short-term tests of modifications to the Super-parameterized Community Atmosphere Model (SPCAM)-Intermediately prognostic higher-order closure (IPHOC) Multiscale modeling framework (MMF) model to achieve energy balance for long-term simulations by August 31, 2013.
3. Complete the analyses of the cloud-resolving simulations of CFMIP-GEWEX Intercomparison of Large-eddy and Single-Column Models; where CFMIP is Cloud Feedback Model Intercomparison Project; GEWEX is Global Energy and Water Exchange.(CGILS) cases, using the large-eddy simulations as benchmark, so that a journal article shall be submitted for publication, by May 31, 2013.
4. Fully test the simplified higher-order turbulence closure tested in Single column model (SCM), cloud resolving model (CRM), MMF and General circulation model (GCM), so that a journal article documenting the simplified scheme shall be submitted for publication, by October 31, 2013.
5. Complete the simulations and analyses of the Version 5 of Community Atmosphere Model (CAM5) simulations with simplified Intermediately prognostic higher-order closure (IPHOC); specifically, AMIP-type and patterned-sea surface temperature (SST) global change simulations, by January 31, 2014.
6. Complete the testing of the Xu-Randall cloudiness parameterization in Version 4 of Community Atmosphere Model (CAM4) and CAM5 by December 31, 2013.
7. Complete tasks specified by the turbulence parameterization intercomparison project with Colorado State University by January 31, 2014.
8. Perform new (to be specified with TM) MMF simulations if computational resources become available; January 31, 2014.
9. Attend and present significant results from modeling analyses at scientific meetings.
10. Publish papers in scientific journals from finished work. Initial draft of a paper is to be submitted to the TM within 3 months of the final analysis of majority of results. Revise submitted papers for final publications.

**Mod 1: The following deliverables have updated due dates:**

1. **January 31, 2015**
2. **August 31, 2014**
4. **March 31, 2014**
5. **January 31, 2015**
7. **January 31, 2015**

**New Deliverable:**

11. **Perform and analyze CO2 doubling MMF simulations by June 1, 2014**

#### **6.0 Other Information Needed for Performance of Task**

Travel to meetings and workshops may be required (3-4 trips/year, 3-4 days per trip), including DOE ASR Science Team meeting and Working Group meeting. Travel to one international meeting each year may be required for 5 days.

#### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

#### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

#### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

#### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-030\_Mod3 CY3

**Task Order Title:** CERES FM-6

### **1.0 Technical POC (TPOC):**

Name: phillip.brown  
Organization: E607:FPD/CERES Project  
Email Address: phillip.l.brown@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall perform tasks to support design, analysis, fabrication, assembly, test, and calibration tasks for the Clouds and the Earth's Radiant Energy System (CERES) Flight Model 6 (FM6) instrument and Ground Support Equipment (GSE) planned for the Joint Polar Satellite System -1 (JPSS-1) satellite. This specifically includes support to FM6 instrument electrical engineering design and electronics, flight software and ground support equipment software (GSE SW), systems engineering, instrument performance and calibration, as well as support to cost, programmatic and engineering trades analyses.

#### **2.1 Design and Analysis Support:**

- (a) The contractor shall provide support in the examination and assessment of the CERES FM6 instrument electrical and software design to objectively confirm and assure that the implemented design meets the operational and performance requirements specified by the NASA TM. The support shall include examination and assessment of component, subsystem, and system designs, analyses, testing, and verification activities of the FM6 instrument electrical and software designs including the examination of designs, schematics, process and production paths, test and verification procedures, and support as necessary during testing as determined by the NASA technical monitor (TM). The contractor shall assist in assessing analyses and other documentation as determined by the NASA TM to assure the implemented design achieves specified requirements and performance expectations and is documented properly.

2.2 Systems Engineering Support: The contractor shall provide support to the CERES FM6 systems engineering effort in formulating, managing, and tracking FM6 instrument and GSE verification and validation activities and in assisting in the evaluation of submitted verification products and verification data. The contractor shall provide support in defining the baseline and any updates to the FM6-to-JPSS-1 physical and functional interface assisting in assessments and evaluation of proposed revisions to the FM6-JPSS-1 Interface Control Document and other JPSS satellite controlling systems engineering documentation as determined by the NASA TM. The contractor shall provide support to CERES in preparing data and materials in support of the JPSS-1 Flight Project Delta Critical Design Review (CDR). [Note: document(s) to be provided by TM and/or access will be made available to a central server where documents reside].

2.3 Instrument Calibration and Performance Support: The contractor shall provide support in the assessment of CERES FM6 instrument functional and performance data including instrument functional and performance data obtained during instrument environmental testing and during instrument calibration. This support includes accessing the data, plotting and trending data, and providing assessment of the data relative to instrument functional performance, radiometric performance, and calibration performance.

2.4 Integration and Test Support:

(a) The contractor shall provide support in establishing planning and in document development for the CERES FM6 to JPSS-1 spacecraft integration and test campaign. The contractor shall provide support in planning and developing documentation for CERES for the JPSS-1 mission operations and ground systems. The contractor shall support the JPSS-1 Data Format Working Group in supporting the planning and development of a CERES FM6 JPSS-1 Instrument Table Description Document and other CERES FM6 JPSS-1 mission operations documents as determined by the NASA TM.

2.5 Cost, Programmatic and Engineering Trades Analysis Support: The contractor shall perform cost, programmatic and engineering trades analyses utilizing historical CERES and Earth Radiation Budget Satellite (ERBE) project data to facilitate development, acquisition, and deployment of Earth Radiation Budget instruments/missions. The contractor shall also support Program/Project Review Teams by providing Cost and Programmatic evaluation support to the review teams.

2.6 Performance Standards

2.6.1 Performance Standard for Design and Analysis Support: The contractor shall support a hands-on evaluation of designs, analyses, and other verification products, and associated documentation (e.g., operators manual) for required accuracy of coverage, relevance to the

requirement, and for document maturity in support of ongoing work to support completion of the FM6 instrument through to the FM6 Pre-Ship Readiness Review/PSRR. [Note: document(s) to be provided by TM and/or access will be made available to a central server where documents reside]. The contractor shall summarize monthly its work related to examinations, evaluations, and assessments of reviewed material, report on its support to meetings and exchanges with NASA and other NASA contractors, and as well provide status on maturity of documentation and hardware in support of planned reviews.

**2.6.2 Performance Standard for Systems Engineering Support:** The contractor shall support an assessment of the CERES FM6 systems engineering products generated by the CERES prime contractor to verify that documented products submitted as verification and validation artifacts by the CERES prime contractor are acceptable to NASA. [Note: document(s) to be provided by TM and/or access will be made available to a central server where documents reside]. In support of CERES FM6 reviews, the contractor shall support NASA in reviewing documented products and review materials for the one remaining instrument life cycle review, the CERES FM6 Pre-ship Readiness Review/System Acceptance Review. The contractor shall support document review, and as necessary, material preparation needed in support of the JPSS-1 Flight Delta Critical Design Review (dCDR). The contractor shall provide support in maintaining and updating the CERES FM6 to JPSS-1 Interface Control Document (ICD) verification compliance matrix. The contractor shall summarize monthly via written report its work respective to examinations, evaluations, and assessments of reviewed material and its support to verification compliance, report on its support to meetings and exchanges with NASA and with NASA contractors, and as well provide status on maturity of documentation in support of planned reviews.

**2.6.3 Performance Standard for Instrument Calibration and Performance Support:** The contractor shall support the transfer and reduction of captured instrument test data for evaluation of CERES FM6 instrument functional and radiometric performance in support of final FM6 instrument completion through to the CERES FM6 instrument Pre-Ship Readiness Review/Systems Acceptance Review. The contractor shall summarize monthly via written report its work respective to data capture, plotting, assessment, and trending of data as required, report on its meetings and exchanges with NASA, with NASA contractors, and with other CERES and stakeholders.

**2.6.4 Performance Standard for Integration and Test Support:** The contractor shall produce the baseline document for the CERES JPSS-1 Satellite Integration and Test Plan as well as review other heritage CERES



satellite level integration and test support documentation created for FM5 on NPP and provide support to a restructure of such documentation for application to FM6 during the JPSS-1 satellite integration and test campaign. [Note: document(s) to be provided by TM and/or access will be made available to a central server where documents reside]. The contractor shall summarize monthly via written report its work related to examinations, evaluations, and assessments of reviewed material and progress on expected products as well as report on its support to meetings and exchanges with NASA and other NASA contractors.

**2.6.5 Performance Standard for Cost, Programmatic and Engineering Trades**

**Analysis Support:** The contractor shall utilize historical cost, schedule, and technical planning and performance data to support the creation of programmatic and technical cost models for estimating cost, content, and schedule estimates for future development of Earth Radiation Budget instruments/missions. The contractor shall also support CERES FM6 Program/Project Review Teams by participating in the evaluation of Project Review programmatic, cost, and technical planning and products. The contractor shall summarize monthly via written report its support to cost and schedule modeling and Project Review Team requested efforts.

**Mod 1: The purpose of this modification is to provide additional contractor support required for this task under sections "2.3 Instrument Calibration and Performance Support" and "2.4 Integration and Test Support" above. The additional support is needed due to an increase in CERES FM6 instrument calibration and spacecraft integration requirements.**

**Mod 2: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015, to provide continuing support for the CERES FM-6 requirements in Section 2.0 above, and add the following additional requirements:**

**2.1.1 The contractor shall provide support to the delta EMC testing of the CERES FM-6 instrument at NGAS through January 31, 2015.**

**2.2.2 The contractor shall provide support to the update of project to spacecraft interface control documentation. The contractor shall provide support to CERES in**

preparing material in support of the CERES FM-6 System Acceptance Review planned for the end of March of 2014.

2.3.4 The contractor shall support the FM-6 instrument vacuum and performance regression testing post recovery from the MAM and ICM performance issues.

**Mod 3: The purpose of this modification is to provide additional support to the CERES FM6 in the following areas under Section 2.0 above. The additional support is needed due to an increase in CERES FM6 instrument design, integration, and test requirements:**

**2.1(b): The contractor shall provide additional support in the areas of CERES FM6 electrical and software designs.**

**2.4(b): The contractor shall provide additional support to CERES FM6 integration and test (I&T) including the electrical and software I&T, as well as mission and ground systems documentation development for the CERES JPSS-1 mission.**

### 3.0 Special Requirements

- 3.1 Access to Sensitive Data: Yes. The contractor may at times be required to access and evaluate Sensitive But Unclassified (SBU) data, ITAR material, or other contractor proprietary data and Non-Disclosure Agreement (NDA) shall be required.
- 3.2 Design and Analysis Support, Systems Engineering Support, and Integration and Test Support : Members of this team shall support the CERES FM6 Chief Engineer and in response to work requirements defined by the CERES FM6 Chief Engineer or his delegated discipline team leads.
- 3.3 Instrument Calibration and Test Support: Members of this team shall support the CERES FM6 Instrument Scientist and FM6 Chief Engineer in response to work requirements defined by the FM6 Instrument Scientist and FM6 Chief Engineer.
- 3.4 Cost, Programmatic and Engineering Trades Analysis Support: Contractor support in this area shall support the CERES Project Manager in response to work requirements defined by the Project Manager for the performance of cost and schedule models for future Earth radiation Budget instruments/missions. Contractor support in the area shall also support the Chair of the CERES Instrument Independent Review Team (IIRT) Chair in response to requirements defined by the IIRT Chair.

**Mod 1: The purpose of this modification is to provide additional contractor support required for this task under sections "3.2 Design and Analysis Support, Systems Engineering Support, and Integration and Test Support" and "3.3 Instrument Calibration and Test Support" above. The additional support is needed due to an increase in CERES FM6 instrument calibration and spacecraft integration requirements.**

#### 4.0 Schedule/Milestones/Period of Performance

Period of Performance: 02/01/2013-1/31/2014.

**Mod 2: The new period of performance is February 1, 2013 through January 31, 2015**

#### 5.0 Deliverables/Reporting Requirements

The contractor shall provide a monthly summary report, produced in a format agreed upon between the contractor and the NASA TM, to the NASA TM delivered via email that includes the response to the reporting requirements listed in the sub-tasks below.

- 5.1 Subtask 2.1 Design and Analysis Support: The contractor shall summarize monthly its work related to examinations, evaluations, and assessments of reviewed material, report on its support to meetings and exchanges with NASA and other NASA contractors, and as well provide status on maturity of documentation and hardware in support of planned reviews.
- 5.2 Subtask 2.2 Systems Engineering Support : The contractor shall summarize monthly via written report its work respective to examinations, evaluations, and assessments of reviewed material and its support to verification compliance, report on its support to meetings and exchanges with NASA and with NASA contractors, and as well provide status on maturity of documentation in support of planned reviews.
- 5.3 Subtask 2.3 Instrument Calibration and Performance Support: The contractor shall summarize monthly via written report its work respective to data capture, plotting, assessment, and trending of data as required, report on its meetings and exchanges with NASA, with NASA contractors, and with other CERES and stakeholders. Other deliverables include data plots and documented data trending assessments.
- 5.4 Subtask 2.4 for Integration and Test Support: Production of a FM6 JPSS-1 Instrument Integration and Test Plan. The contractor shall summarize monthly its work related to examinations, evaluations, and assessments of reviewed material and progress on expected products as well as report on its support to meetings and exchanges with NASA and other NASA contractors.,
- 5.5 Subtask 2.5 for Cost, Programmatic and Engineering Trades Analysis Support: The contractor shall summarize monthly via written report its support to cost and schedule modeling and Project Review Team requested efforts.

## 6.0 Other Information Needed for Performance of Task

### 6.1 Subtask 2.1 Design and Analysis Support: Travel:

- Pre-ship/System Acceptance Review (PSRR), Redondo Beach, CA - 2 travelers, 4 days including travel days

### 6.2 Subtask 2.2 Systems Engineering Support: Travel:

1. Pre-ship/System Acceptance Review (PSRR), Redondo Beach, CA - 1 traveler, 4 days including travel days
2. Technical Interchange Meeting (TIM), Redondo Beach, CA - 1 travelers, 4 days including travel days

### 6.3 Subtask 2.3 Instrument Calibration and Performance Support: Travel :

1. Pre-ship/System Acceptance Review (PSRR), Redondo Beach, CA - 2 travelers, 4 days including travel days
2. Instrument TVAC/Calibration, Redondo Beach, CA – 3 travelers, 10 days including travel days

### 6.4 Subtask 2.4 Integration and Test Support: Travel:

1. JPSS TIM, Goddard Space Flight Center (GSFC), Greenbelt, MD - 1 traveler, 3 days including travel days
2. JPSS TIM, GSFC, Greenbelt, MD - 1 traveler, 3 days including travel days

### 6.5 Subtask 2.5 Cost, Programmatic and Engineering Trades Analysis Support: Travel:

- Pre-ship/System Acceptance Review (PSRR), Redondo Beach, CA - 1 travelers, 4 days including travel days

Additional travel requirements may come up during the contract year that are not identified in this statement of work. These travel requirements will be determined by the NASA TM and communicated directly to the contractor.

**MOD 3: The purpose of this mod is to provide additional travel requirements for CERES FM6 integration and test, as well as JPSS-1 life cycle reviews, under 6.4 above:**

**4. NGAS, Redondo Beach, CA- 3 travelers for 5 days for CERES FM6 pack and ship;**

- 5. Ball Aerospace, Boulder, CO- 3 travelers for 5 days for CERES FM6 bench acceptance test;**
- 6. Boulder, CO -3 people for 8 days for CERES FM6 JPSS-1 spacecraft integration;**
- 7. GSFC, Greenbelt, MD- 3 travelers for 3 days for technical interchange meeting;**
- 8. Ball Aerospace, Boulder, Co- 3 travelers for 3 days for technical interchange meeting.**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be

assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-031\_Mod0 CY4

**Task Order Title:** DEVELOP National Program Student Support

## **1.0 Technical POC (TPOC):**

Name: michael.ruiz  
Organization: E3:Science Directorate  
Email Address: Michael.L.Ruiz@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

### **2.1 Description of Contractor Work**

- a. DEVELOP is a Science Mission Directorate Applied Sciences training and development activity. DEVELOP extends NASA science research to benefit society and improve human quality of life. DEVELOP, which includes participation from federal, state and local government, and industry professionals, supports interns who demonstrate to community leaders research project outcomes of NASA science measurements and predictions addressing local policy issues.
- b. This task order establishes Contractor tasks for DEVELOP Program activity. The Contractor shall plan and organize national activities to include participation in relevant conferences, lead weekly National Program meetings, and deliver research results at diverse forums. The Contractor shall mentor and guide interns throughout project execution. The Contractor shall be responsible for editing and proofreading technical papers and abstracts for publication at scientific and public policy forums, and ensuring that the NASA DEVELOP Program activities align with those of NASA's Applied Sciences Program.
- c. The Contractor shall support the DEVELOP Program through assistance in providing science advisor support, generation of Program Plans, logistical support at solicitation panel reviews, and general program management support. Contractor tasks also include supporting the Science Directorate at NASA Langley with general administrative support such as meeting and conference planning. The Contractor shall be responsible for all administrative support necessary to pay student researchers, arrange travel, obtain supplies and equipment, and other related program activities.



d. The contractor shall provide support for general administrative and financial services for the DEVELOP National Program by completing the following requirements:

i. Lead the transition the DEVELOP intern application into an online application,

ii. Create and manage DEVELOP financial tracking and reporting tools,

iii. Complete value of DEVELOP node analysis,

iii. Establish reporting and communication structure, and

iv. Research, analyze and evaluate new business opportunities for DEVELOP, such as a strategy to engage military veterans with DEVELOP.

## 2.2 Description of Intern Consultant Work

a. Interns in the DEVELOP Program shall collaborate to integrate NASA space-based Earth observation sources into research projects. Interns shall collect and analyze NASA and partner satellite and in situ data to conduct example rapid prototype projects that address a community concern and specific program element(s). With guidance from a NASA or partner organization mentor, interns shall execute their project within the allotted 10-week term. Intern consultants shall generate deliverables including: technical paper, presentation, poster, Earthzine virtual poster session submissions, and brochure summaries and images. In addition, consultants shall submit weekly accomplishments to the National Program Office through quad charts, attend weekly staff meetings, and maintain contact with science advisors and partners.

## 3.0 Special Requirements

3.1 Due to the nature of the work, the Contractor shall ensure travel and procurement activities are accomplished in a timely manner to support participant project activities. These activities include air transportation, hotel rooms, registration fees, supplies, conference expenses, etc. The Contractor shall maintain the necessary commercial credit cards to facilitate this activity.

3.2 The Contractor shall travel to NASA HQ, Washington, DC, and other national DEVELOP locations at least eight times during the contract year for approximately 16 days total. There may be additional travel requirements throughout the year. If additional travel requirements are necessary, the NASA TM will communicate the requirements and details of the travel with the Contractor.

3.3 The Contractor shall recognize that some of the work under this task is procurement sensitive information of the United States Government. In the performance of this task, the Contractor shall receive procurement sensitive data and shall generate procurement sensitive

data. The Contractor shall protect all such information in accordance with NASA FAR Supplement (NFS) 1852.237-72, Access to Sensitive Information. All such data shall be marked "Sensitive but Unclassified" and shall be secured at all times from improper disclosure. To safeguard this information, the Contractor shall form a special team to perform the work required by this task. The team shall be formed in a way that will ensure information provided to the team members or generated by the team members in the performance of the task is not transmitted to other employees or management personnel of the contractor or any subcontractor by any means, written or verbal. Further, the team shall not release the information to anyone but Government personnel identified by the Contracting Officer as proper recipients of the information. The Contractor shall ensure that all members of the team working on this task have executed a Nondisclosure Agreement.

3.4 Prior to commencement of this task, the Contractor shall ensure that all personnel working on this task are free from personal conflicts of interest by complying with Federal Acquisition Regulation (FAR) clause 52.203-16, Preventing Personal Conflicts of Interest.

#### **4.0 Schedule/Milestones/Period of Performance**

Period of performance is February 1, 2014 through January 31, 2016.

#### **5.0 Deliverables/Reporting Requirements**

5.1 The Contractor shall provide the following deliverables:

- a. Plan and organize national activities to include participation in scientific and governing agency meetings, conferences, lead weekly National Program meetings, and deliver research results at diverse forums as determined by the NASA TM.
- b. Mentor and guide interns throughout the project execution.
- c. Edit and proofread interns technical papers and abstracts for publication at scientific and public policy forums.
- d. Ensure that the NASA DEVELOP Program activities align with those of NASA's Applied Sciences Program.
- e. Provide logistical support at solicitation panel reviews and general program management support as determined by the NASA TM.
- f. Support the Science Directorate at NASA Langley with general administrative support, such as meeting and conference planning.

- g. Provide all administrative support necessary to pay intern researchers, arrange for travel, obtain supplies and equipment, and other related program activities.
- h. Collaborate to integrate NASA space-based Earth observation source into intern research projects.
- i. Written monthly status report summarizing the activities and progress of the requirements outlined in section 2.0. This report shall be written as a Microsoft Word document and delivered to the Technical Monitor on the first business day following month end by electronic mail.

## **6.0 Other Information Needed for Performance of Task**

6.1 Purchases: Shipping of materials and purchase of supplies may be required to support this effort and will be determined by the NASA TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-032\_Mod2 CY3

**Task Order Title:** Lidar Data Support

## **1.0 Technical POC (TPOC):**

Name: chris.hostetler  
Organization: E304:Atmospheric Composition Branch  
Email Address: Chris.A.Hostetler@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

This task supports NASA Langley Research Center (LaRC) airborne High Spectral Resolution Lidar (HSRL) remote sensing program, and other lidar and satellite analysis projects conducted as part of Department of Energy (DOE) and NASA research programs. The contractor shall support the development of software for lidar data acquisition and real-time data analysis; hardware support, including lasers, detectors, and control systems development, operation, and maintenance; on-site operations, system, networks, and configuration support; data analysis and interpretation support; and documentation, presentation, and publication support.

The contractor shall also assist in the development, implementation, and testing of advanced algorithms for retrievals of atmospheric aerosol profiles from airborne and spacebased lidars. This support includes assisting in the development of appropriate aerosol models and studying the statistical variation of aerosol properties to determine capabilities and limitations of aerosol retrieval techniques.

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, to include but is not limited to, work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The format of technical progress reports (see 5.0, Deliverables) shall be established by the NASA TM.

These reports shall be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

All work specified by the Task Order shall be performed under the following structure.

### **2.1 Work Breakdown Structure**

100 Real-time Analysis Support

110 Lasers, Detectors, Opto-Mechanical, and Control Systems Development/Modification  
120 Lidar operations support (in laboratory and on field missions)  
130 Simulation, Analytical Study, and Data Reduction Support  
140 Documentation, Presentation, and Publication Support  
150 Assist in developing, implementing, and testing advanced aerosol retrieval algorithms. Assist in developing aerosol models and studying statistical variation of aerosol properties to determine capabilities/limitations of retrieval techniques.

## 2.2 Quality and Performance Standards

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS II Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance is monitored through periodic reviews with the TM and through formal semiannual surveys.

Baseline standards include:

- Analysis and interpretations of science data are documented and/or presented within schedules agreed to between the NASA Technical Monitor (TM) and the contractor.
- Lidar measurements are successfully analyzed and archived within schedules agreed to between the NASA TM and the contractor.
- Backups are generated as specified by each point of contact within schedules agreed to between the NASA TM and the contractor.

The contractor shall purchase specialized software and hardware for advanced data analyses associated with new HSRL and Differential Absorption Lidar (DIAL) systems as determined by the TM.

**Mod 1: The purpose of this modification is to provide additional support under 2.1, paragraph 150 above: Assist in developing, implementing, and testing advanced aerosol retrieval algorithms. Assist in developing aerosol models and studying statistical variation of aerosol properties to determine capabilities/limitations of retrieval techniques.**

**Mod 2: The purpose of this modification is to provide the following additional requirements under Section 2.0:**

### **2.1 Work Breakdown Structure**

**160 Provide project coordination and planning to the HSRL Principal Investigator (PI), the instrument development team, and the airborne research investigation team, to enhance the team's ability to effectively plan work and achieve objectives.**

### **2.2 Quality and Performance Standards**

- **Work closely with the PI, scientists, and engineers to identify requirements and establish project objectives.**
- **Attend team meetings in order to provide project management consultation and to understand the project planning requirements of the team.**
- **Plan project tasks and milestones and provide progress updates for the plan.**
- **Work with the project team to identify and mitigate technical, cost and schedule risks.**
- **Develop tailored project planning tools and documents for the PI and project team use.**
- **Develop resource plans, budgets, and procurement plans. Track actuals to the plans and budgets.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data:

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The lidar systems include export controlled technology. The contractor shall work with the NASA TM to comply with the NASA export control policies.

**Mod 2: The Project Coordinator will not have access to the NASA financial system, therefore, NASA will provide, to the Project Coordinator, financial reports showing actual costs, obligations, and commitments in order to monitor progress on the budget plan.**

### **4.0 Schedule/Milestones/Period of Performance**

Task milestones and schedule will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings.

Period of Performance: Task award through January 31, 2016.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide quarterly progress reports (in the form of a Microsoft word document) of the task status of accomplishments electronically via email to the NASA TM. The status of ongoing tasks, results, and issues shall be reported to the TM through informal oral status meetings. The contractor shall deliver the following to the TM at agreed-upon intervals and in specified formats:

- Lidar standard data products
- Lidar experiment simulation results
- Lidar, in-situ, and satellite data analysis products
- Resolution of all systems and configuration problems
- Backup of all units on a prioritized schedule
- Updates of system and standard products
- Papers and journal articles as appropriate

## **Mod 2: The following deliverables are added:**

- **Tailored project planning tools and documents provided to the PI for project team use.**
- **Resource plans, budgets and procurement plans.**
- **Project progress reports and project presentations, as necessary.**
- **Monthly report to the Technical Point of Contact (TPOC) with copy to SSAI STARSS Group Manager.**

### **6.0 Other Information Needed for Performance of Task**

Extensive travel may be required to accomplish the objectives of this task including support for field campaigns. The exact locations, durations, and timings of these campaigns will evolve over the course of the period of performance and will be determined by the TM. As a rough estimate, the contractor shall provide support for approximately 3 Full Time Equivalent weeks of travel. In addition, the contractor may travel to national and international meetings to present the results of task work.

One 4-day trips to TBD national meetings and workshops one 5-day trips to TBD international meetings or workshops.

Additional travel may be required and will be directed by the TM.

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-033\_Mod3 CY3

**Task Order Title:** Support for DACOM, DLH, and Prototype Development Activities

**1.0 Technical POC (TPOC):**

Name: glenn.diskin  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Glenn.S.Diskin@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**Subtask 1:**

- a. The contractor shall provide support for airborne and ground-based sensors currently operating and under development. These sensors include, but are not limited to, the Differential Absorption Carbon Monoxide Measurements (DACOM) airborne instrument, the Diode Laser Hygrometer (DLH) airborne series of instruments, and the Carbon Cycle Column Radiometer (C3R) ground prototype instrument. These instruments all fall under the responsibility of the NASA Technical Monitor. Support shall include preparation of instruments for use on field measurement campaigns; operation and maintenance of instruments in laboratories at NASA Langley, at remote sites, and aboard research aircraft; calibration and characterization of instruments; modifications to instruments, including design and implementation; development and deployment of software necessary to operate instruments; development of software to reduce and analyze experimental data from instruments; and preliminary data analysis. Associated tasks, including but not limited to laboratory organization and upkeep; component specification and characterization; and coordination of instrument shipments; shall also be considered to be a part of instrument support. Critical to this task is the integration of the work into the overall scientific mission being performed. This includes conveying instrumental progress, performance and data to project scientists while on deployment as well as frequent interaction with the staff and management of the Science Directorate.
- b. It is estimated that, due to the heavy utilization of the instruments within the TM's purview, this support will require one full-time mechanical / electronic technology

specialist and one full-time electronic / software specialist, each with at least 10 years' experience with the type of diode laser instrumentation being fielded.

- c. For this subtask, the contractor's performance shall be evaluated on: Timeliness and quality of the instrument support provided. Field campaigns require strict adherence to schedule, and it is imperative that deadlines be met in order to ensure that the data collected will be of the highest quality possible. Post-campaign deadlines for data submission must also be met. The TM will provide to the contractor schedules for the respective field campaigns and schedules for post campaign data submission.

**Subtask 2:**

- a. In addition, the contractor shall also conduct occasional instrument characterization and optimization for the DACOM and/or DLH instruments on an as-needed basis as determined by the TM. These characterizations include but are not limited to assessment of laser spectral and spatial behavior, both static and dynamic, as well as assessment of the performance and stability of the instruments. Following the characterization, the contractor shall be required to place the instrument(s) in an operational configuration suitable for field deployment.
- b. The contractor shall also participate in field measurement campaigns, including but not limited to SEACR4S, DC3, and other campaigns as identified by the NASA TM. Activities shall include operation and maintenance of instruments, participation in test and research flights, and preliminary data processing and archiving. Travel costs for such activities are not included in this subtask. It is estimated that the instruments' development and utilization schedules may require approximately 200 hours per year to accomplish by a senior level instrument scientist.
- c. The contractor's performance shall be evaluated on: (1) Quality of the assessment and of the assessment report, which shall describe the current state of the instrument(s) and of the laser sources upon which it relies; and (2) Timeliness of the characterization and optimization.

**Mod 1: The purpose of this modification is to add a 2013 DISCOVER AQ airborne field campaign to Section 2.0, Subtask 2b.**

**The contractor shall also participate in the 2013 DISCOVER-AQ airborne field**

**campaign conducted in August-October 2013, from the NASA Wallops Flight Facility (integration and test) and from Ellington Field, Houston TX (science phase). Activities shall include operation and maintenance of instruments, participation in test and research flights, and preliminary data processing and archiving. This field campaign will require no more than 400 total hours by a senior level instrument scientist. This 400 hour limit is in place of, not in addition to, the 200 hours described in the original Subtask 2 b. No provision is being added to cover the travel costs associated with this effort, as that will continue to be provided for in a separate task.**

**Mod 2: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing support for instrument development, maintenance, and deployment, as well as data reduction and analysis.**

**Mod 3: The purpose of this Mod is to add a Subtask 3 as specified below:**

**Subtask 3: The contractor shall purchase one mid-infrared laser to be used in an existing airborne science trace gas measurement instrument known as the Differential Absorption Carbon Monoxide Measurements (DACOM). DACOM provides critical measurements of carbon monoxide (CO), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) for a range of airborne earth science investigations, and has been doing so for over 25 years. DACOM utilizes lasers in the mid-infrared portion of the electromagnetic spectrum. This purchase is for a laser to be used as a backup for the laser used to measure CH<sub>4</sub>. Specifications are as follows:**

**a. Distributed Feedback (DFB) Tunable, Single-Mode Interband Cascade Diode Lasers (qty 1)**

- Wavelengths: 1 @ 3314.4 nm**
- Optical power: > 1 mW**
- Injection Current < 200 mA**
- Laser supplied in TO-66 housing**
- Laser must operate as specified without the use of cryogenics, with thermoelectric cooling only**

- **No moving parts will be allowed**

**b. Mounting and collimation accessories for items I**

- **TO-66 housing with TEC and NTC**

- **Black cap for TO-66 mount, with antireflection coated window**

- **Heatsink for TO-66 mount including connectors for electronics and optics**

- **Prealigned lens with standard cage system mounted on TO-66 heatsink**

**3.0 Special Requirements**

Access to Sensitive or ITAR Data: No

Other(Specify): N/A

**4.0 Schedule/Milestones/Period of Performance**

Period of Performance is 03/01/2013 - 01/31/2014.

**Mod 2: The new period of performance is 03/1/2013 through 1/31/2016.**

**5.0 Deliverables/Reporting Requirements**

Quarterly reports describing completed and ongoing activities.

Reports, as required by the TM, on the assessment, optimization, and operation of the DACOM, DLH, and/or other relevant instrument(s).

The format, delivery method and due date of the deliverables will be communicated by the NASA TM to the contractor.

**Mod 3: Delivery date for items in Subtask 3 is no later than August 31, 2014.**

**6.0 Other Information Needed for Performance of Task**

Travel as directed by the TM for visiting scientists or other staff may be required to support this task. Some incidental material purchases, including but not limited to such items as electronic components, lab computer accessories, software packages, storage media, manuals, reference books, and supplies may be required to support the task, as directed by the TM. Some miscellaneous items such as training costs, publication costs, conference fees, and other miscellaneous items may be required to support the task, as directed by the TM.

Expenses for travel for field campaigns DISCOVER-AQ, SEAC4RS, etc., should be not charged to this task.

No additional travel requirements are known currently. If additional travel requirements are necessary during the period of performance, the TM will communicate the requirements directly with the contractor.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number: A-035\_Mod0 CY3**

**Task Order Title: MIDAS**

### **1.0 Technical POC (TPOC):**

Name: Yong.Hu  
Organization: E304:Atmospheric Composition Branch  
Email Address: yongxiang.hu-1@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide support for the following studies:

- 1) Long term climate record quality assessment using Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO)/CloudSat missions cloud, aerosol and ocean data record. This study includes (a) assessment of Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) calibration stability using time series of CALIOP data for various vicarious targets such as water clouds and ocean surface, theoretical assessment of calibration uncertainty associated with multiple scattering; (b) studying time series of CALIOP observation of clouds, aerosols, ocean surface and subsurface backscatter and their seasonal/interannual variation; (c) comparing the observations with climate modeling results, including but not limited to outputs from Intergovernmental Panel on Climate Change (IPCC) models and climateprediction.org.
- 2) Radiative transfer modeling studies for coupled ocean-atmospheric system. This study involves (a) the improvement of the existing coupled ocean/atmosphere full polarization radiation transfer model developed by Dr. Pengwang Zhai; (b) sensitivity study of polarimetric measurements to changes in physical properties of aerosols and ocean biogeochemistry; (3) Research Scanning Polarimeter (RSP)/High Spectral Resolution Lidar (HSRL) data analysis studies relevant to the development of next generation combined lidar/polarimeter retrieval algorithm while collaborating with the HSRL group.
- 3) Developing new scientific algorithms using combined CALIPSO/CloudSat and Glory mission observations. This study is part of the Glory science team activities. It includes (a) develop algorithm to apply Glory observations of ocean surface properties to improve CALIOP ocean surface backscatter assessment; (b) using Glory water cloud microphysical properties and CALIOP depolarization data to derive water cloud droplet

number concentration; (c) ocean sub-surface studies using combined Glory/CALIOP data.

- 4) Using accurate cloud and aerosol observations from active remote sensing to study uncertainties in the Earth Observing System (EOS) cloud and radiation climate record derived from passive remote sensing. This study involves CALIPSO/CloudSat, Moderate Resolution Imaging Spectroradiometer (MODIS) and Clouds and the Earth's Radiant Energy System (CERES) data analysis and radiative transfer calculations to assess uncertainties in atmospheric radiative fluxes.

The contractor shall meet the following performance standards in support of Multi-Instrument DATA Synthesis (MIDAS:)

- Data analyses approaches are demonstrated and documented within schedules agreed upon between the contractor and the TM.
- Analysis and interpretations of science data are documented and/or presented within schedules agreed upon between the contractor and TM.
- Results of studies, investigations, and modeling activities are delivered within schedules agreed upon between the contractor and TM.

The contractor shall provide organizational support to the Pre-Aerosol, Clouds, and ocean Ecosystem (PACE) Mission Applications Representative to organize the relevant applications communities on behalf of PACE. Design a website for PACE Mission Applications to publicize applied sciences activities related to PACE and prepare the community for PACE data for applications of societal benefit. Support and facilitate organizations' and communities' efforts to imagine, articulate, and anticipate possible applications.

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

- Schedule: Schedules will be agreed upon during regular meetings or as requested by the TM.
- Milestones: As established by the TM and agreed to by the contractor.
- Period of Performance: February 1, 2013 through January 31, 2016.

### **5.0 Deliverables/Reporting Requirements**

- The contractor shall provide Quarterly Reports (Microsoft Word document) which include completed and projected accomplishments and metrics reflecting the contractor's success in meeting the performance standards described in Section 2 to the NASA TM via email.
- The contractor shall provide scientific code for improved radiative transfer computations; research algorithms for cloud and aerosol retrievals and other inputs for

documenting technical analyses and scientific studies as determined by discussion with the TM and delivered to the TM in an agreed upon format and time between the contractor and the TM.

- The contractor shall provide collocated active and passive remote sensing data, graphics, and inputs for documenting technical analyses and scientific studies as determined by discussion with the TM and delivered to the TM in an agreed upon format and time between the contractor and the TM.
- The contractor shall produce scientific publications as determined by the NASA TM to report results.
- The contractor shall produce presentations for technical meetings including but not limited to science team meetings as determined by discussion with the TM and delivered to the TM in an agreed upon format and time between the contractor and the TM.

## **6.0 Other Information Needed for Performance of Task**

**One international travel and two domestic travel for CALIPSO, ACE and Glory science conferences/workshops for 1 person;**

Two international travel and two domestic travel for CALIPSO, Glory and ACE science conference/workshops for 1 person;

One international travel and two domestic travel for CALIPSO, Glory and ACE science conference/workshops for 1 person;

Locations of the international travel are likely the CALIPSO meeting in France and ILRC in Greece. Domestic meeting locations TBD.

Additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.



## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-037\_Mod1 CY4

**Task Order Title:** CEOS Science and Engineering Consultation

**1.0 Technical POC (TPOC):**

Name: brian.killough  
Organization: D2:Systems Engineering Directorate  
Email Address: Brian.D.Killough@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

Background Information: The Committee on Earth Observation Satellites (CEOS) is an international organization focused on optimizing the benefits of spaceborne Earth observations through the coordination of instrument and satellite and systems. NASA Langley Research Center (LaRC) is the lead of the CEOS Systems Engineering Office (SEO), which provides systems engineering leadership, conducts systems engineering assessments and develops systems engineering tools to support CEOS initiatives. NASA LaRC will coordinate the release of any information resulting from this task to the CEOS organization.

2.1 The contractor shall perform systems analyses, provide technical management to NASA's United States Group on Earth Observations (USGEO), maintain the CEOS Action Tracking Tool, provide administrative and outreach functions to CEOS, conduct data acquisition planning for several CEOS projects, develop and integrate CEOS's Working Group on Information Systems and Services (WGISS) Integrated Catalog (CWIC) and provide data management for large CEOS datasets.

2.2 The contractor performance shall be evaluated on (a) Completion of milestones and final reports according to the schedules agreed upon by the NASA Technical Monitor and contractor, and (b) Completion of informal status reports summarizing the work completed and future plans according to the schedules agreed upon by the NASA Technical Monitor and contractor.

(1) CEOS Systems Analyses:

The contractor shall manage NASA's inputs to the annual update of the Mission-Instrument-Mission (MIM) database, participate on the CEOS Disaster Risk Management (DRM) team, participate in the Working Group on Climate meetings, developing requirements and architectures, conducting gap analyses and systems studies, and manage the development of an Essential Climate Variable (ECV) inventory.

(2) USGEO Management Analyst:

The contractor shall support NASA Earth Science Division's (ESD) Applied Sciences Program by conducting management analysis and coordination of initiatives with the U.S. Group on Earth Observations (USGEO). This task shall include conducting risk assessments, participation in USGEO workshops, and coordination of NASA's involvement in USGEO and Group on Earth Observations (GEO).

(3) Action Tracking Tool Maintenance:

The contractor shall maintain the operation of the CEOS Action Tracking Tool including minor updates for enhanced functionality and the repair of problems.

(4) CEOS Administrative and Outreach:

a. The contractor shall maintain the current technical content and add new technical content for the CEOS website; the contractor shall maintain the CEOS mailing lists and the technical content of the CEOS Action Tracking database and shall coordinate the development of CEOS education outreach materials and work with the CEOS Working Group on Capacity Building and Data Democracy (WGCapD) to conduct training for systems engineering tools.

(5) CEOS Data Acquisition Planning:

The contractor shall lead data acquisition planning for several CEOS projects including Global Forest Observation Initiative (GFOI) and the Group on Earth Observations Global Agricultural Monitoring initiative (GEOGLAM). This effort shall include development of data acquisition planning documents and utilization of the CEOS Visualization Environment (COVE) tool to perform assessments.

(6) CWIC (CEOS WGISS Integrated Catalog):

The contractor shall provide research and development for CEOS's Working Group on Information Systems and Services (WGISS) and provide design and implementation of the CEOS WGISS Integrated catalog (CWIC). CWIC is the community catalog for satellite data providing search and access to satellite data within partner systems.

(7) CWIC Data Center Integration and Enhanced Functionality:

The contractor shall integrate more data centers into CWIC and enhance CWIC functionality. In addition, the contractor shall work with GEO to integrate CWIC with GEOSS and their data systems. This task shall include detailed metric reporting, updates to CWIC documentation, and periodic progress reports.

(8) CEOS Data Management:

The contractor shall develop the CEOS data management and computing platform hardware and software architecture to support COVE and Earth science datasets. The contractor shall develop a RESTful (Representational State Transfer) Web Service interface for COVE, implement a cloud-based platform for large datasets, investigate Big Data frameworks to support CEOS Earth science datasets, develop mobile applications for COVE, and develop a scalable, multi-touch, videowall application to access the CEOS data management and computing Platform.

(9) Enhancements to the CEOS Mission-Instrument-Measurement (MIM) Database:

The contractor shall develop enhancements and gap analysis tools for the CEOS MIM database. These tools shall consider connections to the COVE tool, detail user-defined gap studies, and links to data products.

**Mod 1: The purpose of this modification is to add a new requirement to Section 2.0 (4) CEOS Administrative and Outreach:**

**2.0 (4) b: The contractor shall revise and modernize the CEOS web portal. The contractor shall include new capabilities for content management (WordPress), meeting registrations, document management, calendar, and keyword search. The contractor shall coordinate updates and reviews with the CEOS Community.**

**3.0 Special Requirements**

None

**4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2014 through January 31, 2015

## 5.0 Deliverables/Reporting Requirements

The contractor shall provide quarterly informal status reports to the Task Monitor (TM) to summarize the work completed and future plans. The contractor shall provide technical reports to NASA TM upon the completion of technical meetings, science and engineering analyses, and upon completion of NASA and CEOS documentation review. These technical reports should be provided in a Microsoft word document and delivered to the NASA TM electronically via email within 7 days of completion of the task. As a technical consultant to NASA, the contractor shall provide recommendations and assessment of the CEOS program plans provided in a Microsoft word document and delivered to the NASA TM via email by an agreed upon timeframe between the contractor and NASA TM.

**Mod 1: The deliverable for Mod 1 is as follows:**

**New CEOS website by December 31, 2014**

## 6.0 Other Information Needed for Performance of Task

The contractor shall be required to support several meetings. The meetings shall include, but are not limited to:

- (1) Multiple Dates, Washington DC - CEOS and USGEO Meetings (1 person, 2 days, monthly)
- (2) April 2014, Toulouse, France - CEOS SIT-29 Meeting (2 persons, 5 days)
- (3) July 2014, Quebec City, Canada – IGARSS Meeting (1 person, 5 days)
- (4) September 2014, Paris, France – CEOS SIT Workshop (2 persons, 5 days)

Additional information regarding the details of travel and/or requirements for travel shall be provided to the contractor by the TM.

## 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such

requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-043\_Mod1 CY3

**Task Order Title:** Data Analysis and Instrument Support for Suborbital Research Platforms

### **1.0 Technical POC (TPOC):**

Name: Mei.Ying.Yang  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: mei.y.yang@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide analysis, technical, and overall cognizance to supporting measurement activities in the laboratory and onboard atmospheric research aircraft in support of sub-orbital flight experiments. This support shall include all instrument testing and preparation for laboratory and field deployment. The contractor shall perform all instrument operation and maintenance while in the laboratory and for airborne applications, perform data analyses, and responsible for archival processes.

2.1 The contractor shall perform the following task requirements:

1. Laboratory testing and calibration of AVOCET (Atmospheric Vertical Observations of CO<sub>2</sub> in the Earth's Troposphere) and the PICARRO system (PAMCO<sub>2</sub> – PICARRO Atmospheric Measurements of Carbon Dioxide) prior to integration on the NASA Dryden DC-8 aircraft for the ASCENDS campaigns\*.
2. carbon cycle research with data from field campaigns including but not limited to Southeast Asia Composition, Cloud, Climate Coupling Regional Study (SEAC4RS), Deriving Information on Surface conditions from Column and Vertically Resolved Observations Relevant to Air Quality (DISCOVER-AQ), and Active Sensing of CO<sub>2</sub> Emissions over Nights, Days, and Seasons (ASCENDS). Additional field campaigns will be communicated to the contractor by the NASA TM.
3. Laboratory testing and calibration of AVOCET prior to integration on the NASA Wallops P3B for the DISCOVER-AQ field campaigns\*.
4. Instrument and data analysis support for the AVOCET instrument for data collected during the DISCOVER-AQ campaign\*.
5. Laboratory testing and calibration of AVOCET and PAMCO<sub>2</sub> prior to integration on the NASA Langley UC12 for an ASCENDS campaign.

6. Continued data analysis support for AVOCET and PAMCO<sub>2</sub> data collected during ASCENDS field campaign\*.
7. Assist TM with any related or remaining field campaign and data analysis items such as uploading the binaries, data, documentations, S/W, etc. onto the NASA Langley Research Center Atmospheric Data Center (NASA LaRC ASDC) servers, and saving these files onto DVDs, instrument development and testing, proposal writing, manuscript publication.
8. Field participation in all field campaigns (for DISCOVER-AQ, ASCENDS and SEAC4RS)
9. Participation in the 9th International Carbon Dioxide Conference in BeiJing, China with presentation of data.

2.2 Performance elements specific to this task are as follows:

1. Laboratory testing and calibration are accomplished within schedules agreed on between the contractor and the TM.
2. Field participation through instrument operation on all airborne platforms is accomplished within schedules agreed on between the contractor and the TM and consistent with respective field deployment requirements.
3. Measurements are captured according to the experiment plans provided by the TM.
4. Data analyses are performed within schedules agreed on between the contractor and the TM, consistent with the requirements and expectations of the field campaign or proposal awarded.
5. Government furnished equipment and property is properly utilized, maintained, tracked and accounted for.
6. Presentation of data at conferences and meetings within the scope agreed on between the contractor and TM.

\*The SEAC4RS, DISCOVER AQ, ASCENDS field campaign dates are variable and will be provided to the contractor by the NASA TM.

**Mod 1: The purpose of this modification is to extend the period of performance end date to include the ASCENDS and DISCOVER-AQ flights scheduled through 2016.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: not applicable

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance is February 1, 2013 to January 31, 2014.

**Mod 1: The new period of performance is February 1, 2013 to January 31, 2016.**



4.1 Major milestones are driven by the ASCENDS, SEAC4RS and DISCOVER-AQ mission schedule:

1. DISCOVER-AQ California campaign flights February 2013
2. ASCENDS campaign flights February 2013 – March 2013
3. Integration on the DC-8 in July 2013
4. Integration on P3 in August 2013
5. DISCOVER-AQ campaign science flights in August - September 2013 (Texas)
6. SEAC4RS campaign flights in August – September 2013 (Singapore)
7. Archival of science data post-campaigns

\*The SEAC4RS, DISCOVER AQ, ASCENDS field campaign dates are variable and will be provided to the contractor by the NASA TM.

**Mod 1: The additional milestones driven by the ASCENDS and DISCOVER-AQ mission schedule under Section 4.1 are as follows:**

8. **ACES (ASCENDS CarbonHawk Experiment Simulator) ground range testing in January 2014 at NASA LaRC**
9. **ACES flight campaign in February 2014 at NASA LaRC**
10. **Integration/test flights on P3 for DISCOVER-AQ in June 2014 at NASA WFF**
11. **Integration/test flights on DC8 for ASCENDS in July 2014 at NASA DAOF**
12. **DISCOVER-AQ campaign science flights in July – August 2014 (Colorado)**
13. **ASCENDS campaign science flights in August 2014 (California)**

## 5.0 Deliverables/Reporting Requirements

The contractor shall provide a semi-annual status and accomplishment report, written in Microsoft word document, for the task delivered electronically to the NASA Technical Monitor via email.

Informal oral meetings shall be held between the contractor and the NASA Technical Monitor at the request of the Technical Monitor as required.

## 6.0 Other Information Needed for Performance of Task

Travel required for field deployments and attendance at conferences and science data meetings

For this contract year, the following estimated travel is required:

In February: 20 days for DISCOVER-AQ travel to Palmdale, CA

In February: 5 days for ASCENDS travel to Palmdale, CA

In March: 14 days for ASCENDS travel to Palmdale, CA and Wallops Island, VA

In June: 5 days for 9th International Carbon Dioxide Conference in BeiJing, China

In July: Integration on the DC8 in support of the SEAC4RS field campaign in Palmdale, CA (5 days)

In August: 5 days integration for DISCOVER-AQ Texas to Wallops Island, VA followed by 5 days in Houston, TX

In September: 10 days for DISCOVER-AQ Texas to Houston TX, followed by 20 days for SEAC4RS in Singapore

In December: 5 days for AGU conference in San Francisco, CA.

Additional travel may be required, including (5 days) to Palmdale, CA for support of SARP field campaign and will be determined by the NASA TM and communicated to the contractor.

\*The SEAC4RS, DISCOVER AQ, ASCENDS field campaign dates are variable and will be provided to the contractor by the NASA TM.

**Mod 1: The following travel requirements are added to Section 6.0 above:**

**Travel to Dryden Aircraft Operating Facility (DAOF) and NASA Wallops Flight Facility to participate in test flights on the P3 and DC8 during the DISCOVER AQ, and ASCENDS flight campaigns.**

**Test flights at each location will require approximately 4 days of travel for each campaign.**

**There will be two field campaigns in 2014.**

**July-August 2014: 20 days of travel for DISCOVER-AQ (Colorado)**

**August 2014: 15 days of travel for ASCENDS (California)**

**Because flight schedules are subject to change, the NASA TM will communicate with the contractor the specific dates of the field campaigns.**

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-046\_Mod2 CY3

**Task Order Title:** CLARREO Science Support

**1.0 Technical POC (TPOC):**

Name: constantine.lukashin  
Organization: E302:Climate Science Branch  
Email Address: constantine.lukashin-1@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

A. The contractor shall perform tasks to support the definition of science requirements for the Climate Absolute Radiance and Refractivity Observatory (CLARREO) mission. The contractor shall perform tasks associated with algorithm development, data analysis, validation, radiative transfer modeling, orbital and sampling analysis, and intercalibration feasibility studies in support of CLARREO pre-Formulation studies. The tasks include, but are not limited to, the following research areas:

1. Development and analysis of simulated CLARREO data sets from existing infrared and visible data and models for the purpose for refining science and measurement requirements including instrument field-of-view, swath width, spectral resolution and range, measurement accuracy and noise, and spacecraft pointing capability.
2. Development and validation of multi-year data sets to be used for orbital sampling studies.
3. Orbital and sampling analyses in support of CLARREO mission scenario analysis to refine requirements for sampling frequency, spacecraft altitude, mission life, and systematic sampling error.
4. Intercalibration feasibility studies of geostationary and low-Earth-orbit visible and infrared sensors including but not limited to Clouds and the Earth's Radiant Energy System (CERES), Moderate Resolution Imaging Spectroradiometer (MODIS), Advanced Very High Resolution Radiometer (AVHRR), Geostationary Earth Radiation Budget (GERB), Scanning Imaging Absorption Spectrometer for Atmospheric Chartography (SCIAMACHY), Infrared Atmospheric Sounding Interferometer (IASI).
5. Development of tools for performing reference intercalibration, including the development of polarization distribution models (PDM).
6. The combination of existing data and radiative transfer models to test CLARREO infrared and visible benchmarking accuracy and information content.

7. Development and evaluation of radiative kernels to be used in the analysis of CLARREO data.
8. Support for science management, website content development, and education and public outreach activities.
9. Logistics planning and support for CLARREO Science Definition Team meetings.

B. The contractor shall assist the Langley CLARREO team in planning and readiness for all major reviews of the mission development. More specifically, it is expected that the contractor shall assist LaRC in the following:

1. Demonstrating that the CLARREO mission objectives are complete and understandable.
2. Reviewing results of on-going trade studies, suggest modifications, and identify any additional studies as determined by the NASA TM.
3. Reviewing measurement requirements and candidate measurement techniques.
4. Contributing to and participating (as determined by the NASA TM) in semi-annual CLARREO Science Definition Team meetings.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015, to provide continuing CLARREO Science support in Section 2.0 above.**

**Mod 2: The purpose of this modification is to include support for the Principal Component Radiative Transfer Model in Section 2.0, A. above:**

- 10. Development, validation, and deployment of the Principal Component Radiative transfer Model (PCRTM) in the InfraRed and Reflected Solar wavelenths domain.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

#### **4.0 Schedule/Milestones/Period of Performance**

**Period of Performance: February 1, 2013 - January 31, 2014**

**Mod 1: The new period of performance is February 1, 2013 - January 31, 2015**

#### **5.0 Deliverables/Reporting Requirements**

1. The contractor shall demonstrate and document algorithm approaches and computer code within schedules as agreed to between the contractor and the NASA TM.
2. The contractor shall document analysis and interpretation of science data in peer-reviewed journal papers, science conference presentations and proceedings, and CLARREO science team meeting presentations.
3. Science results and analyses are required in time for presentation at semi-annual Science Team Meetings (dates will be communicated to the contractor by the NASA TM).
4. Support for science management activities to be completed within schedules as agreed to between the contractor and the NASA TM.
5. The contractor shall submit a monthly report summarizing accomplishments in a Microsoft Word Document and delivered via email to the NASA TM by the last business day of the month.

#### **6.0 Other Information Needed for Performance of Task**

Travel is required to support this task.

Additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM.

For the purposes of planning, the contractor shall travel to 5-6 CLARREO Science Team Meetings, 3 - 4 domestic conferences, and 2 - 3 international conferences no more than 5 days per trip.

#### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such

requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-053\_Mod1 CY3

**Task Order Title:** Advanced Algorithms and Computing Methods

**1.0 Technical POC (TPOC):**

Name: Yong.Hu  
Organization: E304:Atmospheric Composition Branch  
Email Address: yongxiang.hu-1@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

This effort shall support two individual studies.

The contractor shall support study one as follows:

1. Upgrade the ocean color remote sensing data analysis system (SeaDAS) Software program to include an improved treatment of sunlight including multiple scattering in the atmosphere, and surface wave slope distributions consistent Cloud and aerosol lidar/infrared satellite observation (CALIPSO) measurements.
2. Application of this upgrade to ocean color data and combined ocean color and CALIPSO retrievals.
3. Improving theoretical understanding of ocean surface mean square slope and its applications in lidar remote sensing.

This study requires expertise in retrieving wind information from backscattered laser energy. The CALIPSO wind retrieval also requires the estimation of aerosol extinction between the satellite and the ocean surface.

The contractor shall support study two as follows:



1. Studying CALIPSO and High spectral resolution lidar (HSRL) ocean sub-surface backscatter.
2. Deploy ship-based in situ measurements of ocean sub-surface optical properties.
3. Data analysis studies for assessment of CALIPSO/HSRL ocean sub-surface beam attenuation and backscatter profiles using the ship-based measurements.

This study requires expertise in theoretical and experimental ocean optics research, coupled ocean-atmospheric radiative transfer, and in development of advanced retrieval algorithm of ocean optical properties for lidar data analysis.

The contractor shall conduct analysis and testing for water path extinction retrieved from spontaneous Brillouin backscattering intensity using iodine filters for frequency discrimination.

Performance standards are as follows:

1. Software program upgraded based upon schedule agreed to by NASA TM and contractor
2. In situ observations based upon schedule agreed to by NASA TM and contractor

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing advanced algorithms and computing methods support in Section 2.0 above.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 - January 31, 2014

## **Mod 1: The new period of performance is February 1, 2013 through January 31, 2016**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide all the field data collected under this task and provide a contract year end report to the NASA TM in an agreed upon format and schedule between the NASA TM and the contractor.

### **6.0 Other Information Needed for Performance of Task**

Traveling associated with potential field work and presenting results at workshops/conferences (locations and duration TBD).

There are about four field trips (two trips for wave tank experiment at Wallops, each lasts about 7 to 10 days; two trips for shipbased measurements near Gulf of Mexico).

There are about one domestic and one international conference.

additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number: A-056\_Mod2 CY3**

**Task Order Title: NAST Engineering**

**1.0 Technical POC (TPOC):**

Name: allen.larar  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Allen.M.Larar@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide engineering and technical support for the NASA/ National Polar-orbiting Operational Environmental Satellite System (NPOESS) Airborne Sounder Testbed-Interferometer (NAST-I) program; NPOESS is the National Polar-orbiting Operational Environmental Satellite System which has been restructured into the Joint Polar Satellite System (JPSS). This support shall focus on activities to maintain, optimize, and improve instrument hardware performance, while including advancements to instrument command and control, and data acquisition and visualization software. Areas of support include, but are not limited to: dynamic alignment, blackbody, and overall instrument controllers; and data acquisition and display software modules. The contractor shall also support expected checkout and experiment flights of NAST-I by analyzing and interpreting near-real-time NAST-I instrument flight science and engineering data.

**2.1 Performance Standards:**

- a. Supports improvements to and optimization of the NAST-I sensor performance, instrument control, and data acquisition and display software.
- b. Participates in meetings, mostly via telecon, discussing status and results, on schedules agreed upon between the contractor and the Task Monitor (TM).
- c. Updates technical documentation corresponding to hardware and software optimization and improvement activities.
- d. Supports instrument inter-calibration activities.

- e. Supports field checkout and experiment flights per NAST requirements and schedules agreed upon between the contractor and the TM.
- f. Supports activities focusing on flying NAST-I on other aircraft platforms.

**Mod 1: The purpose of this modification is to add additional key milestones in Section 4.0, and to add travel to Section 6.0, as set forth in their respective Sections below.**

**Mod 2: The purpose of this modification is to (1) extend the period of performance for the entire task through January 31, 2016, to continue providing beneficial engineering support which is in the best interest of the project, as well as ensure system repairs and refinements are optimally implemented; and (2) provide an additional requirement in Section 2.1 above:**

**g. Supports instrument calibration and characterization activities.**

### **3.0 Special Requirements**

Other (Specify):

Familiarity with advanced atmospheric sounder systems; thorough working knowledge and experience with Fourier Transform Spectrometer (FTS) systems, with specific and extensive background in high spectral resolution infrared systems. An applications engineer that has experience in the field of optical remote sensing, especially in the infrared domain. Ten years or more experience maintaining, calibrating, and improving Fourier Transform Spectrometers is expected, with particular emphasis in the area of performance optimization for high-altitude aircraft environment implementations.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2014.

**Mod 2: The new period of performance is February 1, 2013 through January 31, 2016**

Key milestones shall include participation in the following:

- a. Ground testing of NAST-I at NASA Langley Research Center (LaRC) (calibration, uplooking, and inter-comparison tests)
- b. Checkout and optimization of the refurbished NAST-I system on the NASA ER-2 aircraft out of Palmdale, CA;
- c. Support Suomi NPOESS Preparatory Project (SNPP) flight activities planned for May 2013 based out of Palmdale, CA;

**Mod 1: The purpose of this modification is to add additional key milestones in Section 4.0, as follows:**

**d. NAST-I performance verification testing and flight readiness improvement activities at LaRC: The contractor shall work with lab test data to further optimize and improve key instrument subsystems (the interferometer command and control, dynamic alignment, data acquisition, and blackbody controller modules and associate software) to address areas of improvement identified from the recent SNPP field mission flights.**

**e. Inter-comparison testing of NAST-I and ground-based Atmospheric Sounder Spectrometer by Infrared Spectral Technology (ASSIST) instruments at LaRC: The contractor shall provide scripts for NAST-I zenith sky viewing and other ground support test equipment, and contribute to NAST-I inter-comparison test implementation.**

**f. NAST-I calibration testing at LaRC: The contractor shall provide traceable calibration targets and other ground support test equipment, and contribute to NAST-I calibration test implementation.**

**g. Performance verification checkout flights conducted on the ER-2 in Palmdale, CA: The contractor shall optimize dynamic alignment system in-flight performance and analyze flight data to verify expected performance is achieved.**

**Mod 2: The purpose of this modification is to add additional key milestones in Section 4.0, as follows:**

**h. Ground testing of NAST-I at NASA LaRC shall include characterization.**

**i. Checkout and optimization of NAST-I changes and overall system performance on the NASA ER-2 aircraft out of Palmdale, CA or on the NASA WB-57 out of Houston, TX;**

**j. Support Suomi NPOESS SNPP flight activities nominally planned for one campaign per calendar year at a TBD base location;**

**k. NAST-I performance verification testing and flight readiness also address areas of improvement identified from recent flight data or ground testing.**

## **5.0 Deliverables/Reporting Requirements**

- The contractor shall deliver engineering and technical results as determined by the NASA TM in an agreed upon format between the contractor and the NASA TM. Schedules for delivering the reports will be agreed upon between the NASA TM and the contractor.

## **6.0 Other Information Needed for Performance of Task**

a. Travel shall be required for instrument performance optimization and instrument flights. The contractor shall travel approximately 2 weeks to Palmdale, CA in support of NAST-I flights. Exact details of the travel will be communicated to the contractor by the NASA TM once flight schedules are finalized.

**Mod 1: The purpose of this modification is to add additional travel requirements to Section 6.0, as follows:**

**b. Travel shall be required for NAST-I calibration testing to be conducted at LaRC, Hampton, VA in August, 2013, for one week.**

**c. Travel shall be required for performance verification checkout flights conducted on the ER-2 in Palmdale, CA, during the Fall 2013 timeframe for one week. Exact details of the travel will be communicated to the contractor by the NASA TM once flight schedules are finalized.**

**Mod 2: The purpose of this modification is to add additional travel requirements to Section 6.0, as follows:**

**d. Travel shall be required for NAST-I calibration testing to be conducted at LaRC, Hampton, VA for one week per calendar year.**

**e. Travel shall be required for performance verification checkout flights conducted on the ER-2 in Palmdale, CA during the Spring of 2014 timeframe for one week. Exact details of the travel will be communicated to the contractor by the NASA TM once flight schedules are finalized.**

**f. Travel shall be required for instrument performance and optimization and instrument flights - approximately 2 weeks to Palmdale, CA or a similar US Base location, once per calendar year.**

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**



Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-058\_Mod0 CY3

**Task Order Title:** Lidar Optical Support

### **1.0 Technical POC (TPOC):**

Name: chris.hostetler  
Organization: E304:Atmospheric Composition Branch  
Email Address: Chris.A.Hostetler@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

This task supports NASA LaRC's airborne High Spectral Resolution Lidar (HSRL) remote sensing program. Specific support tasks include development of prototype interferometers and etalons for use in HSRL-type receivers.

The contractor shall support the LaRC HSRL team as a consultant in characterizing the HSRL receiver interferometers for aerosol and molecular backscatter at 355 nm, 532 nm, and 1064 nm. The contractor shall also work iteratively with the HSRL team to analyze performance tests conducted in the laboratory and in the lidar system, and to perform repairs or modifications to the interferometers as necessitated by the testing. Several repairs and modifications have been identified. They are:

- 1) Continue working with NASA on the iterative tuning of the Piezo-controlled 355 nm interferometer, which includes these subtasks:
  - Performing a preliminary data analysis for the wavefront correction process using NASA test data set to identify any issues with the data.
  - Fabricate a replacement air arm mirror.
  - Modify the replacement air arm mirror based on the wavefront data measurements provided by NASA.
  - Disassemble the 355 nm Piezo interferometer and reassemble making the following modifications
    - Connect the faulty capacitance sensor used to monitor the position of the air-arm mirror
    - Modify the length of the piezo posts such that more dynamic range is available in optical path length adjustment. In the current configuration, one piezo must be operated near the minimum voltage and another near

the maximum to remove tilt. This leaves very little range over which optical path length can be adjusted.

- Replace the air-arm mirror
- Deliver the modified interferometer to NASA

2) Work with NASA on the iterative tuning of the 355 nm Pressure-Tuned (PT) interferometer to remove the as-manufactured tilt error, which includes these subtasks:

- Perform a preliminary data analysis for the wavefront correction process using NASA test data set to identify any issues with the data.
- Analyze test data acquired by NASA on tilt, temperature sensitivity, and wavefront error.
- Compare a NASA-supplied temperature insensitive design with the contractor's design to identify potential causes for temperature sensitivity
- Define additional tests required to develop the required design modifications to improve performance and analyze the data from those tests.
- Measure the Coefficient of Thermal Expansion (CTE) of the current as-built air-arm.
- Design and implement the design modifications to the interferometer.
- Measure the CTE of the new air-arm before assembly of the interferometer.
- Measure the wavefront error and tilt of the as-built interferometer
- Deliver the interferometer to NASA along with guidance on additional tests required to assess residual tilt, temperature sensitivity, and wavefront error.
- Analyze data from these tests and implement the final modifications to the interferometer to reduce tilt, reduce temperature sensitivity, and reduce wavefront error
- Repeat the measurement and correction of tilt and wavefront error as required to achieve a contrast ratio of >100:1

3) Work with NASA on the development of a new optimized 355 nm Pressure-Tuned (PT) interferometer. This includes the following subtasks:

- Analyze and understand test data acquired on the interferometer discussed in item 2.
- Develop a new interferometer design that address the deficiencies of the interferometer developed in item 2. The Contractor shall work with the NASA Team and NASA's mechanical contractor do arrive at a design and mounting approach that enables retrofitting the new device into the HSRL-2 instrument, meets thermal requirements, limits mechanical mounting stresses, and achieves agreed-upon optical performance including a contrast ratio of >100:1. The contractor shall participate in telecons and face-to-face meetings as required with the NASA team and NASA's mechanical contractor to resolve design issues and develop testing procedures.
- Develop a new 355 nm interferometer based on the design concept mutually agreed upon by the Contractor and the NASA Technical Monitor.
- Measure the CTE of the air-arm before final assembly of the new interferometer
- Measure the wavefront error and tilt of the as-built interferometer
- Deliver the interferometer to NASA along with documentation on additional tests as recommended by the contractor to assess residual tilt, temperature sensitivity, and wavefront error.

- Analyze data from contractor's and NASA's tests (as determined by the NASA TM) and implement the final modifications to the interferometer to reduce tilt, reduce temperature sensitivity, and reduce wavefront error
- Repeat the measurement and correction of tilt and wavefront error as required to achieve a contrast ratio of >100:1

The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The contractor shall respond rapidly and effectively to the customer's dynamic, unanticipated, and emergency work requirements by restructuring priorities. The format of technical progress reports (see 5.0, Deliverables) shall be established with the TM to provide maximum value and communication.

These reports shall be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

The contractor shall follow its rigorous ISO, safety, and IT security standards. General quality standards are presented in the STARSS Quality Plan. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.

Performance is monitored through regular teleconferences with the TM.

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

**Other** Task milestones and schedule will be established by the TM and agreed to by the contractor in weekly planning and coordination meetings.

Period of Performance is February 1, 2013 through January 30, 2016

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide quarterly progress reports of the task status of accomplishments in a microsoft word document and delivered electronically via email to the NASA TM. The status of ongoing

tasks, results, and issues shall be reported to the TM through weekly status meetings. The contractor shall deliver the following to the TM as required:

- Studies and reports on interferometer performance issues.
- Design documentation and reports on repairs and modifications, if any, to HSRL interferometer
- Rebuilt 355 Piezo-tuned interferometer
- Rebuilt 355 Pressure-tuned interferometer
- New 355 Pressure-tuned interferometer

## **6.0 Other Information Needed for Performance of Task**

no travel is required in support of this task.

Shipping of materials and purchase of supplies may be required to support this effort as determined by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-059\_Mod3 CY3

**Task Order Title:** Advanced Lidar Retrieval Studies

### **1.0 Technical POC (TPOC):**

Name: chris.hostetler  
Organization: E304:Atmospheric Composition Branch  
Email Address: Chris.A.Hostetler@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

This task supports NASA LaRC's airborne High Spectral Resolution Lidar (HSRL) remote sensing program. Specific support tasks include development and assessment aerosol retrievals using lidar data and combinations of lidar data and data from passive polarimeters.

I. The contractor shall work with the HSRL team and designees (as determined by the NASA TM) to explore aerosol retrieval techniques and the uncertainties in the retrieved products using various combinations of extinction, backscatter, and depolarization profiles. The study shall include assessment of the implementations of autonomous lidar algorithms for satellite-based lidars providing backscatter at 355, 532, and 1064 nm and extinction at 355 and 532 nm. The study may also include retrievals using a combination of lidar data and data from passive radiometric instruments.

II. The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The format of technical progress reports (see 5.0, Deliverables) shall be established with the TM. These technical progress reports shall be used to confirm priorities and current schedule constraints continually, and to communicate the work areas planned for the coming month. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

All work specified by the Task Order shall be performed under the following structure.

1. Update retrieval study objectives and work plan
2. Retrieval algorithm development
3. Retrieval code development

4. Participation in the acquisition and assessment of lidar observations from relevant missions as determined by the TM
5. Testing retrieval code on simulated data, field data acquired from field missions, and other relevant data sources, as determined by the TM
6. Report results in literature and meetings/conferences

**Mod 1: The purpose of this modification is to provide additional contractor support required for this task. The additional support is needed beginning in August 2013, based on an increase in the support required for this phase of the study.**

**Mod 2: The purpose of this modification is to add the development of a turn-key, high-speed hardware-software computing system for use in the office or capable for travel to field mission deployments to Section 2.0 above:**

**III. Turn-key system: The contractor shall develop and test a turn-key hardware-software system to enable rapid operational aerosol microphysical retrievals from lidar data, and the processing of airborne and simulated data cases with it.**

**1. Enables more rapid data processing of data from airborne flights for same-day reporting in the field**

**2. Assessment of speed advances required for future data streams from a satellite instrument streaming data 24x7**

**3. Rapid processing of many thousand simulation cases to assess retrieval uncertainties and sensitivities**

**4. Microphysical parameters can be retrieved in "near real time mode".**

**5. Hardware Requirements:**

**a. Overall system shall have size compact and light enough and rugged enough to be taken on field campaign deployments**

**b. System shall have multiple processing cores**

**c. Cores should be interconnected in "shared-memory"**

**d. Memory shall be at a minimum 128 GB of RAM (or greater, as determined based on future use calculations and database expansion needs.)**

**6. Software Requirements:**

**a. Linux Operating System**

**b. Installed Gcc compiler (normally included in Linux)**

**c. Hierarchical Data Format (HDF)-library and Message Passing Interface (MPI)-library**



**Mod 3: The purpose of this mod is to provide additional iterations to the algorithm and retrieval codes due to the results of the project research, to Section 2.0.I above:**

**a) The contractor shall provide additional iterations to the algorithm and retrieval codes. These include improved error calculations, improvements to the accuracy of the absorption results, and improved characterization of atmospheric dust.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Task milestones and schedule will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings.

Period of Performance is 02/01/2013 through 01/31/2016

**Mod 1: The period of performance for additional contractor support is August 25, 2013 through January 31, 2016.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide quarterly progress reports, in the form of a Microsoft Word document, of the task status of accomplishments to the NASA TM via email. The status of ongoing tasks, results, and issues shall be reported to the TM through informal oral status meetings. The contractor shall deliver the following to the TM at agreed-upon intervals and in specified formats:

1. Implementation of new capabilities in the retrieval code including improvements in processing speed and error computations, particle size distribution retrievals, aerosol absorption
2. Develop User Guide and documentation for retrieval codes and algorithms
3. Install retrieval codes on NASA computer and instruct members of HSRL team on operations (computer will be provided by the NASA TM).
4. Test retrieval code on appropriate simulated data sets
5. Test retrieval code on data sets acquired with HSRL-2 on the Two-Column Aerosol Project (TCAP) mission and on other suitable data sets as determined by the NASA TM; compare retrieved parameters with other available remote sensing and in situ data as determined by the NASA TM.

6. Investigate retrievals with other combinations of lidar data (e.g., 3-beta, 1-alpha) as determined by the NASA TM
7. Report results of algorithm development, code modifications, and code testing with real and synthetic data in appropriate forums including but not limited to workshops, conferences, journal articles

**Mod 2: The purpose of this modification is to add the following deliverables to Section 5.0 above:**

**8. Turn-key computing system:**

- a. Turn-key hardware-software system for high-speed computation of aerosol microphysics from level 2 lidar extinction and backscatter products (due January 31, 2014)
- b. Automated retrieval software compatible with turnkey system.

**Mod 3: The purpose of this mod is to add the following deliverables to Section 5.0 above:**

**9. Characterize error sensitivity:**

- a. Report(s) to the NASA HSRL team describing studies of retrieval error calculations, including a discussion of systematic difference in retrieval induced by changes in input error bar size. If studies reveal that this is a problem in the retrieval, provide a resolution.
- b. Journal article describing random and systematic uncertainty in retrieval output (both microphysics and optical including absorption).

**10. Improve absorption:**

- a. Algorithm and code upgrades that improve retrieval absorption results
- b. Participate in and provide consultation to NASA HSRL team and external scientists for additional comparisons of retrieval results with

**other available in situ and remote sensing data. Provide report(s) describing these comparisons.**

**c. Journal article demonstrating validated absorption retrievals. If this is not possible due to ongoing problems with absorption retrievals, then provide detailed report(s) to the NASA HSRL team explaining ongoing issues and strategy for mitigating them.**

**11. Enable accurate retrieval of non-spherical particles:**

**a. Modifications to the retrieval code to incorporate non-spherical particles.**

**b. Research-quality retrievals for dust measurements in campaign data.**

## **6.0 Other Information Needed for Performance of Task**

Some travel is required on this task, including:

- Travel for field mission support: 4 weeks travel for each of 2-4 field missions for 2 people. Field mission locations will be in the continental US with final locations determined by the TM.
- 3-day trip to the Washington, DC, area to support the ACE Science Working Group meeting
- Trips to workshops and conferences in the US (approximately 2 trips, locations TBD, approximately 5 days per workshop/conference)

Any additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the NASA TM

MOD 3: The purpose of this portion of the modification is to reduce travel as follows:

- Only 1 field mission trip for 1 person for 7 days (destination: Boulder)  
Eliminate second field campaign
- Eliminate CALIPSO/Cloudsat science team meeting.
- Keep ACE meeting travel
- Keep AGU travel.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-060\_Mod1 CY3

**Task Order Title:** CALISPO, CloudSat, CERES and MODIS Production

### **1.0 Technical POC (TPOC):**

Name: seiji.kato  
Organization: E302:Climate Science Branch  
Email Address: seiji.kato-1@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall perform support to the project funded by the National Aeronautics and Space Administration (NASA) Energy Water cycle Study (NEWS) in three technical areas 1) subsetting data separated by cloud object types, 2) assisting in cloud object analyses, and 3) assisting in surface radiation budget analyses. In addition, the contractor shall perform support to the project funded by the National Oceanic and Atmospheric Administration (NOAA) Climate Data Record (CDR) project in areas 1) calibrating Earth Radiation Budget (ERBE) instrument by comparing observed radiances, 2) deriving cloud properties from Advanced Very High Resolution Radiometer (AVHRR); 3) collocating AVHRR pixels with Clouds and Earth's Radiant Energy System (CERES) footprints (convolution) ; 4) computing surface and atmospheric irradiances; 5) time and sampling; and 6) data management support. Furthermore, the contractor shall perform support to the project funded by the NASA Making Earth System Data Records for Use in Research Environments (MEaSUREs) project in four technical areas 1) calibration of ERBE nonscanners (ERBS, NOAA9, and NOAA10), 2) establish ERBE (scanner and non-scanner) top-of-atmosphere (TOA) irradiance accuracy to the level of CERES-derived TOA irradiances, 3) production of surface irradiances for the ERBE period using ERBE-derived TOA irradiances as constraint and estimation of their uncertainties, 4) computation of variability of deseasonalized anomalies for the ERBE and CERES period and contribution of surface, cloud and atmospheric property variability to the irradiance variability.

### **2.1 Technical/Science Support**

I. The contractor shall support the effort analyzing multiple satellite sets and reanalysis including Cloud-aerosol lidar and infrared Pathfinder Satellite Observations (CALIPSO), CloudSat, Moderate-resolution imaging Spectroradiometer (MODIS), CERES, Goddard Earth

Observing System (GEOS) reanalysis , as well as other data sets used in the CERES, CALIPSO and CloudSat projects. The contractor shall develop an algorithm to subset CALIPSO CloudSat CERES and MODIS (CCCM) merged data product, along with CERES Single Scanner Footprint (SSF) data product, depending on cloud object types. The contractor shall perform an analysis to understand variability of surface and atmospheric irradiances and relationship to latent heat flux. In addition, the contractor shall analyze cloud properties as a function of cloud object types and meteorological conditions such as El Niño/Southern Oscillation (ENSO). Furthermore, the contractor shall analyze cloud and aerosol effects on radiation. The contractor shall summarize work/analyses in memos, reports, conference and meeting proceedings, and peer-reviewed scientific journals.

II. The contractor shall support the process of NOAA 9 and NOAA 10 ERBE scanner data using similar algorithms used in the CERES process. The contract shall evaluate the calibration stability of ERBE scanners by, for example, comparing observed radiances and by comparing irradiances with non-scanner derived irradiances. The contractor shall develop algorithms to process ERBE scanner data in a similar way that CERES data are processed and produce the same set of data products produced in the CERES project. The contractor shall perform the validation of the NOAA 9 and NOAA 10 ERBE scanner data product. The validation effort includes the visualization of the NOAA 9 and NOAA 10 ERBE scanner data. The contractor shall summarize work/analyses in memos, reports, conference, and meeting proceedings, and peer-reviewed scientific journals.

III. The contractor shall apply a calibration technique to ERBE nonscanners that estimates the filter function of the shortwave channel, similar to that used in the CERES project. The contractor shall evaluate the resulting calibration and TOA irradiance derived from ERBE nonscanners whether they are at the CERES-derived TOA irradiance accuracy. The contractor shall compute TOA and atmospheric irradiance using ERBE-derived TOA irradiances as constraint, using a similar method used in producing the CERES Energy Balance and Field (EBAF) products. The contractor shall estimate variability of TOA and surface irradiances from deseasonalized anomalies and contribution of surface, cloud, and atmospheric property variabilities to them. Detailed description of the method is given in the proposal by Kato et al. to NASA MEaSUREs and will be provided to the contractor by the NASA TM. The contractor shall summarize work/analyses in memos, reports, conference, and meeting proceedings, and peer-reviewed scientific journals.

IV. The contractor shall attend scientific conferences to present results from these activities once a year.

## **2.2 Data management support**

I. The contractor shall produce CALIPSO, CloudSat, CERES and MODIS merged data product for distribution to the public. The contractor shall revise the merged data by closely

following the revision of CALIPSO, CloudSat, CERES, and MODIS data which can be found on the respective mission's website. The contractor shall work with the NASA Langley Research Center Atmospheric Science Data Center (ASDC) to archive the merged data product for the distribution to the public.

II. The contractor shall work with the Langley Atmospheric Science Data Center (ASDC) to archive the cloud object data products for the distribution to the public. Distribution of the data to the public shall be through the CERES website or through the NASA Langley Research Center ASDC as determined and provided by the NASA TM.

III. The contractor shall produce CERES-like ERBE data products from scanners and nonscanners (ERBS, NOAA9, and NOAA10) for distribution to the public through the CERES website, which will be provided by the NASA TM.

IV. The contractor shall work with the NASA Langley Research Center Atmospheric Science Data Center (ASDC) and NASA MEaSUREs program office to distribute data products produced by MEaSUREs related work described above. The contractor shall attend Earth Science Data System (ESDS) Working Groups meetings organized by the NASA MEaSUREs management. Dates and times of ESDS Working Group meetings will be communicated to the contractor by the NASA TM.

### **2.2.1 Code development**

- a. The contractor shall perform the code development required for subsetting data, irradiance variability analysis, comparison with latent heat flux, and analyzing cloud properties by cloud types.
- b. The contractor shall perform the code development required for producing a set of data products using ERBE data in the same way that CERES data are processed for the distribution.
- c. The contractor shall develop codes to calibrate ERBE scanner and nonscanners, produce surface and atmospheric irradiances, and the variability and contribution analyses. Codes include to those for production, evaluations, visualizations (i.e. plotting), and analyses.
- d. The contractor shall develop and maintain tool kits required for above tasks.

### 2.3 Performance Standards

The contractor performance shall be evaluated on:

- a. Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- b. Required codes and documents are received within time period requested by NASA Technical Monitor; time periods will be agreed upon between the NASA TM and the contractor.
- c. Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor; time periods will be agreed upon between the NASA TM and the contractor.

**Mod 1: The purpose of this modification is to add additional code development requirements under Section 2.1.1 above:**

- e. Convert existing ERBE non-scanner code to support data processing on the AMI x86 chipset. Validate code functionality and operation by comparison with historical datasets.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### 4.0 Schedule/Milestones/Period of Performance

Period of performance is 02/01/2013 through 09/30/2014.

### 5.0 Deliverables/Reporting Requirements

The contractor shall deliver data sets described in Section 2.0 above electronically on a hard drive connected to the CERES main server. The hard drive will be provided to the contractor by the NASA TM. Due dates are:

- 1) By the end of FY2014 for the NEWS project (cloud object data sets described in Section 2.0)



1.1) subsetting data separated by cloud object types,

1.2) cloud object analyses data, and

1.3) surface radiation budget analyses data.

2) By the end of July 2013 for the ERBE project (cloud properties and TOA and surface irradiances described in Section 2.0). Data sets include SSF1degree, CRS1degree, and SYN1degree similar to those produced in the CERES project. Those data sets should be processed and evaluated by the way described in Section 2.0 including

2.1) calibrating Earth Radiation Budget (ERBE) instrument by comparing observed radiances data,

2.2) deriving cloud properties from Advanced Very High Resolution Radiometer (AVHRR) data;

2.3) collocating AVHRR pixels with Clouds and Earth's Radiant Energy System (CERES) footprints (convolution) ;

2.4) surface and atmospheric irradiances comparing with surface observations;

2.5) accounting for proper time and sampling

**Mod 1: The purpose of this modification is to add additional deliverables for software and data products under Section 5.0 above:**

**3) Software and Data Products for additional Code Development:**

**3.1) Software: Updated ERBE non-scanner related algorithms compatible with GNU Compiler Collection (GCC) Gfortran that are capable of production level data processing on the NASA LaRC Archive Modernization through Intergration (AMI) computer system Intel x86 microprocessors. Due date: September 15, 2014.**

**3.2) Data Products: Monthly-averaged regional, zonal, and global estimates of radiation budget parameters identical within acceptable tolerances to historical ERBE data products, including S-4 Regional, Zonal, and Global Averages; S-4G Regional, Zonal, and Global Gridded Averages; S-7 Medium-Wide Field of View Nonscanner Data, and S-10 Nonscanner Earth Radiant Flux and Albedo. The initial AMI compatible code shall be delivered to an AMI cerx86a partition accessible to the TM and other team members within six months of mod start date.**

**3.3) Progress Report: The contractor shall electronically email a monthly progress report in Microsoft compatible format, to the TM by the 10th of each month.**

## **6.0 Other Information Needed for Performance of Task**

Travel is required to at least 2 conferences and/or science team meetings, with a duration of one week each, that are domestic and held in the eastern part of the United States and will be decided by the TM.

Additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-064\_Mod2 CY3

**Task Order Title:** NAIRAS Software System Interface

### **1.0 Technical POC (TPOC):**

Name: christopher.mertens  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Christopher.J.Mertens@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

All work specified by the Task Order shall be performed under the following structure:

- a. The contractor shall maintain the functionality and operation of the real-time version of Nowcast of Atmospheric Ionizing Radiation System (NAIRAS) model and the interface and dissemination of the NAIRAS data products to the public webpage (webpage will be provided to the contractor by the Technical POC).
- b. The contractor shall develop perl and unix scripts for interfacing radiation model codes with On-Line Tool for the Assessment of Radiation in Space (OLTARIS) input/output data.
- c. The contractor shall improve/develop Fortran coding for implementation of environmental, transport, and response models into OLTARIS framework.
- d. The contractor shall support verification and validation of models (models will be determined by the Technical POC and communicated to the contractor) by setting up scripts to run test cases and providing analysis support.

Quality and Performance Standards:

- a. Performance shall be monitored through periodic reviews with the Technical POC and through formal semiannual surveys. The Contractor shall provide a technical status report to the Technical POC in a format and on a schedule as requested.
- b. The format of technical progress reports (see 5.0, Deliverables) will be established with the Technical POC to provide maximum value and communication. These reports will be used to confirm priorities and current schedule constraints continually, and to communicate the work areas of the WBS planned for the coming month. Metrics for delivery schedules will be established and evolved through the planning mechanism of the technical progress reports.

**Mod 1: The purpose of this modification is to add two new requirements to enhance the capabilities of the NAIRAS model in Section 2.0 above, as well as extend the period of performance for the entire task:**

**e. The contractor shall make all necessary improvements to the user interfaces of the NAIRAS model.**

**f. The contractor shall transition the research modules under development into the operational radiation model for testing and benchmarking.**

**Mod 2: The purpose of this modification is to provide radiation modeling, calibration, and data analysis support for the Rad-X project.**

## **2.1 Science instrument calibration and beam tests:**

**The contractor shall:**

**a. Participate in RadX telecons for the purpose of supporting the planning and implementation of the radiation detector calibration campaign.**

**b. Travel to both Lawrence Livermore National Laboratory (LLNL) and Loma Linda University (LLU) Medical Center for the execution of the radiation detector calibration campaign in August 2014.**

**c. Ensure the radiation detectors and dosimeters to be used in the RaDX Balloon Flight Study are properly calibrated to the extent possible with the data obtained during measurements taken at LLNL and LLU.**

**d. Provide a written report to the Technical POC detailing the measurements taken at LLNL and LLU.**

**e. Provide training to the staff participating in the RaDX Balloon Flight Study related to the radiation detection and instrumentation calibration.**

**f. Provide expert advice to the staff of the RaDX Balloon Flight Study concerning other matters related to the use of the radiation detectors and dosimeters during the study begin in September 2014 until completion of the study.**

**g. Provide expert assistance and advice to the RadX staff after the calibration campaign is over.**

## **2.2 GEometry ANd Tracking (GEANT)4 Modeling:**

**The contractor shall perform Galactic Cosmic Ray (GCR) transport calculations through the Earth's atmosphere using the Monte Carlo Geant4 code as set forth below:**

**a. The GCR transport simulations shall be analyzed to provide input and guidance to the RaD-X science team in the refinement of the project science traceability matrix and design architecture of the science payload.**

**b. The contractor shall develop algorithms to analyze RaD-X detector calibration data and RaD-X flight data.**

**c. The contractor shall analyze the results to assist in achieving the major RaD-X project science milestones as follows: (1) refining the science requirements, (2) science detector calibration analysis algorithms, and (3) the processing of science detector flight data. The schedule and specific tasks associated with these major milestones are specified in the RaD-X detailed project schedule, and will evolve over the execution of the mission.**

## **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): specific computer codes are ITAR controlled. the specifics of these codes will be communicated to the contractor by the NASA Technical POC.

#### **4.0 Schedule/Milestones/Period of Performance**

Task period of performance is 02/01/2013 through 01/31/2014.

**Mod 1: The new period of performance is 2/1/2013 through 1/31/2016.**

#### **5.0 Deliverables/Reporting Requirements**

- a. The Contractor shall deliver OLTARIS perl and unix scripts and fortran routines to implement improved environmental transport and response models in an agreed upon format and on an agreed upon schedule between the Technical POC and the contractor.
- b. The Contractor shall deliver scripts to run verifications and validation test cases to the Technical POC in an agreed upon format and on an agreed upon schedule between the Technical POC and the contractor.
- c. The Contractor shall provide monthly progress reports developed in Microsoft Word and delivered to the Technical POC via email by the last business day of the month.

**Mod 1: The following deliverables are added for the NAIRAS model:**

**d. The contractor shall deliver the Code to the Technical POC (in an agreed upon format) for the improved interface modules by 1/31/15.**

**e. The contractor shall deliver the Code to the Technical POC (in an agreed upon format) for the operational modules by 1/31/16.**

**Mod 2 Deliverables for Section 2.1 above:**

**a. Written Report by Sep 2014**

**b. Monthly Status Reports by the 5th of each month**

**c. Mod 2 Deliverables for Section 2.2 above:**

**d. GCR transport simulation output files and corresponding plots**

**e. Source code and installation/build/makefiles and output files and corresponding plots to analyze RaD-X detector calibration and flight data.**

**f. Monthly progress reports (by the 5th of each month in Microsoft Word format) documenting progress with the Geant4 simulations.**

**g. Status and progress updates at the bi-monthly Space Weather Group Meetings.**

**6.0 Other Information Needed for Performance of Task**

no travel is required for this task.

**7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

**8.0 Safety**



Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-065\_Mod0 CY3

**Task Order Title:** Science Directorate Management Support

**1.0 Technical POC (TPOC):**

Name: rebecca.bales  
Organization: E3:Science Directorate  
Email Address: Rebecca.W.Bales@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**2.1 Administrative Support**

a. The Contractor shall provide administrative support to the Science Directorate staff. This support shall include preparing travel authorizations and vouchers (both foreign and domestic) for NASA employees utilizing the NASA electronic travel system to initiate requests, make employees travel and lodging reservations and assisting with preparation of travel vouchers when requested. This travel support shall also include invitational travel orders for non-NASA personnel as required. All documentation related to foreign travel shall be prepared and delivered to the appropriate personnel for completion. The contractor shall assist Science Directorate managers in monitoring travel budget forecasts and expenditures. The contractor shall make arrangements for visitors, both foreign and domestic, which shall include the completion of all required documentation and communication with all NASA offices associated with approving/regulating visitors. The Contractor shall utilize Microsoft Office software to prepare correspondence, presentations, forms and other administrative documents in accordance with NASA Correspondence Management and Communications Standards and Style, and Langley Office Correspondence Procedures guidelines. Final products shall be delivered to the requestor in the format requested, hardcopy or electronically. Contractor shall assist with the preparation of Technical Publication submittal and approval via the Langley electronic LF 99 system. Other support shall include answering the telephone,

receiving/greeting visitors, receiving and responding to e-mails, setting up meetings utilizing NASA's electronic calendar system, photocopying, facsimile transmission, processing incoming and outgoing mail, shipping, receiving, filing, and file maintenance. The contractor shall also assist, as determined by the NASA TM, in the preparation of citations and awards. The Contractor shall make arrangements for on- and off-site meetings which shall include, but is not limited to, reserving the venue, ensuring all attendees are made aware of the agenda, and arranging for all meeting equipment (i.e., presentation aids). The contractor shall maintain an inventory of all supplies. When inventory reaches a reorder point, the contractor shall report to NASA point-of-contact (as determined by the NASA TM) for reorder. The Contractor shall initiate and submit orders for NASA Agency Consolidated End-User Services (ACES) service via the ACES Online Delivery system and ACES catalogue as determined by the NASA TM. Access to the ACES system and catalogue will be provided to the contractor by the NASA TM.

#### b. Performance Standards

The contractor performance shall be evaluated on:

1. Correspondence and other tasks performed are free of errors
2. Required correspondence and tasks are performed within time period requested by NASA Technical Monitor

### 2.2 Program Analysis and Control Support

The Contractor shall provide program analysis and control services to assigned technical projects/activities within the Science Directorate as determined by the NASA TM. The Contractor shall provide resources planning, budgeting, control, analyses, documentation and reports on assigned projects. Duties include participating in project formulation and setup activities, monitoring and analyzing project resource plans versus actuals, out-year planning, identification of contingency/replanning opportunities, and preparation of required financial planning, control, or reporting documents.

The Contractor shall determine fiscal budget and workforce resource requirements and allocations based on priorities and needs and controls expenditures. The NASA TM will work with the Contractor to establish deadlines based on Government priority. The contractor shall meet agreed upon deadlines based on Government priority and established work request procedures when accepting work. The Contractor shall respond to ad hoc customer inquiries. Customers include

management, engineers and scientists at LaRC, other Centers, NASA Headquarters and Industry.

The Contractor shall develop integrated monthly and specialized reports for assigned projects as determined by the NASA TM. Specific products will be communicated by the project manager and/or Science Directorate management, and typically include (1) analysis of budget plans versus actuals by cost element (procurement, labor, travel and pools), (2) interpretations of financial reports, (3) analysis of workforce plans versus actuals, (4) preparation of specialized analytical reports, charts, and exhibits as requested, and (5) preparation and tracking of project's purchase requisitions.

The Contractor shall use the Government applications SAP, Business Warehouse, Workforce Integrated Management System (WIMS), Programmatic Template (PT), and Funds Control System (FCS). The Contractor shall enter, maintain, retrieve, analyze, and manipulate resource data and provide status to LaRC project management as requested. Data input shall be loaded into PT, Project Management Tool (PMT), the Funds Control System and the Electronic Purchase Request System (EPRS).

Performance Standards:

Contractor performance shall be evaluated on:

1. Analysis and products are free of errors
2. Analysis and products are delivered in accordance with deadlines established by project managers, Science Directorate management, and Government budget process activities.

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of performance is 02/01/2013 through 01/31/2016.

Schedules and milestones will be provided to the Contractor by the NASA Technical Monitor.

## 5.0 Deliverables/Reporting Requirements

### Deliverables:

2.1 The contractor shall provide monthly status reports electronically to the NASA TM at an agreed upon time and format between the NASA TM and the contractor.

2.2 The contractor shall

- Deliver integrated monthly and specialized reports for assigned projects in an agreed upon format and schedule between the NASA TM and the contractor.
- Deliver completed budget formulation and execution actions per established Government budget processes and deadlines in an agreed upon format and schedule between the NASA TM and the contractor. The government budget processes and deadlines will be communicated to the contractor by the NASA TM.

### Reporting Requirements:

2.1 The contractor shall

- Support the Science Directorate with general administrative support, including but not limited to meeting and conference planning.
- Provide all administrative support necessary to arrange for travel, obtain supplies and equipment, and other related directorate activities.
- Additional schedule and milestones will be provided to the Contractor by the NASA Technical Monitor as required.

## 6.0 Other Information Needed for Performance of Task

No travel or purchases are required in support of this task.

## 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## 8.0 Safety

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-068\_Mod2 CY3

**Task Order Title:** ASCENDS

**1.0 Technical POC (TPOC):**

Name: Byron.Meadows  
Organization: D208:Laser Remote Sensing Branch  
Email Address: byron.l.meadows@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall support the development and validation of measurement technologies, techniques and mission concepts for the ASCENDS, Carbon Hawk, and other related projects. This effort shall include the development of software for conducting simulations, analytical studies, and data reduction associated with atmospheric remote sensing projects:

- a. The contractor shall develop hardware and software for data acquisition and real-time analysis systems for atmospheric science investigations.
- b. The contractor shall develop, operate, and maintain lasers, detectors, control systems, and other elements of integrated remote sensing systems.
- c. The contractor shall provide on-site operations, systems, networks, and configuration support of the ASCENDS program.
- d. The contractor shall provide hardware support for lasers, detectors, control systems, and other elements of these remote sensing systems.
- e. The contractor shall support the planning, logistics, and execution of field experiments.
- f. The contractor shall document the analysis and interpretations of science data in informal reports, papers, and journal articles.

2.1 Performance standards are as follows:

- a. Analysis and interpretations of science data are documented and/or presented within schedules agreed to between the Contractor and NASA Technical Monitor.

b. Measurements are successfully captured and archived within schedules agreed to between the Contractor and NASA Technical Monitor.

c. Laser and LIDAR system components and subsystems are successfully developed and operated within schedules agreed to between the Contractor and NASA Technical Monitor.

d. Remote and in-situ measurement systems are developed, integrated, and tested on NASA airborne sciences platforms such as the UC-12, B200, DC-8, P3, and Global Hawk within schedules agreed to between the Contractor and NASA Technical Monitor.

e. Planning and execution of airborne science field experiments are successfully developed and executed within schedules agreed to between the Contractor and NASA Technical Monitor.

f. Support for the development mission concepts responsive to NASA mission needs is provided within schedules agreed to between the Contractor and NASA Technical Monitor.

**Mod 1: The purpose of this modification is to add additional analysis for lidar data to Section 2.0 above, as well as extend the period of performance for the entire task:**

**g. The contractor shall analyze differential absorption Intensity-Modulated Continuous-Wave (IM-CW) lidar data to determine CO<sub>2</sub> column amounts, ranging capabilities, and the impacts of clouds on CO<sub>2</sub> column estimates; the contractor shall then compare the lidar data with in situ and other sensor observations.**

**Mod 2: The purpose of this modification is to change the Technical Monitor from Mary DiJoseph, to Byron Meadows.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A



#### 4.0 Schedule/Milestones/Period of Performance

- Period of performance is February 1, 2013 through January 31, 2014.
- Milestones and schedules are as agreed to in monthly planning and coordination meetings between the Contractor and NASA Technical Monitor.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task:**

**Period of performance is February 1, 2013 through January 31, 2015.**

#### 5.0 Deliverables/Reporting Requirements

The contractor shall deliver following to NASA Technical Monitor at agreed upon intervals and in specified formats between the NASA TM and the contractor:

- a. Experiment simulation results.
- b. Passive and active remote sensing, in situ, and satellite data analysis products.
- c. Resolution of all systems and configuration problems.
- d. Updates of system and standard products.
- e. Informal meetings as needed at the request of the customer.
- f. Contractor shall provide quarterly reports on progress, results, and issues electronically to NASA Technical Monitor
- g. Papers and journal articles as appropriate.

**Mod 1: The purpose of this modification is to add an additional deliverable to Section 5.0 above:**

**h. CO2 column estimates from clear sky measurements, CW lidar range accuracies, and retrieved results of CO2 amounts in various meteorological conditions.**

#### 6.0 Other Information Needed for Performance of Task

No travel requirements for this task.

Miscellaneous software or equipment purchases may be required and will be determined by the NASA TM and communicated to the contractor.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-069\_Mod3 CY3

**Task Order Title:** ASCENDS Science Assessment & Evaluation

### **1.0 Technical POC (TPOC):**

Name: syed.ismail  
Organization: E304:Atmospheric Composition Branch  
Email Address: syed.ismail-1@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

#### Overview

This task will provide science expertise and advice for the Active Sensing of CO<sub>2</sub> Emissions Over Nights, Days and Seasons (ASCENDS) mission implementation to ensure the satisfactory accomplishment of the mission science objectives. The ASCENDS mission will enhance understanding of the role of carbon dioxide (CO<sub>2</sub>) in the global carbon cycle.

#### Description of Work

The contractor shall provide the technical staff to perform the following work.

All work specified by the Task Order will be performed under the following structure.

#### 2.1 Outline of Work

1. The contractor shall develop input to the specification for the ASCENDS Design Reference Mission, including:

Science objectives with traceability to measurement requirements and instrument performance requirements as an input to the space flight instrument conceptual design.

2. The contractor shall conduct analysis to ensure that the scientific data to be returned from the Design Reference Mission meets the needs of the NASA ASCENDS science team. Analysis results are documented in formal ASCENDS Systems Engineering Reports (SER's). The NASA TM will provide the format for the ASCENDS SER's.
3. The contractor shall complete assessment and evaluation of scientific requirements for the ASCENDS Project Manager and Project Scientist.
4. The contractor shall develop inputs to publications for peer reviewed journals and presentations at scientific conferences. Inputs are documented via formal memoranda to the NASA TM or ASCENDS SER's.
5. The contractor shall attend, as determined by the NASA TM, the following Scientific conferences:  
  
Fall American Geophysical Union (AGU), San Francisco, CA, December 2013 for 5 day attendance at the conference.  
  
American Meteorological Society Annual (AMS) Meeting, January 2014, for 5 day attendance at the conference.  
  
The 9<sup>th</sup> International Carbon dioxide Conference (ICDC9), Beijing, China, June 3-7, 2013
6. The contractor shall complete definition and assessment of algorithms, products, and data validation plans. These instructions are documented in writing via informal memoranda or e-mails to the NASA TM. Analysis and interpretation of science data are documented and/or presented within schedules agreed to between the contractor and NASA TM.
7. The contractor shall support the development of science requirements and specifications to develop modeling for measurement requirements.

8. The contractor shall conduct flight planning and coordination to meet science objectives during the DC-8 Flight Campaign at Palmdale, CA during February-March, 2013. Attendance of the contractor during the DC-8 Flight Campaign in the first week of science flights is required. Exact dates of the mission will be provided to the contractor by the NASA TM.
  
9. The contractor shall conduct a Study of the Impact of 1.27 micron Airglow on the Determination of Ground Pressure by Laser Absorption Spectroscopy of Molecular Oxygen. The study is focused on evaluating the impact of airglow broadband radiation on ASCENDS CO<sub>2</sub> measurements. This is one of elements of the error budget for measurement uncertainties of CO<sub>2</sub> for ASCENDS. The contractor shall refine the analysis of the impact of airglow on Satellite-Based Laser Remote Sensing of Surface Pressure in the 1.3 μm band, present results at the Fall Meeting of the AGU and write and submit a paper to Journal of Geophysical Research – Atmospheres, and respond to reviewer comments.

## 2.2 Quality and Performance Standards

- A. Specific task quality requirements are established with the TM on a continual basis during the performance of the task.
  
- B. This work WILL NOT require Capability Maturity Model Integration (CMMI) Level 2 processes for Systems Development.
  
- C. Performance is monitored through periodic reviews with the TM and through formal semiannual evaluation of the task. The contractor shall provide a technical status report to the TM in a format and on a schedule as determined by the NASA TM and agreed upon with the contractor.

**Mod 1: The purpose of this modification is to add additional requirements under**

**Section 2.1, Item 9, above, as a direct result from the Peer Review Team's recommendations:**

**a. The contractor shall complete calculations and analysis to produce time dependent estimates of stimulated emissions; evaluate results of calculations; and incorporate these new results into the existing manuscript.**

**b. The contractor shall modify and submit the manuscript of the Airglow paper to the Journal of Geophysical Research (JGR) for review.**

**c. The contractor shall respond to reviewers comments and submit for final publication.**

**Mod 2: The purpose of this modification is to (1) extend the period of performance for the entire task through January 31, 2015 to provide continuing science expertise for the ASCENDS mission; and (2) remove requirements under Section 2.1, Items 3, 4, 6 and 7 above, as they are no longer needed for future work; and (3) remove January 2014 AMS travel requirement and replace with ASCENDS Community Workshop in FY 2014 (details TBD) in Section 2.1, Item 5, for estimating purposes.**

**MOD 3: The purpose of this modification is to provide additional support under 2.1, Item 9 above, due to the expansion of the manuscript elements and responses from journal reviewers as well as the ASCENDS peer review team.**

**Item 9: i. Following the unexpected addition of**

**calculations as requested by the Technical Point of Contact (TPOC) which expanded the scope of the manuscript, and due to the extensive recommendations by the Journal Reviewers, the contractor is requested to modify the manuscript and prepare for final review and publication.**

### **3.0 Special Requirements**

The contractor shall sign a Non-Disclosure Agreement in order to support this task.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2014.

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2015.**

### **5.0 Deliverables/Reporting Requirements**

#### 5.0 Deliverables

The contractor shall provide the following deliverables via e-mails with attached Microsoft word, or power point, or excel documents as determined by the NASA TM:

- 5.1 Draft science traceability matrix (April 30, 2013)
- 5.2 Analysis of March 2013 aircraft campaign data (October 30, 2013)
- 5.3 ASCENDS Systems Engineering Reports (as needed)
- 5.4 Draft mission error budget (June 30, 2013)
- 5.5 Trip reports from each trip to the AGU, AMS, and ICDC9 conferences, and the DC-8 Flight Campaign

5.6 Respond to reviewer's comments of the Airglow paper submitted to the JGR and revise by end of June (deliverable--response document, June 30, 2013)

**Mod 1: The purpose of this modification is to add an additional**

**deliverable under Section 5.6 above:**

**a. Revised and published manuscript entitled, “Estimate of the Affect of Ambient O<sub>2</sub>(a<sup>1</sup>D<sub>g</sub>) in the Atmosphere on Satellite-Based Laser Remote Sensing of O<sub>2</sub> Columns using the Absorption Lines of O<sub>2</sub>(a<sup>1</sup>D<sub>g</sub>)”. Document shall be delivered to TM in a Standard Electronic Form such as MS Word, or Adobe PDF (December 31, 2013)**

**Mod 3: The purpose of this modification is to add an additional deliverable under Section 5.6 above:**

**b. Final manuscript for publication in the Journal of Geophysical Research**

## **6.0 Other Information Needed for Performance of Task**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**



In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-071\_Mod5 CY3

**Task Order Title:** SAGE III Assessment & Refurbishment

**1.0 Technical POC (TPOC):**

Name: Dianne.Cheek  
Organization: E6:Flight Projects Directorate  
Email Address: dianne.l.cheek@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**Electronic Systems Branch Support (D203)**

Power Supply:

The contractor shall provide power system design and development for SAGE III. This includes designing power distribution units that include relays, fuses, DC-DC converters, and filters; understanding EMI/EMC related issues associated with the system design; performing analytical and/or predictive modeling to characterize the system/sub-system power and energy storage capabilities; and analyzing the power system for reliability and fault tolerance.

Deliverable: The contractor shall deliver the Power System Design to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

ISS Requirements:

The contractor shall review and identify applicable International Space Station requirements for SAGE III. The contractor shall maintain the SAGE III requirements documents and database. The contractor shall perform the SAGE III verification activities including verification planning, verification requirement development, verification procedure development, verification assessment, and development of the SAGE III verification end-item data package in support of the ISS Certificate of Flight readiness (CoFR). Up to four 2 day trips to JSC shall be required.

Deliverable: The contractor shall deliver documentation of ISS Requirements for SAGE III and SAGE III Verification End-item data package to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

EEE Parts:

The contractor shall provide Electrical, Electronic, and Electromechanical (EEE) part specification and market research support. The contractor shall perform research on EEE parts availability based on the guidance / recommendations of Project engineering. The contractor shall determine if recommended parts are available from prospective vendors within Project schedule requirements. Based on information obtained, the contractor shall develop purchase recommendations for project approval. The contractor shall support project parts status tracking.

Deliverable: The contractor shall deliver the EEE part specifications and market research results to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

### **Remote Sensing Flight Systems Branch Support (D204)**

#### Interface Adaptor Module Requirements and Development:

- i. The contractor shall develop and maintain the system requirements and the architecture of the Interface Adaptor Module (IAM). The IAM is used to interface between the International Space Station Avionics with the SAGE III Integrated Pallet which consists of the SAGE III Instrument, Hexapod, Contamination Monitoring Packages (CMP) and the Disturbance Monitoring Package (DMP). Functions of the IAM include: power distribution, data processing, data storage, communication with SAGE III, Hexapod and ISS, health and status telemetry collection and distribution, science telemetry collection, storage and playback through ISS, and interfaces for a contamination monitoring package and a disturbance monitoring package.
- ii. The contractor shall provide system engineering support for the development of hardware and software requirements and develop the interface control documents for the IAM, CMP, and DMP. The contractor shall provide software engineering expertise for the development of IAM flight software for the IAM engineering and flight units. This work shall include software architecture, design, code, and testing. The contractor shall perform architecture development and design of firmware and complex electronics required for the IAM and CMP components. In addition, the contractor shall develop design of the flight memory board that will reside in the IAM. The contractor shall develop IAM documentation that is required as part of NASA 7150.2A.
- iii. The contractor shall perform IAM integration and testing, including integration of IAM boards and box-level acceptance testing which will take place in facilities at NASA Langley Research Center. There will be additional system integration testing that will occur with Hexapod at Alenia's facilities in Turin, Italy, testing of software at JSC and testing of mechanical and electrical interfaces at KSC.
- iv. The contractor shall develop documentation and presentations for the following reviews for the SAGE III Integrated Pallet: CDR scheduled in February 2013 and SIR and IAM, CMP, and DMP subsystem System reviews. In addition, the contractor shall attend and provide technical input for vendor reviews for components that Langley is procuring on contract. The contractor attending and providing technical input for vendor reviews for components that Langley is procuring on contract shall have a non-disclosure agreement.
- v. Travel shall include four 3-day trips to vendor sites in CA or AZ for environmental testing and product review; two 2-day trips to JSC for communication testing; and two 2-day trips to KSC for interface testing. One 5-day trip to Turin, Italy to test IAM and HEU/Hexapod interface.

Deliverable: The contractor shall deliver the IAM System requirements, interface control document, IAM integrated testing results, presentation and analyses supporting project life

cycle reviews to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

Electrical Engineering:

- i. The contractor shall support the development of the system requirements and the architecture of the Interface Adaptor Module (IAM). The IAM is used to interface between the International Space Station Avionics with the SAGE III Integrated Pallet which consists of the SAGE III Instrument, Hexapod, Contamination Monitoring Packages (CMP) and the Disturbance Monitoring Package (DMP). Functions of the IAM include: power distribution, data processing, data storage, communication with SAGE III, Hexapod and ISS, health and status telemetry collection and distribution, science telemetry collection, storage and playback through ISS, and interfaces for a contamination monitoring package and a disturbance monitoring package.
- ii. The contractor shall provide engineering expertise for the development of hardware requirements and interface control documents for the IAM, CMP, and DMP. The contractor shall develop, test and document the Power Distribution Unit which will include both the engineering and flight IAM Units. In addition, the contractor shall design of the Solid State Memory Card that will reside in the IAM. The contractor shall provide IAM documentation that is required as part of NASA 7150.2A. The contractor shall design GSE test equipment, cables (flight and engineering) and procedures. The contractor shall provide IAM integration and testing, including integration of IAM flight boards and box-level acceptance testing which will take place in facilities at Langley Research Center. There will be additional system integration testing that will occur with Hexapod at Alenia's facilities in Turin, Italy and at the Kennedy Space Flight Center. The contractor shall support subsystem and milestone reviews including CDR, PER, and SAR.

Deliverable: The contractor shall deliver hardware requirements and board design for IAM and integration and test results to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

**Flight Software Systems Branch (D207)**

Flight Software Programming:

- i. The contractor shall provide programming for the SAGE III project flight software and ground support equipment in C/C++ and assembly language. The contractor shall provide programming for embedded systems in the flight hardware, ground test equipment, and instrument mockups. The contractor shall also provide programming for ground data processing equipment. The contractor shall develop documentation of the code design, functionality, and processing. All software shall be developed and maintained in a CMMI environment. Education requirement is BS degree or higher in Computer Science. The contractor shall be able to work independently and within an engineering team. Deliverables shall include fully tested software code of defined systems and associated documentation on software implementation and execution.
- ii. The contractor shall provide support to update to SAGE III Documentation and to update and execute software.

Deliverables: The contractor shall deliver the IAM flight software and ground support software and updated software documentation to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

## **Systems Engineering & Integration Office (D209)**

### Systems Engineering Support:

The contractor shall provide SAGE III systems engineering technical input on an episodic basis. The objective of the systems engineering consulting is to rapidly address questions or issues that arise concerning the legacy SAGE III design, implementation, and/or performance.

**Deliverable:** The contractor shall deliver technical input supporting project lifecycle reviews to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

## **Systems Integration & Test Branch (D210):**

### Instrument Maintenance, Integration, and Test:

- i. The contractor shall plan and perform quarterly maintenance testing of the SAGE III flight instrument according to established processes and procedures. The contractor shall prepare test reports and perform analyses of instrument telemetry and maintain a record of instrument performance trends from these tests.
- ii. The contractor shall maintain and certify Ground Support Equipment.
- iii. The contractor shall update legacy test plans and procedures to comply with current NASA and NASA LaRC center processes and procedures and identify areas where processes and procedures can be improved.
- iv. The contractor shall support preparations and the conduct of the SAGE III sun/moon look test and support analysis of sun look test data.
- v. The contractor shall monitor and maintain legacy SAGE III bonded stores.
- vi. The contractor shall perform SAGE III experiment integration test plans, facility assessments and other activities associated with environmental testing of spaceflight developmental and flight hardware.
- vii. The contractor shall plan and conduct integration of the SAGE III experiment pallet.
- viii. The contractor shall perform integrated environmental testing of the Instrument Payload and preparation for the System Integration Review (SIR).
- ix. Purchase of some miscellaneous items to support instrument/flight hardware development and laboratory testing may be required, as directed by the TM. These items include, but are not limited to, circuit boards, microprocessor boards, data storage devices, electronic memory devices, electrical/electronic connectors, test devices, electro-optical components, software programs, computing equipment, interface devices, and other similar miscellaneous items. Other items include training costs for essential skill training and for required NASA certifications, publication costs, and conference registration fees, as directed by the TM.
- x. The contractor shall monitor and maintain B1250 Clean Room and surrounding lab area in accordance with the SAGE III Contamination Control Plan.
- xi. The contractor shall provide support to update SAGE III Documentation and to update and execute software.

**Deliverables:** The contractor shall deliver maintenance testing of flight hardware and GSE, instrument and integrated payload integration and testing results, facility cleanliness as defined by SAGE III Contamination Plan, Sun/moon look test results, SAGE III Bonded Stores to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

## **Flight Projects Directorate (E6)**

Project Management: The contractor shall provide project management support to the SAGE III Project Management Team. The contractor shall develop and review project products including plans, procedures, agreements, briefings, schedules, cost estimates, integrated baseline, risk items, and EVM reports. Participation in team meetings, either on-site or via WebEx/telecom, will be scheduled using MS Outlook. Document review will use either email routing or NX routing. Working knowledge of NASA and Langley flight project management practices and requirements, legacy SAGE III missions, MS Office products, Adobe, WebEx, and NX is required.

**Deliverable:** The contractor shall provide Project documents used for SAGE III lifecycle reviews to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

Technical Editing: The contractor shall provide document review for content flow and appropriate grammatical application and technical editing of all project documents for the SAGE III lifecycle reviews, including subsystem reviews.

**Deliverable:** The contractor shall deliver technically edited project documents for project lifecycle reviews to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

### Schedule Risk Assessment:

i. As defined in NPR 7120.50, SAGE III is required to maintain analysis of its probabilistic assessment of schedule and risks. The contractor shall update SAGE III schedule risk analysis for system level CDR. The contractor shall develop monthly schedule risk analysis reports providing the SAGE III project with analysis for forward planning. The contractor shall travel to LaRC for presentation of the updated schedule risk analysis.

**Deliverable:** The contractor shall deliver monthly Risk Analysis Report and updated existing risk analysis for project CDR to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

### Threat Analysis:

The contractor shall provide senior project management through project CDR to maintain SAGE III "threat assessment" as part of the project risk management process. The threat assessment is necessary to improve the project risk management process and support reporting the NASA LaRC Center Management Council (CMC) and other project stakeholders.

**Deliverable:** The contractor shall deliver Monthly Threat Analysis Report to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

## EVMS

The Contractor shall provide support for Earned Value Management system operations using Cobra. Support includes data entry and manipulation and report building and execution. Support will be by phone and web teleconference. No travel is required.

Deliverable: The contractor shall deliver data analysis of SAGE III EVM data and process critique of SAGE III EVM process to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

**Mod 1: The purpose of this modification is to add a subtask under "Electronic Systems Branch Support (D203)" above, based on an increase in the requirements for Impedance Training on the Venable Test Equipment:**

### **Impedance Training**

**The contractor shall provide Impedance Training on the Venable Test Equipment for SAGE III Staff Engineers in order to evaluate and verify the impedance of the PDU boards. Training is to be conducted at LaRC no later than April 29, 2013 for two days.**

**Deliverable: In a LaRC-sponsored training session, the contractor shall deliver information, demonstrate use of, and instruct SAGE III Staff Engineers on using the Venable Test Equipment.**

**Mod 2: The purpose of this modification is to provide additional contractor support required for this task under Section 2.0, "Systems Integration & Test Branch (D210)" above. The additional support is needed based on an increase in requirements for "Instrument Maintenance, Integration, and Test" Section only:**

**xii: The contractor shall plan and perform quarterly maintenance testing of the SAGE III flight instrument according to established processes and procedures. The contractor shall prepare**

test reports and perform analyses of instrument telemetry and maintain a record of instrument performance trends from these tests.

**Mod 3:** The purpose of this mod is to purchase additional hardware under Section 2.0, "Systems Integration & Test Branch (D210)". The current circuit boards are being used in ground support computers for testing the avionics being built for SAGE III. The testing will take longer than originally expected, due to a failure of the backplane printed circuit board and failure of the serial interface chip. Because of this delay, additional circuit boards are required so the testing of the Interface Adaptor Module and Disturbance Monitoring Package will not be negatively impacted.

xiii: The contractor shall purchase a total of six (6) science data printed circuit boards used for simulating the science data interface and the disturbance monitoring interface for all of the SAGE III payload's environmental tests. Specifically: Two (2) boards are required for two (2) flight units; two (2) boards are required for engineering development units, and two (2) boards will be used for spares.

**Mod 4:** The purpose of this mod is to (1) specify the deliverable due dates for each section in 2.0 above and update the SAGE III Schedule Risk Analysis requirements due to rebaseline and furlough impact, and (2) extend the period of performance end date to match the updated SAGE Project Plan due to schedule rephasing and furlough impact:

**Electronic Systems Branch Support (D203) Deliverables:**

**Power Supply: Due January 31, 2014**



**ISS Requirements: Due June 30, 2015**

**EEE Parts: Due March 31, 2014**

**Remote Sensing Flight Systems Branch Support (D204) Deliverables:**

**Interface Adaptor Module Requirements and Development: Due June 30, 2015**

**Electrical Engineering: Due May 31, 2014**

**Systems Engineering & Integration Office (D209) Deliverables:**

**Systems Engineering Support: Due June 30, 2015**

**Systems Integration & Test Branch (D210) Deliverables:**

**Instrument Maintenance, Integration and Test: Due June 30, 2015**

**Flight Projects Directorate (E6) Deliverables:**

**Project Management: Due June 30, 2015**

**Technical Editing: Due March 30, 2015**

**Schedule Risk Assessment: Due September 30, 2014**

ii. The contractor shall also develop a presentation showing their technical approach and process for analysis by providing details on how the SAGE III schedule risk model was developed. Presentations shall allow for Questions & Answers and shall include sample models to fully communicate model techniques through a series of online presentations and telecons. Travel is required for one person to travel to LaRC for a 2-day trip to provide final presentation of updated schedule risk analysis and approach.

**EVMS: Due January 31, 2014**

**Mod 5: The purpose of this modification is to specify new deliverable due dates in Section 2.0 above, and to update plans and reports due to the launch date reschedule, as well as other project-rescheduled dates, as a result of the re-testing on flight hardware components.**

**Electronic Systems Branch Support (D203) Deliverables:**

**ISS Requirements: Due Sep 30, 2015**

**EEE Parts: Due Sep 30, 2015**

**Remote Sensing Flight Systems Branch Support (D204) Deliverables:**

**Interface Adaptor Module Requirements and Development: Due Sep 30, 2015**

**Electrical Engineering: Due Sep 30, 2015**

**Systems Engineering & Integration Office (D209) Deliverables:**

**Systems Engineering Support: Due Sep 30, 2015**

**Systems Integration & Test Branch (D210) Deliverables:**

**Instrument Maintenance, Integration and Test: Due Sep 30, 2015**

## **Flight Projects Directorate (E6) Deliverables:**

**Project Management: Due Jan 31, 2016**

**Technical Editing: Due Jan 31, 2016**

**Schedule Risk Assessment: Due Jun 30, 2015**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): ITAR information in this task and will be handled according to LANGLEY RESEARCH CENTER SECURITY/ TECHNOLOGY TRANSFER CONTROL PLAN (STTCP).

The contractor recognizes that the some of the work under this task is procurement sensitive information of the United States Government. In the performance of this task, the contractor shall receive procurement sensitive data and shall generate procurement sensitive data. The contractor shall protect all such information in accordance with NASA FAR Supplement (NFS) 1852.237-72, Access to Sensitive Information. All such data will be marked "Sensitive but Unclassified" and shall be secured at all times from improper disclosure. To safeguard this information the contractor will form a special team to perform the work required by this task. The team will be formed in a way that will ensure information provided to the team members or generated by the team members in the performance of the task will not be transmitted to other employees or management personnel of the contractor or any subcontractor by any means, written or verbal. Further, the team will not release the information to anyone but Government personnel identified by the Contracting Officer as proper recipients of the information. The contractor shall ensure that all members of the team working on this task have executed a Nondisclosure Agreement.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is 02/01/2013 - 01/31/2014. Milestones are defined by assigned deliverables.

**Mod 4: The new period of performance is 2/1/2013 - 6/30/2015**

**Mod 5: The new period of performance is 2/1/2013 - 1/31/2016**

### **5.0 Deliverables/Reporting Requirements**

Deliverables are defined within each task section. For all task sections the following reporting shall be available.

The contractor shall provide informal status reports to the NASA Task Monitor (TM) to summarize the work completed and future plans, at an agreed upon schedule and format between the NASA TM and contractor.

## **6.0 Other Information Needed for Performance of Task**

### Summary of Travel Requirements

D203 - ISS Requirements: Two 4-day trips to JSC

D204 - Remote Sensing Branch: Four 3-day trips to CA or AZ; Two 2-day trips to JSC; Two 2-day trips to KSC; One 5-day trip to Turin Italy.

Additional travel information will be provided to the contractor by the TM.

**Mod 1: The purpose of this modification is to add a travel requirement for D203, based on a need for new Impedance Training now required on the Venable Test Equipment:**

**D203 - Impedance Training: One 2-day trip to LaRC from JSC**

**Mod 4: The purpose of this modification is to add a travel requirement for E6 as set forth below:**

**E6 - Schedule Risk Assessment final presentation: One 2-day trip to LaRC**

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-072\_Mod2 CY3

**Task Order Title:** Space-Based WINDS Proposal/Project Management support

### **1.0 Technical POC (TPOC):**

Name: michael.kavaya  
Organization: D208:Laser Remote Sensing Branch  
Email Address: Michael.J.Kavaya@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The LaRC "Space-Based Winds" concept is for a lidar that will be able to determine wind direction and velocity from the ISS. LaRC intends to develop the concept and mission requirements, threshold and baseline mission concept, instrument concept, and a preliminary cost estimate for the mission. The strategy is to integrate the existing DAWN instrument to the LaRC UC-12 aircraft for proof-of-concept testing, identify the risks that need mitigation for space flight, create plans for maturing the instrument for further testing targeting the ESSP EV proposal opportunities. Ultimately the plan is to prepare for a dedicated mission as called for in the NRC Decadal Survey.

The primary objectives that this task covers are:

1. Improve the DAWN lidar and fly on the LaRC UC-12 airplane to validate technique and technology.
2. Plan and coordinate with the Space-Based WINDS Science Team on developing mission science requirements, the Science Traceability Matrix, and the Science Value Matrix.
3. Plan the integrated campaign that leads to the EV-3 and EV-4 proposals in such a manner that demonstrates strong feasibility and programmatic robustness.

This task is for Proposal Management support for the Space-Based WINDS.

The contractor shall

- Ensure the LaRC proposal process is followed.
- Manage cross-functional proposal teams in creating proposal deliverables; ensures that appropriate resources are available to the proposal team; participates in researching, writing and editing of proposal. Provides team leadership, assisting the Proposal Manager in identifying work that needs to be

accomplished, tracking the progress of this work, and assuring assigned tasks are completed in a timely manner.

- Facilitates formal review teams (Blue, Red, Gold) with senior and executive level managers.
- Serves as POC for selected proposal writing functions as determined by the NASA TM.
- Analyzes solicitation requirements and prepares proposal plans: outlines, tasks, schedules, and responsibilities.
- Works with LaRC Space-Based Winds POC and PI and proposal team to develop and identify proposal win strategies, differentiators, and strengths.
- Validates proposal compliance with RFP requirements.
- Ensures that the cost/price volume is consistent with the technical volume.
- Acts as a resource in the business development process as determined by the NASA TM
- Provide support to the NASA TM for proposal graphics and tables development.
- Project scheduling expertise, specifically developing the Mission Master Schedule and developing, tracking, and assessing the Proposal schedule.
- Program Management support including but not limited to marketing and effective communication with the team members as the proposal is written.
- Risk management support, specifically the integration of identified technical and programmatic risks with cost and schedule management. Assisting the Proposal Manager in developing effective and implementable risk mitigations and developing a reserve strategy to manage these risks.
- Assessing cost and schedule realism of the proposal, identifying areas where reserves will be needed to mitigate risks.
- Assisting the team in developing effective and persuasive sections, graphics, and presentations for the proposal

In addition to the usual MS Word and Excel skills, expertise in MS Project for schedule assessments and options is required. It is highly desired that the candidate have familiarity and experience with NASA and LaRC, as the proposal team will have to work within many of the existing NASA systems.

**MOD 1: The purpose of this modification is to extend the period of performance to January 31, 2014 due to the ESSP EV proposal in Section 2.0 will not be released until after December 2013. This no cost extension applies to the entire task and all deliverables.**



**MOD 2: The purpose of this modification is to extend the period of performance to September 30, 2014, to include requirements for the upcoming Severe Weather Wind aiRborne Lidar (SWWRL) EVS-2 proposal:**

- **The contractor shall assist with upcoming DAWN research flights on the UC-12B and perform all required updates to documentations and presentations.**
- **The contractor shall perform document thinking and calculations underlying the SWWRL EVS-2 proposal.**
- **The contractor shall transition from the SWWRL proposal work to actual implementation of the proposal, if SWWRL is approved for EVS-2.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data : Yes: ITAR and SBU  
Other (Specify):

### **4.0 Schedule/Milestones/Period of Performance**

The POP will be from February 1, 2013 - July 31, 2013

**MOD 1: The new period of performance is February 2, 2013 - January 31, 2014.**

**MOD 2: The new period of performance is February 2, 2013 through September 30, 2014.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall deliver the following in an agreed schedule and format between the NASA TM and the contractor:

1. Science team tasks, schedules, and plans
2. Proposal (EV-3/EV-4) plans and schedules
3. Draft mission schedule

Reporting:

The contractor shall submit monthly reports of accomplishments composed in a Microsoft word document, delivered to the TM via email.

## **6.0 Other Information Needed for Performance of Task**

There are no travel requirements for this task.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_. Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-081\_Mod2 CY3

**Task Order Title:** Linking NASA Satellite Data and Science to Enhance Fire Emissions

**1.0 Technical POC (TPOC):**

Name: duncan.fairlie  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: t.d.fairlie@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**The contractor shall provide the following support:**

1. Compile a database of smoke observations from the CALIPSO satellite for North America from July 2006 – December 2009, with supporting documentation.
2. Compile a database of meteorological profiles – temperature, static stability, moisture, and wind – for fires observed over North America for July 2006 – December 2009, with supporting documentation.
3. Support the NASA TM in using these databases for the development of a smoke-injection height database.
4. Participate in the preparation of any report and/or paper that describe the results of these activities.

**Mod 1: The purpose of this modification is to extend the period of performance for this entire task through May 31, 2014, due to the finding of a coding error which needs to be resolved prior to the task being completed.**

**Mod 2: The purpose of this modification is to extend the period of performance for the entire task through July 31, 2014, to provide continuing support for the resolution of the coding error.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

no foreign national will be assigned to this task.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 through January 31, 2014.

- Commence work on project: February, 2013.
- Deliver database of CALIPSO smoke observations (to be determined through meetings with the NASA TM)
- Deliver database of meteorological variables tied to observed fires (to be determined through meetings with the NASA TM)
- Prepare final report (to be determined through meetings with the NASA TM)

**Mod 1: The new period of performance is February 1, 2013 through May 31, 2014.**

**Mod 2: The new period of performance is February 1, 2013 through July 31, 2014.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall deliver a database of CALIPSO smoke observations for July 2006 – December 2009 to the NASA TM in an agreed upon format and schedule between the NASA TM and the contractor.

Contractor shall provide following deliverables to the NASA TM in an agreed upon format and schedule between the NASA TM and the contractor:

- Database of meteorological profiles for observed fires for July 2006 – December 2009.
- Documentation supporting the delivered data bases.

- Quarterly Reports of task status and accomplishments.
- Informal (Oral) status reports
- Participation in a joint final report/ publishable manuscript.

## **6.0 Other Information Needed for Performance of Task**

Travel to science team meetings as directed by the TM may be required  
Likely one 3-day trip to Michigan Tech Research Institute, Ann Arbor, MI. Dates TBD

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-082\_Mod6 CY2

**Task Order Title:** DISCOVER-AQ Supplementary Science

**1.0 Technical POC (TPOC):**

Name: Mary.Kleb  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Mary.M.Kleb@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

DISCOVER-AQ is a five year project with the primary goal to improve the ability to diagnose surface air quality conditions from satellite observations. Over these five years DISCOVER-AQ will conduct four deployments to areas with histories of experiencing violations of air quality standards for ozone and/or PM2.5. The first deployment was to the Baltimore metro area during July 2011. The second deployment will be to the San Joaquin Valley in California from January 15 to February 12, 2013. The sub-tasks below describe several activities which will contribute to the overall success of this project. The first sub-task relates to analysis of data collected during the first deployment while the additional sub-tasks provide for additional important measurements during the second deployment to California in 2013 not included in the original DISCOVER-AQ proposal.

Sub task (1)

A pressing question for GEO-CAPE science planning involves resolving the spatial and temporal variability of certain trace gases and aerosols over coastal waters in order to optimize ocean color (OC) retrievals. The Airborne Compact Atmospheric Mapper (ACAM) measured slant columns of NO<sub>2</sub>, O<sub>3</sub>, and HCHO from the UC-12 aircraft during DISCOVER-AQ in the summer of 2011. The High Spectral Resolution Lidar (HSRL) was also flown aboard this platform, measuring aerosols in vertical columns. The UC-12 had 50 flights over the Chesapeake Bay collecting sufficient data to provide robust statistics of the spatial and temporal variability of these gases and aerosols over the water. The contractor shall provide an analysis of that variability which will be value-added data products from DISCOVER-AQ.

Sub task (2)

2.1 The contractor shall provide tethered balloon observations of boundary layer meteorological structure as well as near-surface gradients in trace gases and aerosols through the Millersville University Atmospheric Boundary Layer (MABL) facility. This is an important component in connecting measurements at the surface to aircraft profiles reaching down to about 1000ft. Establishing near-surface gradients and their relationship to boundary layer conditions for at least one location in the DISCOVER-AQ network will reduce uncertainty and improve closure in the comparison of remotely-sensed, column-integrated abundances of trace gases and aerosols with in situ vertical profiles and surface measurements.

**Mod 2:**

Sub task (3):

3.1 The contractor shall provide ground based aerosol observations (aerosol chemistry, size distributions, and volatility distributions) using two instrument systems. The first system will consist of an Aerodyne High-Resolution Time-of-Flight Aerosol Mass Spectrometer (HR-ToF-AMS), a Scanning Mobility Particle Sizer (SMPS), and a thermodenuder (TD). The second system includes a Particle Into Liquid Sampler (PILS) and two Metrohm Ion Chromotographs (IC). This aerosol instrument package will significantly improve the characterization of aerosol microphysical and chemical properties at this ground site and will be an important component of the interpretation of integrated aerosol column properties, e.g. AOD.

Sub task (4)

4.1 The contractor shall provide ground-truth aerosol measurements at air monitoring sites in Bakersfield and Fresno, CA. Data include size-resolved aerosol samples at hourly time resolution, ambient light scattering and particle number-size distributions. These measurements will compliment the real-time measurements with broad chemical and optical characterization and source identification at two established monitoring sites, with a time integration of one hour. Instruments include a Rotating Drum Impactor (RDI), a TSI Scanning Mobility particle Sizer (SMPS), and a Optec NGN-2 Intrgrating Ambient Air Nephelometer.

**Mod 3:**

Sub task (2)

2.2 The contractor shall analyze and-quality control the data collected during sub task 2.1 by the MABL facility. The final quality controlled data shall be uploaded to the DISCOVER-AQ data site (<http://www-air.larc.nasa.gov/missions/discover-aq/discover-aq.html>) according to the format and schedule specified in the DISCOVER-AQ Data Management Plan located on the DISCOVER-AQ data site.

Sub task (3)

3.2 The contractor shall process the TD-HR-ToF-AMS/SMPS and PILS-IC ambient data acquired during sub task 3.1, perform quality control to data collected by the instruments, and deliver the data products upon the completion of this project. The final quality controlled data shall be uploaded to the DISCOVER-AQ data site (<http://www-air.larc.nasa.gov/missions/discover-aq/discover-aq.html>) according to the format and schedule specified in the DISCOVER-AQ Data Management Plan located on the DISCOVER-AQ data site.

Subtask (4)

4.2 The contractor shall process and quality control the RDI, SMPS, and nephelometer data collected in during sub task 4.1 and generate estimates of the optical properties of various aerosol types to be agreed upon by the NASA TM for report preparation and publication. The final quality controlled data shall be uploaded to the DISCOVER-AQ data site (<http://www-air.larc.nasa.gov/missions/discover-aq/discover-aq.html>) according to the format and schedule specified in the DISCOVER-AQ Data Management Plan located on the DISCOVER-AQ data site.

Sub task (5)

During the California deployment and using contractor-supplied evacuated steel canisters, the contractor shall collect whole air samples at each of the 6 profiling locations for the P-3B aircraft at the time of each overflight (3 per flight day, unless there are fewer overflights due to weather or other contingencies). The filled canisters shall be returned to the contractor's laboratory for analysis of the contents by gas chromatography using a multi-column/multi-detector system. Final quality controlled data shall be uploaded to the DISCOVER-AQ data site (<http://www-air.larc.nasa.gov/missions/discover-aq/discover-aq.html>) according to the format and schedule specified in the DISCOVER-AQ Data Management Plan located on the DISCOVER-AQ data site.

**MOD 4: The purpose of this modification is to add two sub tasks to perform measurements during the DISCOVER-AQ Houston, TX field deployment:**

**Sub task (6)**

**6.1 The contractor shall provide tethered balloon observations of boundary layer meteorological structure as well as near-surface gradients in trace gases and aerosols through the Millersville University Atmospheric Boundary Layer (MABL) facility during**



**the Houston, TX deployment, September 2013. This is an important component in connecting measurements at the surface to aircraft profiles reaching down to about 1000ft. Establishing near-surface gradients and their relationship to boundary layer conditions for at least one location in the DISCOVER-AQ network will reduce uncertainty and improve closure in the comparison of remotely-sensed, column-integrated abundances of trace gases and aerosols with in situ vertical profiles and surface measurements.**

**6.2 The contractor shall analyze and QC the data collected by the MABL facility. The data shall be uploaded to the DISCOVER-AQ data site in the format specified in the DISCOVER-AQ Data Management Plan and the external data center according to the schedule set forth by the NASA TM.**

**Sub task (7)**

**The contractor shall provide continuous observations of ground level gas and particulate species through the Aerodyne Mobile Laboratory during the Houston, TX deployment, September 2013. On flight days, the mobile laboratory will transit through a pre-established route in one of two ~ 5 km square boxes. The purpose of the flight-day transects will be to generate mixing ratio distributions of O<sub>3</sub>, NO<sub>2</sub> and HCHO. In order to facilitate intercomparisons, as well as provide an anchoring geographic location, the mobile laboratory shall visit at least one fixed site within the boxes each hour. The mobile lab shall connect to a pre-configured fixed inlet that is from an elevated location (10-20 meters) above ground level. The mobile lab group shall work to incorporate additional measurements at these fixed sites. Final QCed data shall be submitted in the format specified in the DISCOVER-AQ Data Management Plan according to the schedule set forth by the NASA TM.**

**MOD 5: The purpose of this modification is to add an additional sub task as set forth below:**

**Sub task (8):**

The DISCOVER-AQ operations during the deployment to Denver, Colorado shall encounter diverse emissions which include oil and gas exploration (fracking in particular) as well as agriculture (including feedlots). The contractor shall distinguish these sources using high resolution measurements of light alkanes. Current DISCOVER-AQ measurements include methane, but ethane is not currently measured. The contractor shall add this capability of collecting ethane measurements, which is critical to interpreting the mixtures DISCOVER-AQ expects to encounter. Due to space on the P-3B being limited, the contractor shall develop a light-weight ethane spectrometer that would be ideal to complete the payload. The contractor shall integrate the instrument on the NASA P-3B at Wallops, VA during late June/early July 2014 and collect measurements during the month-long deployment to Denver (July 13 2014 – August 13 2014). Travel in support of this work shall be reimbursed separately under the DISCOVER-AQ travel task.

**MOD 6: The purpose of this modification is to add additional sub tasks as set forth below:**

**Sub task (9):**

**During the DISCOVER-AQ San Joaquin Valley operations (January – February 2013), airborne carbon dioxide (CO<sub>2</sub>) measurements were made from NASA P-3B. The contractor shall conduct three months of in-depth CO<sub>2</sub> data analysis of the collected data during that field experiment. The contractor shall perform data analysis to understand the data, the conditions under which the measurements were made**

(meteorological, chemical, diurnal cycles), and to contribute to the advancement of scientific knowledge.

**Sub task (10):**

**The contractor shall provide tethered balloon observations of boundary layer meteorological structure, as well as near-surface gradients in trace gases and aerosols through the Millersville University Atmospheric Research and Aerostat Facility (MARAF) during the Colorado deployment, mid-July through mid-August, 2014. This is an important component in connecting measurements at the surface to aircraft profiles reaching down to about 1000ft. Establishing near-surface gradients and their relationship to boundary layer conditions for at least one location in the DISCOVER-AQ network will reduce uncertainty and improve closure in the comparison of remotely-sensed, column-integrated abundances of trace gases and aerosols with in situ vertical profiles and surface measurements.**

**3.0 Special Requirements**

Access to Sensitive or ITAR Data  (Check if applicable) NA  
Other (Specify): None

**4.0 Schedule/Milestones/Period of Performance**

Period of performance: sub-task 1: March 26, 2012 - September 30, 2012.  
Period of performance: sub-task 2: March 26, 2012 - January 31, 2013 (although the requirement will carry over into CY2 with a period of performance end date of February 28, 2013)

Mod 1: Period of performance end date changed to February 28, 2013.

Mod 2:  
Period of performance: sub-task 3: As soon as possible - February 28, 2013  
Period of performance: sub-task 4: As soon as possible - February 28, 2013

Mod 3: Task Period of Performance: Date of award through February 28, 2014.

Period of performance: sub-task 1: As soon as possible until September 30, 2012.

Period of performance: sub-task 2.1: As soon as possible until February 28, 2013.  
Period of performance: sub-task 2.2: March 1, 2013 until December 31, 2013.  
Period of performance: sub-task 3.1: As soon as possible until February 28, 2013.  
Period of performance: sub-task 3.2: March 1, 2013 until December 31, 2013.  
Period of performance: sub-task 4.1: As soon as possible until February 28, 2013.  
Period of performance: sub-task 4.2: March 1, 2013 until December 31, 2013.  
Period of performance: sub-task 5: As soon as possible until July 31, 2013.

**MOD 4: The purpose of this modification is to provide the period of performance for the two new sub tasks added to Section 2.0 above, and to change the CY2 end date for this task:**

**Period of performance: Sub task 6: June 1, 2013 until May 31, 2014.**

**Period of performance: Sub task 7: May 13, 2013 until January 31, 2014.**

**Period of performance CY2: April 10, 2012 through May 31, 2014**

**MOD 5 : The purpose of this modification is to provide the period of performance for the new sub task 8 added to Section 2.0 above, and to change the CY2 end date for this entire task:**

**Period of performance: Sub task 8: February 1, 2014 through February 28, 2015.**

**Period of performance CY2: April 10, 2012 through February 28, 2015**

**MOD 6 : The purpose of this modification is to provide the period of performance for the new sub tasks added to Section 2.0 above:**

**Period of performance: Sub task 9: May 1, 2014 through July 31, 2014**

**Period of performance: Sub task 10: April 15, 2014 through January 15, 2015**

## 5.0 Deliverables/Reporting Requirements

### Sub task (1)

- 1) Generate animation of HSRL and ACAM data to illustrate temporal and spatial variability.
- 2) Perform statistical analysis of variability in NO<sub>2</sub>, O<sub>3</sub>, HCHO (ACAM) and aerosol properties (HSRL) over course of DISCOVER-AQ MD deployment, each day, and horizontal extent.
- 3) Provide preliminary assessment for how horizontal variability (particularly for NO<sub>2</sub>) may affect ocean color retrievals.
- 4) Archive data products on the DISCOVER-AQ data website.

### Mod 2:

#### Sub tasks (2.1), (3.1), and (4.1)

- 1) Participate in CA deployment deployment (Jan 15-Feb 12, 2013).
- 2) Provide daily status reports during the CA deployment and deliver field data according to schedule.
- 3) Participate in science team activities (telecons, meetings). Schedule will be provided to contractor by the NASA TM.

- 1) NASA TM.

### Mod 3

#### Sub tasks (2.2), (3.2), (4.2)

- 1) Provide final data in the format specified in the DISCOVER-AQ Data Management Plan.
- 2) Participate in science team activities (telecons). The schedule for telecons is the last Thursday of every month at 1pm (eastern).

### Sub task (5)

- 1) Conduct measurements described in sub task (5) and participate in daily telecons during the California deployment (Jan 15-Feb 12, 2013).
- 2) Provide daily status reports during the California deployment and deliver field data according to schedule.
- 3) Provide final data in the format specified in the DISCOVER-AQ Data Management Plan.
- 4) Participate in science team activities (telecons). The schedule for telecons is the last Thursday of every month at 1pm (eastern).

**MOD 4:**

**Sub tasks (6) and (7)**

- 1) Participate in TX deployment (2-30 September 2013).**
- 2) Provide daily status reports during the TX deployment and deliver field data according to schedule.**
- 3) Provide final data in the format specified in the DISCOVER-AQ Data Management Plan.**
- 4) Participate in science team activities (telecons, meetings).**

**The schedule will be provided to the contractor by the NASA TM.**

**MOD 5: The following deliverables are added to Sub task (8) as set forth below:**

**Sub task (8):**

- 1) Participate in Wallops deployment (June to July 2014).**
- 2) Participate in Denver, CO deployment (13 July to 13 August 2014).**
- 3) Provide daily status reports during the deployments and deliver preliminary data according to schedule in ICARTT format.**
- 4) Provide final data in the format specified in the DISCOVER-AQ Data Management Plan.**
- 5) Participate in science team activities (telecons, meetings).**

**The schedule will be provided to the contractor by the NASA TM.**

**MOD 6: The following deliverables are added as set forth below:**

**Sub task (9):**

- 1) Provide written report to the Technical POC describing analysis and results for future development into peer-reviewed manuscript.**
- 2) Participate in DISCOVER-AQ telecons and meetings.**

**Sub task (10):**

**1) Participate in DISCOVER-AQ team telecons.**

**2) Provide analysis and QC of the data collected by the MARAF. The data shall be uploaded to the DISCOVER-AQ data site in the format specified in the DISCOVER-AQ Data Management Plan and the external data center according to the schedule set forth by the NASA Technical POC.**

**6.0 Other Information Needed for Performance of Task**

Travel for sub-task (2): Travel costs for 8 people to travel to the field for deployment

Material Purchases for sub-task (2) include but are not limited to:

Tethered balloon supplies

Other materials in support of DISCOVER-AQ deployment include but not limited to batteries, helium, site preparation supplies

Mod 2:

Material purchases for sub-task (3) include but are not limited to:

Supplies for instruments, software license, data storage, computer hardware

Material purchases for sub-task (4) include but are not limited to:

Materials and supplies

Any additional material purchases should be approved by the NASA TM prior to making the purchase.

**MOD 4: The purpose of this modification is to provide travel and equipment details and material purchases for the two new sub tasks (6) and (7) added to Section 2.0 above:**

Travel and Equipment for subtask (6):

Vehicle and fuel costs to haul 2 trailers and 8 individuals to Houston, TX

2 rental trailers for 5 weeks

12 individuals to travel to the field for deployment to Texas for 35 days

Material Purchases for sub-task (6) include, but are not limited to:

Tethered balloon supplies: Sounding Sensor packages for tethered balloon;  
Radiosonde with GPS windsand balloons; coated tetherline

Other materials in support of DISCOVER-AQ deployment include: batteries,  
helium, site preparation supplies.

Materials and supplies for sub-task (7):

Miscellaneous equipment and materials in support of DISCOVER-AQ deployment.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.



## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-084\_Mod0 CY3

**Task Order Title:** Support of CHRONOS Framework for Commercial Partnering—GEOCAPE

**1.0 Technical POC (TPOC):**

Name: doreen.neil  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Doreen.O.Neil@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

- a. **BACKGROUND:** NASA Langley Research Center (LaRC) has been developing effective technical, project management and commercial partner acquisition approaches to hosting NASA payloads on commercial geostationary spacecraft since 1995. In particular, LaRC has executed a Memorandum of Understanding with US Air Force SMC to foster best practices and exchange technical and programmatic information on the use of commercial hosts for government payloads. A common acquisition approach is emerging from this collaboration, with NASA HQ using an Air Force IDIQ contract to provide commercial hosting information and services for NASA payloads. A sustainable structure for doing government business with the commercial satellite industry is required.
- b. **OBJECTIVE:** Develop an implementing structure of technical interfaces, project management responsibilities, and commercial contracts for the GE-CAPE commercially hosted NASA science payloads. The Contractor shall have relevant past experience with commercial geostationary space industry, government contracting, and international business. This experience is critical to assure the approach developed is sustainable in the commercial space industry, with the highest likelihood of project success for NASA.
- c. **SCOPE OF WORK:** GEO-CAPE: The contractor shall provide support to include, but not limited to, the identification and analysis of commercially hosted government payload contract data packages, and adaptation to the goals and objectives of NASA's Decadal Survey missions. The scope of the task comprises high level technical comprehension of the commercial geostationary satellite functions, understanding the structure and range of approaches for conducting government hosted payload business with commercial satellite

industry in a sustainable manner for both NASA and the industry, and support of internal NASA reviews and discussions of the approach.

2.1 Tasks: The Contractor shall, in conjunction and coordination with the Technical Monitor, expand the data base of contracting documents from recent successful commercially hosted government payloads in geostationary orbit. The Contractor shall assist in the assessment of these documents in light of NASA policies and procedures.

2.2 The Contractor shall assist in development and improvement of similar documents in draft form for accommodating GEO-CAPE payloads on commercial communications spacecraft. This assistance includes, but is not limited to, developing and reviewing documents thoroughly for compliance with applicable policies, technical compliance, management plans and baseline costs to conduct the GEO-CAPE commercial business efficiently.

2.3 The Contractor shall work with the GEO-CAPE Mission Design Team to complete the following steps:

(i) Assist in the definition and planning of the accommodation and access to space activities for GEO-CAPE instruments, working with the Technical Monitor;

(ii) Development of a NASA-compliant framework for conducting the external partner relations needed to perform the GEO-CAPE mission, including but not limited to, methods for determination and coordination of project planning, project execution, systems engineering, and conflict resolution systems between the GEO-CAPE, NASA HQ, and the commercial partners, as well as the structure and content of governing documents including contracts.

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No

Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 25, 2013 - January 31, 2016.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide the following deliverables:

1. Library of sample contract information for current NASA and other government agencies

hosted payload projects. Initial electronic delivery July 1, 2013 to TM. Provide updates as materials become available.

2. Expert reports analyzing the success and shortcomings of current NASA and other government agency hosted payload projects cited in the library in the first deliverable:
  - a. Until the library in deliverable 1 is assembled, a brief progress report to TM monthly, electronically via email.
  - b. Upon completion of the assembly of the library in delivery 1, An initial concise written assessment report comparing selected recent government payloads shall be delivered electronically to the TM no later than Sept 30, 2013.
3. Draft diagrams, documents, and other materials to assist in planning the partner relationship (between NASA and commercial satellite vendors) for the GEO-CAPE mission as requested by the Technical Monitor. Electronic delivery to TM on mutually agreed schedule.

The Government has unlimited rights to all deliverables of this Order.

## **6.0 Other Information Needed for Performance of Task**

**TRAVEL:** Some travel is expected to support this task, in particular in support of the ongoing relationship between NASA Langley and the Air Force Commercially Hosted Infrared Payload (CHIRP) project, and selected industry conferences and meetings. Travel will include: Three 5-day trips per year to LA, four 3-day industry meetings in DC area. Foreign travel not likely.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

SSAI shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-085\_Mod2 CY3

**Task Order Title:** Travel Support for SEAC4RS

**1.0 Technical POC (TPOC):**

Name: Mary.Kleb  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Mary.M.Kleb@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall support the NASA Southeast Asia Composition, Cloud, Climate Coupling Regional Study (SEAC4RS) travel needs which include science team meetings, integration, deployment for SEAC4RS, and de-integration.

The contractor shall perform the following task requirements for each event:

1. Arrange travel for non-NASA participants to include, but is not limited to, flight reservations, lodging, and rental car. The TM will decide approved participants and communicate to the NASA TM:
  - a) 50 people for joint SEAC4RS/DC3 Science Meeting;
  - b) 15 people for Forecast Rehearsal Meeting;
  - c) 100 people for aircraft integration;
  - d) 120 people for SEAC4RS deployment
2. Provide reimbursement for travel expenses to event participants upon submission of an expense report.
3. Maintain and provide a detailed account of expenses incurred by and reimbursed to event participants.

**Mod 1: The purpose of this modification is to provide updated details regarding the SEAC4RS deployment to Section 2.1 above:**

- c) **90 people for aircraft integration;**

- d) 250 people for SEAC4RS deployment;
- e) 55 people for de-integration;

**Mod 2: The purpose of this modification is to (1) descope Section 2.1.d to account for the SEAC4RS deployment team returning earlier than anticipated; (2) add a SEAC4RS Science Team Meeting to Section 2.1 above, and (3) extend the period of performance for the entire task through August 31, 2014:**

- f) 40 people for travel to Science Team Meeting in Boulder, CO for 5 days in April/May timeframe;

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance for Award is February 1, 2013 through January 31, 2014

**Mod 2: The new period of performance is February 1, 2013 through August 31, 2014:**

The final expense reports should be able to be completed within 30 days after the completion of each event. The NASA TM will provide a spreadsheet to the contractor which will provide a list of expected participants and locations from which they will travel for purposes of cost estimation.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall deliver bi-weekly updates (due each Friday) after the event providing a detailed account of expenses incurred by and reimbursed to participants. The contractor shall report expenditures related to the purchase of the consumables to the TM within 2 weeks following the order date (to include, but is not limited to, items purchased and shipping information).

The contractor shall deliver a detailed accounting for each event's expenses (Science Meeting, Forecast Meeting, Integration, SEAC4RS Deployment, Deintegration).

Changes to reporting requirements will be determined by the NASA TM and communicated and agreed upon between the NASA TM and the contractor. The format, delivery method and due date of the deliverables, if not detailed above, will be communicated by the NASA TM to the contractor.

## **6.0 Other Information Needed for Performance of Task**

Blocks of about 100 (Science Meeting) or 15 (Forecast Meeting) rooms at or below government per diem rate shall be negotiated with a local hotel near the venues for these events. For SEAC4RS integration a block of rooms at or below government per diem rate shall be negotiated with a local hotel in the Lancaster/Palmdale, CA, area. For SEAC4RS deployment, room blocks will be negotiated by NASA Earth Science Program Office who will work in coordination with the contractor.

Shipping of materials and purchase of supplies may be required to support these events, as determined by the NASA TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-086\_Mod2 CY3

**Task Order Title:** Travel Support for the DISCOVER-AQ and MEaSURES Projects

**1.0 Technical POC (TPOC):**

Name: Mary.Kleb  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Mary.M.Kleb@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

- A. The contractor shall support the NASA DISCOVER-AQ deployment-related logistical needs and DISCOVER-AQ and TCP travel needs which include integration and deployment for DISCOVER-AQ, and travel support for TCP related to DISCOVER-AQ.

The contractor shall perform the following task requirements for each event:

1. Arrange travel for non-NASA participants:
  - a. 30 people for DISCOVER-AQ
  - b. 15 people for TCP meetings related to DISCOVER-AQ, including but not limited to flight reservations, lodging, and rental car.
  - c. The level of support for each participant will be decided by the TM and communicated to the contractor.
  - d. The total amount of support should be equivalent to 30 (DISCOVER-AQ) or 15 (TCP) people with full support.

2. Support DISCOVER-AQ field deployment logistical needs, including purchase of consumables totaling \$50,000.
3. Contingency for potential requirements to provide shipping of instrument or other deployment-related items as determined by the TM. For international shipping, provide support through a specified United States company for instrument(s) in support of the DISCOVER-AQ September 2013 deployment. Due to the highly delicate (fragile) nature of the instrument(s), the requirement that the shipper be familiar with importing the instrument(s) under a carnet to avoid import duties, and time sensitivity, the shipping company will be specified by the TM. This will minimize potential schedule delays and possible damage to the instrument resulting in an inability to participate in the project that are likely with an inexperienced shipper. The TM will identify the shipping organization.
4. Provide reimbursement for travel expenses to event participants upon submission of an expense report.
5. Provide a detailed account of expenses incurred by and reimbursed to participants.

**Mod 1: The purpose of this mod is to extend the period of performance through January 31, 2015 to (1) include Houston de-integration; (2) provide continuing support for science team- and deployment-related logistical needs; and (3) include Summer 2014 deployment requirements in Section 2.0 above:**

**B. The contractor shall also support the NASA DISCOVER-AQ science team meetings, integration, deployment and de-integration for field experiments as well as deployment-related logistical needs for the Summer of 2014.**

**1. Arrange travel for contractor participants:**

a. 28 people for the DISCOVER-AQ Science Team Meeting - 5 days

b. 28 people for deployment - 30 days

c. 10 people for integration – 14 days

d. 6 people for de-integration – 2 days

2. Field deployment logistical needs, including purchases of consumables such as, but not limited to, International shipment of PTRMS instrument, shipment of NATIVE trailer, compressed gases, site preparation for ground instrumentation and other purchases pertaining to the field campaign.

3. Provide shipping support for instrument(s) in support of DISCOVER-AQ Summer 2014 deployment.

**MOD 2: The purpose of this modification is to (1) provide travel support for additional participants beyond those cited in MOD 1 Section 2.0.B.1 during the DISCOVER-AQ field mission scheduled for 13 July 2014 through 13 August 2014. (2) Provide support for the additional logistical deployment needs that have emerged at various field mission sites.**

**The contractor shall:**

- 1. Add the following requirement for Section 2.0.B.1 above:
  - e. 16 additional people for deployment -30 days.****
- 2. Modify the requirements contained in Section 2.0.B.2 to include providing night time site security at designated locations and arranging for the installation of electrical panels to support additional ground instruments.**

**3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

**4.0 Schedule/Milestones/Period of Performance**

Period of Performance is March 1, 2013 - January 31, 2014

**Mod 1: The new period of performance is March 1, 2013 through January 31, 2015**

The final expense reports should be able to be completed within 30 days after the completion of each event. The NASA TM will provide a separate spreadsheet which will provide a list of expected participants and locations from which they will travel for purposes of cost estimation.

**5.0 Deliverables/Reporting Requirements**

The contractor shall deliver bi-weekly updates (due each Friday) after the event providing a detailed account of expenses incurred by and reimbursed to participants. The contractor shall deliver through a report expenditures related to the purchase of the consumables to the TM within 2 weeks following the order date (to include items purchased and shipping information).

The contractor shall deliver to the TM a detailed accounting for each project's expenses (DISCOVER-AQ, TCP) in an agreed upon schedule and format between the NASA TM and the contractor.

Changes to reporting requirements shall be coordinated with and approved by the TM and schedule and format will be agreed upon between the NASA TM and the contractor.

**6.0 Other Information Needed for Performance of Task**

1. A block of about 30 (DISCOVER-AQ) or 15 (TCP) rooms at or below government per diem rate shall be negotiated with a local hotel near the venue for the science team and

workshop events. For DISCOVER-AQ integration and deployment, a block of rooms in the Houston, TX area will be negotiated by a NASA civil servant as determined by the NASA TM who will work in coordination with the contractor.

## **Mod 1: The additional information for deployment is below:**

**2. A block of about 40 DISCOVER-AQ rooms at or below government per diem rate shall be negotiated with a local hotel near the venue for the science team. For the science team meeting the room block will be in Hampton, VA. For DISCOVER-AQ deployment, a block of rooms in Louisville, CO area will be negotiated by a NASA civil servant as determined by the NASA TM who will work in coordination with the contractor.**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-087\_Mod2 CY3

**Task Order Title:** Lidar Field and Laboratory Research Support

**1.0 Technical POC (TPOC):**

Name: russell.deyoung  
Organization: E304:Atmospheric Composition Branch  
Email Address: Russell.J.Deyoung@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

a) An experiment is underway to address the potential of measuring the quantity of dissolved oxygen in seawater as an indication of the biological health of ocean and bay seawater for marine organisms. This measurement uses a Raman lidar in the lab (NASA LaRC B1250) for future aircraft deployment. The experiment is being conducted in Building 1250 lab 124D with a 355-nm pulsed Nd:YAG laser beaming into a tube filled with water which emits backscattered light at Raman wavelengths that correspond to nitrogen, oxygen and water vapor. From this backscatter signal the concentrations of dissolved oxygen and nitrogen can be determined. The contractor shall support this experiment by providing student researcher services as needed to operate the lidar system and take data.

b) The contractor shall provide support for the Langley Mobile Ozone Lidar System. Support includes development and documentation of operational procedures for the detector/receiver system, the setup and operation of the system, and documentation of measurements. The lidar will be involved in a field mission in September 2013 and support for this mission is required.

**Mod 1: The purpose of this modification is to add the following Subtask to 2.0 above:**

**c) The contractor shall support the Langley Ozone Profiling Lidar instrument research site on NASA LaRC and Coherent Applications, Inc., Hampton, VA. The contractor shall operate, calibrate, gather ozone and aerosol data, and perform ozone data analysis for this lidar system. The contractor shall perform**

**ozonesonde validation activities for both local and field measurements. The contractor shall perform data retrieval, data analysts and validation, data archival, data comparisons, and publication of results.**

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task in order to include a future field campaign in Section 2.0.b above:**

**b) i. The September 2013 field campaign was cancelled and rescheduled for July 2014.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is 02/01/2013 through 1/31/2014.

**Mod 1: The new period of performance is 02/01/2013 through 1/31/2016**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall deliver a progress report bi-monthly outlining the experimental progress in Microsoft Word document and delivered electronically via email to the NASA TM.

### **6.0 Other Information Needed for Performance of Task**

A college or graduate student is requested to perform this task. The student must be Langley laser certified and have knowledge of the operation of the Continuum 9050 laser system. Also knowledge of oxygen dissolved in water is helpful.

No travel is required for this task.

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-090\_Mod3 CY3

**Task Order Title:** Lidar Opto-Mechanical Support

## **1.0 Technical POC (TPOC):**

Name: chris.hostetler  
Organization: E304:Atmospheric Composition Branch  
Email Address: Chris.A.Hostetler@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

2.1 This task supports NASA Langley Research Center's (LaRC) airborne High Spectral Resolution Lidar (HSRL) remote sensing program. Specific support includes mechanical, opto-mechanical, thermal, and electro-optical systems design and development. The contractor shall develop optical, mechanical, and electrical designs and components for the HSRL instruments of which there are currently two, HSRL-1 and HSRL-2. Components designed and delivered under this task include, but are not limited to the following categories of work: components required for maintenance of the HSRL instruments, components required for upgrade of the HSRL instruments, fixtures and instrument components required to mount the HSRL instruments on aircraft, and ground support equipment for the deployment, operation, alignment, and maintenance of the HSRL instruments. The contractor shall also conduct and document structural and thermal analyses required by the HSRL program.

- a. Note that although Section 5.0 outlines specific hardware deliverables under this task, the nature of this research makes it likely that some additional elements may be required. While as yet unknown, these additional items shall be of the same types of work as those outlined in this task order.

2.2 The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The format of technical progress reports (see 6.0, Deliverables) shall be established with the TM to provide maximum value. These reports shall be used to confirm priorities and adherence to schedule constraints.

Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

### 2.3 Description of Work:

#### Item 1:

I. The contractor shall design and implement an opto-mechanical enclosure for the LaRC pressure-tuned interferometer. This enclosure shall replace the current enclosure for the piezo-tuned interferometer in the HSRL-2 instrument. The enclosure and related subsystems shall meet the following requirements:

Subtask 1. Enclosure shall mechanically and optically interface to the HSRL-2 instrument identically to the existing enclosure

Subtask 2. Enclosure shall implement an internal optical design identical to that of the existing enclosure

- a. Carry the same options for the outputs, built to the identical design: PBS cubes for p-pol locking or “holey” mirrors for s-pol locking

Subtask 3. Enclosure shall interface to the detector modules in a fashion identical to the existing enclosure

Subtask 4. Enclosure shall incorporate a new scheme for mounting the interferometer that:

a. Insulates the interferometer to reduce thermal gradients as much as practical

b. Registers the interferometer mechanically inducing as little degradation in optical performance as practical (i.e., eliminating pressure-induced birefringence to the greatest degree practical)

Subtask 5. Enclosure shall incorporate mechanisms and electronics for pressure tuning the interferometer

II. The contractor shall procure optics to populate the interferometer enclosure and bulk materials for the interferometer as required by the TM.

III. The contractor shall procure mechanical and electrical parts and subsystems as required by the TM to support the development of the interferometer enclosure and subsystems.

The contractor shall travel to Langley and to the interferometer vendor's location for occasional face-to-face design and review meetings as determined by the TM (3 trips total).

Item 2:

The contractor shall deliver the cooling line connectors : Qty = 16 of the female quick-disconnect cooling line connectors and qty=16 of the male quick-disconnect cooling line connectors.

Item 3:

The government design of the Environmental Enclosure Box or EE Box for HSRL 2 was modified from the original design and requires new hardware to make the Environmental Enclosure compatible with the cooling lines on the ER2 aircraft and to reduce risk for integration and deintegration of the HSRL instrument. The associated hardware to be designed, fabricated and delivered is:

Subtask 1. Fabricate new bulkhead adapters located at the rear bulkhead of the ER2 flight chiller rear bulkhead. The exterior end of the new adapters shall have female straight threads which shall mate with the male straight threads of Parker fitting 6 AOEX6-SS. This interface shall also contain a sealing gasket that shall be specified and procured by the contractor. The interior end of the new adapters shall remain unchanged from the present design. Qty = 4 adapters are required to cover two chillers (flight chiller plus spare chiller) with two adapters per chiller.

Subtask 2. Fabricate a new EEbox Coolanol connector panel (of the same shape and form factor as the previous EEbox Coolanol ®connector panel) which shall contain female straight threads (four locations) that shall mate with the male straight threads of Stratoflex 25406-06A-N11 and Stratoflex 5106-06A-N11. This interface shall also contain a sealing gasket that shall be specified and procured by the contractor.

Subtask 3. Fabricate a connector panel for the NASA Langley Research Center Thermal Vacuum chamber that contains female straight threads that shall mate with the male straight threads of Stratoflex 25406-06A-N11 and Stratoflex 5106-06A-N11. This interface shall also contain a sealing gasket that shall be specified and procured by the contractor. The size of the panel and mounting holes shall be specified by the NASA TM upon award of the Modification, but shall be similar to the panel in Task #1.

Subtask 4. Update the HSRL2 ProE Computer Aided Design (CAD) model and deliver an EASM file showing the EEbox, equipment rack, chiller, updated chiller bulkhead adapters, coolant connectors, new coolant connector panel, and coolant lines.

Subtask 5. Fabricate qty = 20 slightly-tight-fitting delrin caps for the quick-disconnect end of 25406-06A-N11, and qty = 20 slightly-tight-fitting delrin caps for the quick-disconnect end of 5106-06A-N11.

Subtask 6. Fabricate qty = 8 spare (blank) standard electrical connector panels for the EEbox.

Subtask 7. Modify the existing blank EEbox electrical connector panels to allow mounting of HSRL2 electrical connectors. This encompasses 17 connector holes in a total of 5 connector panels. Connector dimensions shall be specified and provided by the NASA TM.

Item 4:

The contractor shall design and fabricate hardware to enable the integration of HSRL1 Generation-2 pulsed laser onto the HSRL1 lidar instrument. A 3-D Pro-E Computer Aided Design (CAD) model of the pulsed laser shall be delivered to the NASA TM at a designated time agreed upon between the contractor and the NASA



TM. The hardware to be designed and fabricated and delivered by the contractor shall consist of:

Subtask 1. A baseplate that shall adapt the new pulsed laser to the existing HSRL1 telescope structure. The baseplate shall be designed to mount to the existing HSRL1 telescope structure, and shall also be designed with mounting holes that match the mounting holes on the new pulsed laser.

Subtask 2. A new HSRL1 Transmit Optics Housing that is functionally the same as the existing HSRL1 Transmit Optics Housing. The shape and size of the new housing shall be determined by the contractor and agreed upon with the NASA TM, but it must retain all of the optical and electrical functionality as the previous housing:

- a. Beam steering
- b. Polarization cleanup
- c. Polarization co-alignment of 532 nm and 1064 nm beams
- d. Motorized rotation stage with waveplate for beam attenuation
- e. Motorized rotation stage with waveplate for calibration
- f. Optical pickoff for laser spectral purity measurement
- g. Optical pickoff for laser energy measurement
- h. Optical pickoff for diagnostics (new requirement)

- i. Wedged output window that serves to provide a method for coalignment of the pointing angle of the 532 nm and 1064 nm collinear output beams.
- j. The output beam of the of new Transmit Optics Housing shall have the same nominal transverse position and angular position as the existing HSRL1 system.
- k. Extra space, mounting holes, and mounting hardware in the housing to allow for upgrading the lidar transmitter to include a 355 nm beam.

Subtask 3. Closeout tubes that include mounts for any relay optics or mirrors that might be necessary for transporting the pulsed laser output beam to the new Transmit Optics Housing, as determined by the NASA TM.

Item 5:

The contractor shall deliver Opto-mechanical assemblies: Short and urgent minor machining; including repairs, fixes, and corrections to hardware as discovered during instrument integration activities at NASA. These activities are performed on an as-needed basis as determined by the TM and will be communicated directly to the Contractor by the TM.

**Mod 1: The purpose of this modification is to add Item 6 to Section 2.3 above to provide requirements needed in order to upgrade the HSRL-1 Lidar System:**

**Item 6:**

The contractor shall provide the opto-mechanical work needed to upgrade the HSRL-1 lidar system, as specified below:

**Subtask 1. Design and fabricate a mechanical mount that would allow the HSRL-1 lidar system to be mounted at its current (nominal) angle and also forward pointed 10-15 degrees (final angle in this range TBD) relative to sea-land surface during normal level flight on B200 and UC12 aircraft. It would need to be changeable from nominal (current angle) to forward tilt in-between flights. Design will meet airworthy and safety requirements and this task includes obtaining these approvals. Vignetting of optical beam will be minimized and should not exceed 30% for off-angle position. This effort will also support integration of the new mounting system onto the aircraft.**

**Subtask 2. Design and fabricate a Spectral Purity Housing (SPH) based on the prior HSRL2 design, to allow a 0.75" x 2" iodine cell to mount inside, with an interface to a 50 micron input fiber (with FC connector) and output coupling compatible with standard HSRL-1 PMT housings. In addition to the SPH, an additional fiber-coupled assembly would be designed and fabricated that has the space for an iodine cell removed. Both assemblies will have sufficient space to allow up to three 2 mm thick ND filters before the detector. Both assemblies will have X-Y-Z fiber adjustment to allow for ideal alignment of the beam onto the detector. This work will include the fabrication of six HSRL-1 standard PMT housings, 2 for the assemblies described above and 4 spares.**

**Subtask 3. Conduct a preliminary evaluation of the use of large diameter (30 mm clear aperture) Pockel cells in the HSRL-1 receiver path in order to enable pulse suppression of sea surface spike. NASA is conducting a lab-based study on two types of Pockels cells. Pockel cell mechanical information (size and shape) will be provided to contractor. Contractor will evaluate the feasibility of utilizing these components into the existing HSRL-1 system and provide concept drawings on the placement of these components in relation to surrounding structures and components.**

**Subtask 4. Fabrication and delivery of an optical quality window that is a match to existing HSRL windows currently in use on B200 aircraft.**

**Mod 2: The purpose of this modification is to add Item 7 to Section 2.3 above to provide additional requirements needed in order to upgrade the HSRL-1 Lidar System:**

**Item 7:**

The contractor shall provide the opto-mechanical work needed to upgrade the HSRL-1 lidar system for use with NASA purchased Pockels cells and related components. The contractor shall design and fabricate a new housing system, compatible with the existing HSRL-1 system, to elongate the “collimated” path located after the field stop and before the 1 mm fiber optic input, to provide adequate space for 2 Pockels cells on the 532 nm Parallel and Perpendicular channels, 2 beam splitter cubes, and 2 waveplates. Design shall meet airworthy and safety requirements routinely applied to these types of assemblies.

**Mod 3: The purpose of this modification is to add Items 8, 9, 10 to Section 2.3 above to provide additional requirements needed in order to upgrade the HSRL Lidar Systems:**

**Item 8: The contractor shall provide one replica each, of the two different Spectral Purity Housings (SPH) described in Item 6, Subtask 2.**

**Item 9: The contractor shall provide one modified HSRL-1 Beam Expander unit consisting of qty=1 each of: 1) Main BE Body, Part# 13004-4017-001. 2) Modified BE End Cap (that is 0.2” longer than the original end cap, 08006-4258-000).**

**Item 10: The contractor shall fabricate a replacement bellows adapter plate, with the same dimensions as the previous bellows adapter plate 12020-4013-001, except the two 1/16” NPT threaded ports shall be changed to an SAE gasketed O-ring straight threaded port for use with Swagelok part number SS-100-1-OR (5/16-24 thread).**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: NA

#### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2016.

**Mod 1: The purpose of this modification is to add Item 6 to Section 4.0 above to provide specific delivery dates:**

##### **Item 6:**

**Subtask 1: Deliverables shall be provided to NASA Langley before January 31, 2014.**

**Subtask 2: Deliverables shall be provided to NASA Langley before December 31, 2013, with best effort for delivery before end of November 2013.**

**Subtask 3: Deliverable shall be provided to NASA Langley before November 1, 2013.**

**Subtask 4: Deliverable shall be provided to NASA Langley before February 31, 2014.**

**Mod 2: The purpose of this modification is to add Item 7 to Section 4.0 above to provide specific delivery dates:**

##### **Item 7:**

**Deliverables shall be provided to NASA Langley before February 8, 2014.**

**Mod 3: The purpose of this modification is to add Items 8, 9, 10 to Section 4.0 above to provide a specific delivery date:**

**Item 8, 9, 10: Items to be delivered on by September 30, 2014.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide quarterly progress reports in Microsoft word of the task status of accomplishments delivered to the NASA TM by email. The status of ongoing tasks, results, and issues shall be reported to the TM through weekly oral status meetings. Contractor shall provide following services and deliverables at negotiated dates:

#### Item 1:

The contractor shall deliver the interferometer housing, optics, pressurization hardware, and any fixtures/fasteners required for installation of these components into the HSRL-2 instrument.

The contractor shall deliver the design documentation, including subsystem solid model, e-drawing models, and specific subsystem drawings.

#### Item 2:

The contractor shall deliver the cooling line connectors : Qty = 16 of the female quick-disconnect cooling line connectors and qty=16 of the male quick-disconnect cooling line connectors.

#### Item 3:

The contractor shall deliver the following components and subsystem solid models, e-drawing models, and specific subsystem drawings of those components.

Subtask 1: New bulkhead adapters located at the rear bulkhead of the ER2 flight chiller rear bulkhead. The exterior end of the new adapters shall have female straight threads which will mate with the male straight threads of Parker fitting 6 AOEX6-SS. This interface shall also contain a sealing gasket that shall be specified and procured by the contractor. The interior end of the new adapters will remain unchanged from the present design. Qty = 4 adapters are required to cover two chillers (flight chiller plus spare chiller) with two adapters per chiller.

Subtask 2: New EEbox Coolanol connector panel (of the same shape and form factor as the previous EEbox Coolanol<sup>®</sup> connector panel) which shall contains female straight threads (four locations) that will mate with the male straight threads of Stratoflex 25406-06A-N11 and

Stratoflex 5106-06A-N11. This interface shall also contain a sealing gasket that shall be specified and procured by the contractor.

Subtask 3: Connector panel for the NASA Langley Research Center Thermal Vacuum chamber that contains female straight threads that shall mate with the male straight threads of Stratoflex 25406-06A-N11 and Stratoflex 5106-06A-N11. This interface shall also contain a sealing gasket that shall be specified and procured by the contractor. The size of the panel and mounting holes shall be specified by the NASA TM upon award of the Modification, but shall be similar to the panel in Task #1.

Subtask 4: Update the HSRL2 ProE Computer Aided Design (CAD) model and deliver an EASM file showing the EEbox, equipment rack, chiller, updated chiller bulkhead adapters, coolant connectors, new coolant connector panel, and coolant lines.

Subtask 5: Quantity = 20 slightly-tight-fitting delrin caps for the quick-disconnect end of 25406-06A-N11, and qty = 20 slightly-tight-fitting delrin caps for the quick-disconnect end of 5106-06A-N11.

Subtask 6: Quantity= 8 spare (blank) standard electrical connector panels for the EEbox.

Subtask 7: Modified EEbox electrical connector panels to allow mounting of HSRL2 electrical connectors. This encompasses 17 connector holes in a total of 5 connector panels. Connector dimensions shall be specified and provided by the NASA TM.

Item 4:

The contractor shall deliver the components to enable the integration of HSRL-1 Generation-2 pulsed laser onto the HSRL1 lidar instrument:

- 1- A baseplate that will adapt the new pulsed laser to the existing HSRL1 telescope structure.
- 2- A new HSRL1 Transmit Optics Housing that is functionally the same as the existing HSRL1 Transmit Optics Housing.
- 3- Closeout tubes that include mounts for any relay optics or mirrors that might be necessary for transporting the pulsed laser output beam to the new Transmit Optics Housing, as determined by the NASA TM.
- 4- Subsystem solid models, e-drawing models, and specific subsystem drawings of the components in subitems 1, 2, and 3.
- 5 - Structural analysis report for HSRL-1 with the new pulsed laser and supporting hardware.



6- Completed Federal Aviation Administration (FAA) form 8110 with Designated Engineering Representative (DER) signature for mounting the HSRL-1 instrument in the LaRC B200 and UC-12 aircraft.

Item 5:

The contractor shall deliver Opto-mechanical assemblies: Short and urgent minor machining; including repairs, fixes, and corrections to hardware as discovered during instrument integration activities at NASA. These activities are performed on an as-needed basis as determined by the TM and will be communicated directly to the Contractor by the TM.

**Mod 1: The purpose of this modification is to add the deliverables for Item 6 to Section 5.0 above:**

Item 6:

**The contractor shall deliver the following:**

**Subtask 1: 1) Opto-mechanical mounting system, 2) engineering model and assembly drawing files.**

**Subtask 2: 1) One fiber-coupled Spectral Purity housing with room for iodine cell, 2) One fiber-coupled assembly without space for iodine cell, 3) six HSRL-1 PMT housing assemblies, 4) engineering model and assembly drawing files.**

**Subtask 3: 1) Concept drawings from initial evaluation.**

#### **Subtask 4: 1) Window per specifications:**

- 1) Optical Window #1 (17" diameter x 1.25" thick Corning 7980 OF Grade Fused Silica).**
  - a) The window shall be fabricated as per MIL-W-1366F Group M with dimension given in attached drawing.**
  - b) Material: Corning Fused Silica #7980, Grade 0F**
  - c) Flat surfaces, R = Infinity**
    - i. Transmitted Wavefront Error: < 2 waves P-V at 633 nm**  
**A.Alternate Spec: 1/4 wave P-V over 6" aperture at 633 nm, six interferograms minimum.**
    - ii. Scratch/Dig: 60/40 tested IAW MIL-0-13830A.**
    - iii. Clear Aperture: within 0.25 inches from all outer edges.**
    - iv. Wedge: 1 arcmin or less.**
  - d) Coating: No optical coatings.**
  - e) Optic must not be damage when exposed to a survival temperature of +70C to -70C.**
  - f) Fine grind all non-optical surfaces with a maximum abrasive size of 16 microns.**
  - g) The window shall be fabricated as per MIL-W-1366F Group M with dimension given in attached drawing.**
  - h) Tolerance: Physical dimensions +/- 0.02, Thickness +/- 0.02 inches**
  - i) Record and provide the following inspection data and documentation on delivery:**
    - i. Dimensional inspection.**
    - ii. Transmitted interferogram of clear aperture or photo of test plate fringes if alternate specification is used.**
    - iii. Certificate of conformance specifically referencing compliance with reference military specifications.**

**Mod 2: The purpose of this modification is to add deliverables for Item 7 to Section 5.0 above:**

**Item 7:**

- 1) Housing system and related assemblies required to enable use of Pockels cells and related components.
- 2) Engineering model and assembly drawings.

**Mod 3: The purpose of this modification is to add Items 8, 9, 10 to Section 5.0 above.**

**Item 8: The contractor shall provide one replica each, of the two different Spectral Purity Housings (SPH) described in Item 6, Subtask 2.**

**Item 9: The contractor shall provide one modified HSRL-1 Beam Expander unit consisting of qty=1 each of: 1) Main BE Body, Part# 13004-4017-001. 2) Modified BE End Cap (that is 0.2" longer than the original end cap, 08006-4258-000).**

**Item 10: The contractor shall fabricate a replacement bellows adapter plate, with the same dimensions as the previous bellows adapter plate 12020-4013-001, except the two 1/16" NPT threaded ports shall be changed to an SAE gasketed O-ring straight threaded port for use with Swagelok part number SS-100-1-OR (5/16-24 thread).**

**6.0 Other Information Needed for Performance of Task**

Travel is required to support this task including,

Travel to DFRC to support installation of the HSRL-2 instrument onto the ER-2 aircraft

Trip to LaRC to support design reviews as needed (estimate 2)

Trips to LaRC and to the interferometer vendor's location for occasional face-to-face design and review meetings as determined by the TM: 3 trips total.

Any additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the NASA TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-091\_Mod3 CY3

**Task Order Title:** Multi-Instrument Inter-Calibration (MIIC) Framework

### **1.0 Technical POC (TPOC):**

Name: jon.currey  
Organization: E302:Climate Science Branch  
Email Address: Jon.C.Currey@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

Background:

The goal of the Multi-Instrument Inter-Calibration (MIIC) Framework proposal is to demonstrate an extendable distributed processing framework that allows instrument teams to perform significantly more processing at remote data centers versus transmitting large volumes of data to local science data systems for processing. Many current and future NASA science data products require merging data from multiple instruments on multiple spacecraft. Integrating networking software into the science data production environment will provide better use of computer resources and expedite production of collaborative merged data products.

The contractor shall support the project entitled “Multi-Instrument Inter-Calibration (MIIC) Framework” funded by ROSES-2011, Program Element A.37, Advancing Collaborative Connections for Earth Science (ACCESS), in two areas: 1) develop distributed processing framework based on OPeNDAP to perform inter-calibration of multiple instruments, and 2) integrate science algorithms into the MIIC Framework to demonstrate MODIS/SCIAMACHY/GEO inter-calibration.

#### **2.1 Technical Support**

A. The contractor shall work with OPeNDAP, the TM, and proposal Co-Investigators, to develop the MIIC Framework Architectural Design and Implementation.

B. The contractor shall analyze heritage MODIS/SCIAMACHY/GEO code and map these algorithms into MIIC Framework client and server modules. MIIC Framework software

modules are to include Event Prediction (client), IC Plan Generation (client), IC Plan Parsing and Execution (server), Server-side operations including spatial and spectral convolution, Results Aggregation (server), and Calibration Processing (client). Server side modules shall be developed in C++ and integrated into the OPeNDAP Hyrax Server. Client side modules may be implemented in Java or C++ depending on the user interface. OPeNDAP handlers need to be extended to support MODIS, GOES, and SCIAMACHY data.

C. The contractor shall maintain all software in a Subversion repository and perform appropriate unit testing and develop software using the Eclipse SDE.

D. The contractor shall support deployment testing and document MIIC Framework performance and document MIIC Framework lessons learned and architecture in peer reviewed literature and an ESDSWG white paper.

E. The contractor shall be required for specialized Java/C++ distributed programming support.

## 2.2 Performance Standards

The contractor performance shall be evaluated on meeting the milestones contained as agreed upon between the NASA Technical Monitor and contractor.

**Mod 1: The purpose of this modification is to add a requirement for the contractor to complete the MIIC client integration with the Spring Framework to Section 2.1 above, in order to ensure accuracy of the final product:**

**F. The contractor shall complete the MIIC client integration with the Spring Framework. The contractor shall develop all histogram server-side functions (1D and 2D). The contractor shall perform and document Low Earth Orbin (LEO)-Geostationary Orbit (GEO) and LEO-LEO one month testing on the ASDC dataserver2.**

**Mod 2: The purpose of this modification is to extend the period of performance for the entire task through July 31, 2014, to provide continuing distributed processing support that allows instrument teams to perform significantly more processing at remote data centers.**

**Mod 3: The purpose of this modification is to (1) include new work using OpenDap and the MIIC framework to benefit CERES, and (2) extend the period of performance for the entire task.**

**G. PHASE 1: The contractor shall perform the following duties to benefit CERES:**

- 1. Checkout, build, and test CERES ordering tool code on local workstation**
- 2. Update software development environment to work with Eclipse**
- 3. Document requirements of Phase 1 and architectural concept**
- 4. Deploy software within the ASDC WebRA system**
- 5. Use case #1 – Integrate OPeNDAP backend with CERES Ordering Tool visualization frontend – demo using EBAF (CERES Energy Balanced and Filled) data products**
- 6. Integrate: use case #1 into Spring Framework – document benefits over current approach**
- 7. Compare generalized parameter selection using the THREDDS handler and OPeNDAP DDS/DAS structures versus current approach using database**
- 8. Evaluate current use of databases; determine if upgrade to ORM software (Hibernate) is warranted or if any databases can be eliminated (eg., ASDC db)**

### 3.0 Special Requirements

None

### 4.0 Schedule/Milestones/Period of Performance

Period of performance is 02/01/2013 through 01/31/2014.

**Mod 2: The new period of performance is 2/1/2013 through 7/31/2014.**

**Mod 3: The new period of performance is 2/1/2013 through 8/31/2014**

### 5.0 Deliverables/Reporting Requirements

A. The MIIC Framework software shall be delivered to the NASA TM in a public releasable format; i.e., code needs to be reviewed and follow agreed upon software standards compatible with the OPeNDAP framework at an agreed upon schedule between the NASA TM and the contractor.

**Mod 1: The following deliverable is required:**

**B. The contractor shall electronically provide draft versions of all required MIIC Framework documentation to the TM in a mutually-agreed-upon format.**

**Mod 3: The following deliverable is required:**



**C. The contractor shall electronically provide the Phase 1 Architectural Concept Description to the TM (in a mutually-agreed-upon format) by 6/13/2014.**

**D. The contractor shall electronically provide the Summary of Phase 1 results and recommendations to the TM (in a mutually-agreed-upon format) by 8/29/2014**

### **6.0 Other Information Needed for Performance of Task**

Travel may be required to attend Earth Science Data System Working Group meetings or conferences, both with a maximum duration of one week. Additional travel may be required. Additional travel information will be provided to the contractor by the TM.

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-092\_Mod1 CY3

**Task Order Title:** Mars Space Weather Environment

**1.0 Technical POC (TPOC):**

Name: christopher.mertens  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Christopher.J.Mertens@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

I. The contractor shall perform galactic cosmic ray (GCR) radiation transport calculations using the Monte Carlo Geant4 code. The GCR transport calculations will be performed through the Mars atmosphere and surface environments. The purpose of the Geant4 calculations is to benchmark LaRC's deterministic High Charge (Z) and Energy TRaNsport (HZETRN) code. As part of the Geant4/HZETRN benchmark comparisons, the contractor shall investigate the effects of different physics packages available in Geant4. The initial Geant4/HZETRN benchmark case study will be performed for Earth's atmosphere where measurement data is available. The quantities to be compared are particle flux, total dose, dose by particle, total dose equivalent, and dose equivalent by particle. The NASA TM will provide the code to the contractor.

II. The contractor shall conduct Geant4 GCR transport simulations and compare the results with HZETRN. The quantities to be compared are listed above. The Geant4/HZETRN results will be compared for:

1. Earth atmospheric conditions corresponding to the BESS 2001 and CAPRICE 1994 and 1998 balloon flight campaigns.
2. Mars atmosphere and surface environments.

III. For each Geant4/HZETRN benchmark comparison listed above, the contractor shall quantify the effects of the different physics packages available in Geant4 on these comparisons.

**Mod 1: The purpose of this modification is to (1) extend the period of performance for the entire task through January 31, 2016, to provide continuing galactic cosmic ray radiation transport calculations; and (2) add the following to Section 2.0, II, above:**

**1. a) The Geant4 simulations shall be compared to HZETRN and the balloon flight measurement data.**

**2. a) The TM will select at least one geographic location and date/time for which the Geant4 simulations shall be compared to HZETRN results.**

**b) The Geant4 simulations shall also be compared with measurements from the MARS RAD instrument on the Curiosity Rover.**

### **3.0 Special Requirements**

n/a

### **4.0 Schedule/Milestones/Period of Performance**

The period of performance is February 1, 2013 – January 31, 2014

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016.**

### **5.0 Deliverables/Reporting Requirements**

1. The contractor shall deliver the following in an agreed-upon format and schedule between the NASA TM and the contractor:

a. the Geant4 ascii output files and corresponding plots showing the Geant4/HZETRN comparisons for the benchmark cases listed in the previous section.

2. The contractor shall deliver monthly progress reports documenting progress with the Geant4 simulations. The contractor shall also provide status and progress updates at the bi-monthly Space Weather Group Meetings. The format and schedule for both deliverables shall be agreed upon between the NASA TM and the contractor.

**Mod 1: The following deliverable is added to Section 5.0 above:**

**1. b. the Geant4/RAD comparisons for the benchmark cases listed in the previous section.**

**6.0 Other Information Needed for Performance of Task**

The contractor shall present research progress at the American Geophysical Union 2012 Fall Meeting (5 days of travel). Additional travel information will be provided to the contractor by the TM.

**Mod 1: The following travel requirements are added:**

**The contractor shall present research progress at the American Geophysical Union 2014 and 2015 Fall Meetings (5 days of travel, each meeting).**

**7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

**8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

**9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

**10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-093\_Mod3 CY3

**Task Order Title:** SAGE III Science

**1.0 Technical POC (TPOC):**

Name: gloria.hernandez  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: gloria.hernandez@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**A. Chemistry & Dynamics Branch (E303)**

1. (i) The contractor shall provide SAGE III payload engineering to include, but is not limited to, SAGE III instrument testing, evaluation of flight software architecture and implementation trades, development of limb scattering requirements, development of SAGE III ISS concept of operations, and other mission systems engineering tasks. Deliverables: The contractor shall deliver engineering test reports, trade studies, requirements documents, and other system engineering reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: Two 3 day trips to KSC for payload engineering planning.
  
2. The contractor shall perform the integration and testing, including scripting, of the SAGE III Instrument Assembly for subsystem environmental testing and preparation for system CDR. Deliverables: The contractor shall deliver tested integration scripts and instrument test reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
  
3. (i) The contractor shall develop plans for SAGE III ISS operational data processing to include algorithm porting and/or development for

Level 0 – Level 3 data products, production processing, configuration management, and other elements necessary to produce SAGE III science products in accordance with project Level 1 requirements. Deliverables: The contractor shall deliver draft operations plans for Level 1 production processing, software configuration management, and other software management documents to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: One 2 day trip to the 2013 Science Utilization Team meeting.

4. (i) The Contractor shall provide SAGE III CCD software engineering and CCD ground support equipment support including software development, testing, and production processing, and configuration management. Deliverables: The contractor shall deliver embedded systems software for the instrument CCD and the CCD ground support equipment to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
  
5. (i) The contractor shall provide support on engineering and systems programming for SAGE III flight systems and GSE, including, but not limited to, FORTH programming of the SAGE III CCD and CCD GSE. Deliverables: The contractor shall deliver reviews and consulting reports on FORTH programming to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
  
6. (i) The Contractor shall provide Scientific Programmers to perform data processing and data analysis on SAGE datasets using existing and new software routines. Activities shall include code porting, modification, enhancement, and new code development. The contractor shall perform research activities on satellite datasets and shall prepare related papers and briefings. Deliverables: The contractor shall deliver completed f90 software modules, analysis documents and reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: One 2

day trip/person to the 2013 Science Utilization Team meeting. Two 5 day trips to Fall AGU in San Francisco.

7. (i) The Contractor shall perform activities to execute the SAGE III Education and Public Outreach Plan. Activities include development of website/public media content and public/key activity articles. Articles are for print, video, live broadcast, web sites, and internal and external presentations. Activities include technical writing, editing, and document preparation. Deliverables: EPO articles, plans, web content and other products specified by the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: Four 2 day trips to support EPO activities and exchange meetings. Travel: One 2 day trip to the 2013 Science Utilization Team meeting. One 5 day trip to Fall AGU in San Francisco.
  
8. (i) The contractor shall develop a post-launch data validation plan and perform verification activities as determined by the NASA TM and communicated to the contractor. Deliverables: The contractor shall deliver data validation plans, coordination documents, and post launch validation results and reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: One 2 day trip to the 2013 Science Utilization Team meeting. One 5 day trip to Fall AGU in San Francisco. One 10 day trip for EGU/SPARC meeting in Germany. One 14 day trip to Queensland, New Zealand.
  
9. (i) The contractor shall provide mission operations support to plan and implement the project mission operations systems. The mission operations activities shall include Mission Operations Review planning on-orbit commissioning planning, and operations team training planning. Deliverables: The contractor shall deliver planning documents supporting on-orbit commissioning and team training to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: Two 3 day trips to KSC for payload engineering planning.

10. (i) The Contractor shall provide programming and system engineering for the SCF and SPOC data processing systems, and provide web site development for the SCF quality assurance and data dissemination sites. The contractor shall deliver Perl and Python scripts, other Level 1 and Level 2 software code, readers and plotters, and other software documentation to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: One 2 day trip to the 2013 Science Utilization Team meeting.
  
11. (i) The Contractor shall provide scientific programming for refinement of the existing SAGE III science segment processing code, including the L1 and L2 code, algorithm refinement and validation, development of readers and plotters, and development of documentation. Deliverables: The contractor shall deliver software and supporting documentation.
  
12. (i) The contractor shall perform SAGE III instrument post-refurbishment testing, and system level testing when SAGE III has been integrated to the ExPRESS Pallet Adaptor. The contractor shall maintain SAGE III instrument test infrastructure including the spread system and the Test Occultation Instrument under the direction of the primary Payload Engineering Support Lead. The contractor shall develop test plans and test procedures and perform testing under the direction of the primary SAGE III Test Conductor. Deliverables: The contractor shall deliver engineering test reports, ground system maintenance recommendations and reports, test plans and test procedures, and other system engineering reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
  
13. The contractor shall provide Instrument Operator to perform and execute maintenance testing, post refurbishment testing, and system level testing when SAGE III has been integrated to the ExPRESS Pallet Adaptor. The contractor shall perform the development of test plans, test procedures, test scripts, and databases necessary to



support integrated testing. Deliverables: The contractor shall deliver test plans, test procedures, test scripts, and post-integration test reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

14. (i) The Contractor shall provide programming and development for the ground segment processing system and for the test occultation instrument. Deliverable: The contractor shall deliver completed software modules, analysis documents and reports on programming activities on the ground segment system and the TOI to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
15. The contractor shall review and identify applicable ground system requirements and interfaces for SAGE III. The contractor shall maintain the SAGE III requirements documents and database. The contractor shall perform the SAGE III verification activities including verification planning, verification requirement development, verification procedure development, verification assessment, and development of the SAGE III verification end-item data package. Travel shall include three 2-day trips to KSC. Deliverables: The contractor shall deliver completed requirements documents, interface documents, verification plans, procedures, and reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
16. (i) The Contractor shall provide scientific programming for development of algorithms to retrieve stratospheric trace gas and aerosol profiles, e.g. the SAGE III science segment limb scatter processing code, including the L1 and L2 code, algorithm refinement and validation, development of readers and plotters, and development of documentation. Deliverables: The contractor shall deliver completed f90 software modules, algorithms, analysis documents and reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor. Travel: One 2 day trip to the 2013 Science Utilization Team meeting. Travel: One 5 day trip to Fall AGU in San Francisco.

17. The contractor shall provide mission operations/ground segment engineering support to plan and implement the project mission operations and ground segment systems. Deliverables: The contractor shall deliver completed studies and plans on the ground segment system to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
  
18. (i) The contractor shall provide support to update to SAGE III Documentation and to update and execute software. Deliverables: The contractor shall deliver completed code documentation and reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

### **B. Flight Software Systems Branch (D207)**

1. - 2. (i) The contractor shall be able to work independently and within an engineering team. Deliverables: The contractor shall deliver completed flight and ground system software modules, analysis documents and reports on programming activities to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
- 3. The contractor shall perform software engineering to maintain the ISS simulator and associated ground support equipment that will be used for the SAGE III Instrument pallet development and testing. Deliverables: The contractor shall deliver simulator systems software for the ISS simulator and ground system to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.
- 4. The contractor shall provide support to updates to the SAGE III Documentation and to update and execute software. Deliverables: The contractor shall deliver completed code documentation and

reports to the NASA TM in an agreed upon schedule and format between the NASA TM and the contractor.

5. The contractor shall support meetings and conferences as determined by the NASA TM.

**Modification 1: The purpose of this modification is to provide additional contractor support required for this task under "B. Flight Software Systems Branch (D207)", Paragraphs 1 and 2" above. The additional support is needed based on an increase for flight software programming due to additional software development and testing requirements.**

**Modification 2: The purpose of this modification is to add additional contractor support required for a new ATAL proposal under Section 2.0 above:**

### **C: ATAL Support**

**The contractor shall perform analysis and research support for the awarded proposal, "Nature, Origin and Climate impact of the Asian Tropopause Aerosol Layer (ATAL)". The support shall include:**

1. **The contractor shall use satellite data, primarily CALIPSO and SAGE II observations, to characterize the spatial and temporal properties of the Asian Tropopause Aerosol Layer (ATAL);**

**2. The contractor shall use optical properties from CALIPSO to infer aerosol size and shape characteristics, and shall use SAGE II data to investigate long-term trends.**

**3. The contractor shall attend monthly team meetings and participate in the preparation of manuscripts/presentations describing the results of these activities.**

**Deliverables due 1/31/2014 (unless otherwise specified below): The contractor shall deliver:**

**1. A compilation of satellite images and brightness temperatures from geostationary satellites over Asia for Summer 2008;**

**2. An analysis of coincidences of CALIPSO measurements with deep convection for Summer 2008;**

**3. Monthly informal oral reports on progress (dates to be determined by TM)**

**4. Quarterly reports delivered electronically in Microsoft Office format to the TM due by the 5th of the month.**

**Deliverables due 1/31/2015 (unless otherwise specified below): The contractor shall deliver:**

**1. A new aerosol/cloud classification of ATAL using CALIOP data;**

**2. An analysis of available aircraft and balloon sonde measurements of ATAL between 2006 – 2013;**

**3. A correlative study of ATAL formation with other satellite data e.g. TRMM, Aura-MLS, ACE-FTS, COSMIC-GPS temperatures;**

**4. A compilation of satellite images and brightness temperatures from geostationary satellites over Asia for summers 2006 – 2013;**

**5. Monthly informal oral reports on progress (dates to be determined by TM);**

**6. Quarterly reports delivered electronically in Microsoft Office format to the TM due by the 5th of the month.**

**Deliverables due 1/31/2016 (unless otherwise specified below): The contractor shall:**

**1. Compile CALIOP-SAGE II data for Asian summers for the lifetime of those instruments record for trends studies;**

**2. Compile hourly satellite imagery/cloud top brightness temperature from geostationary satellite for summers 2006 – 2013;**

**3. Provide monthly informal oral reports on progress (dates to be determined by TM);**

**4. Provide quarterly reports delivered electronically in Microsoft Office format to the TM due by the 5th of the month.**

**5. Provide a final project report to the TM, delivered electronically in Microsoft Office format.**

**Modification 3: The purpose of this modification is specify the following: (1) additional support required due to the SAGE III/ISS launch delay and furlough impact and, to align with the SAGE Project Plan as rescheduled (Sections 2.A.3,4,5,6,7,8,9,10,11,12,14,18); (2) update personnel requirements, including removal of departed contractor staff members (Sections 2.A.4,5,16 and 2.B.2); (3) provide engineering support for extended thermal vacuum instrument testing (2.A.1); (4) provide additional support for extended STK modeling of ISS orbit data (Section 2.A.19) and (5) provide additional instrument characterization and test support (Section 2.A.20):**

### **2.A. Chemistry & Dynamics Branch (E303)**

**1. (ii)The contractor shall provide support for extended thermal vacuum testing. The contractor shall provide post-launch payload monitoring and operational programming support. Deliverables: Engineering studies, requirements, documentation due to the NASA TM in an agreed-upon format by 6/15/15. Post-launch reports and code due to the NASA TM in an agreed-upon format by 1/31/16.**

**3. (ii) The contractor shall deliver software planning documents for transition to operations and post-launch processing. Travel: One 2-day trip to the 2014 Science Utilization Team Meeting (location TBD). Deliverables: Documents due to the NASA TM in an agreed upon format by 6/15/2015.**

**4. (ii) The contractor shall provide launch ready CCD software incorporating instrument characterization-based modifications. The contractor shall provide post-launch embedded systems programming support for on-orbit operations. Deliverables: Pre-launch embedded systems software due to the NASA TM in an agreed-upon format by 6/15/15. Post-launch embedded systems software due to the NASA TM in an agreed-upon format 1/31/16.**

**5. (ii) The contractor shall provide launch ready FORTH code for the CCD controller incorporating modifications. The contractor shall provide post-launch FORTH code programming support for on-orbit operations. Deliverables: Pre-launch code due in FORTH format to the NASA TM by 6/15/15. Post-launch code due in FORTH format to the NASA TM by 1/31/16.**

**6. (ii) The contractor shall provide science software including post-launch calibrations and on-orbit characterizations for both transition to operations and mission continuation support. Travel: Two 2-day trips to the 2014 and 2015 Science Utilization Team meetings (location TBD). Two 5-day trips to Fall 2014 and 2015 AGU in San Francisco. Deliverables: Science processing code in f90 and IDL format due to the NASA TM due 1/31/16.**

**7. (ii) Travel: Four 2-day trips to support EPO activities and exchange meetings (location TBD), one 2-day trip to the 2014 and 2015 Science Utilization Team meeting (location TBD), and one 5-day trip to Fall AGU in San Francisco. Deliverables: EPO deliverables due to the NASA TM in an agreed-upon format by 1/31/16.**

**8. (ii) Travel: One 2-day trip to the 2014 and 2015 Science Utilization Team meeting (location TBD). One 5-day trip to Fall AGU in San Francisco in 2014 and 2015. Deliverables: Post-launch validation reports due to TM in an agreed upon format by 1/31/16.**

**9. (ii) The contractor shall provide mission operations planning to support post-launch commissioning and the transition to operations. Travel: Two 3-day trips to KSC engineering planning. Deliverables: Pre-launch planning documentation due to the NASA TM in an agreed-upon format by 6/15/15.**



**Post-launch documentation due to the NASA TM in an agreed-upon format by 1/31/16.**

**10. (ii)The contractor shall provide programming and system engineering support of SCF and SPOC data systems for post-launch, transition to operations, and mission continuation support. Travel: Three 2-day trips to the 2014 and 2015 Science Utilization Team meetings (location TBD). Deliverables: SCF and SPOC data systems code due to TM in an agreed upon format by 1/31/16.**

**11. (ii)The contractor shall provide science software for post-launch algorithm refinement, product validations, and maintenance of readers and plotters. Travel: One 2-day trip to the 2014 and 2015 Science Utilization Team meeting (location TBD). Deliverables: Science code in f90 and IDL format due to the NASA TM by 1/31/16.**

**12. (ii)The contractor shall provide post-launch instrument performance data using modeled output from the test occultation instrument and spread system. Deliverables: Pre-launch instrument rest reports due to the TM in an agreed-upon format by 6/15/15. Post-launch performance verification reports due to the NASA TM in an agreed-upon format by 1/31/16.**

**14. (ii)The contractor shall provide pre-launch updated software for the SPOC processing systems and the test occultation instrument and provide system updates after transition to operations. Deliverables: Pre-launch software updates due to the TM in an agreed-upon format by 6/15/15. Post launch software updates due to the TM in an agreed-upon format by 1/31/16.**

**16. (ii)The contractor shall provide post-launch wavelength calibrations, verification studies, and algorithm refinements. Deliverables: Software modules for pre-launch due to the NASA TM in f90 and IDL format by 6/15/15. Post launch studies due to the NASA TM in an agreed-upon format by 1/31/16.**

**18. (ii)The contractor shall provide documentation support and test support for pre-launch activities. Deliverables: Test cases and documentation due to the NASA TM in an agreed-upon format by 6/15/15.**

**19. The contractor shall provide orbit and event propagation support for mission and payload operations using the STK toolkit. Deliverables: The contractor shall deliver data files containing GPS vectors, ephemeris data, and**

**occultation event schedules to the NASA TM in an agreed upon format by 1/31/2016.**

**20. The contractor shall perform event characterizations using full functional test data, radiance test data, and sunlook/moonlook test data to include establishment of dark current, radiometric analysis, photon conversion efficiency, and spectral resolution. Deliverables: The contractor shall deliver pre-launch test reports, analysis, and characterization data schedules to the NASA TM in an agreed upon format by 6/15/2015. Post-launch reports are due schedules to the NASA TM in an agreed upon format by 1/31/2016.**

### **B. Flight Software Systems Branch (D207)**

**2. (ii) Deliverables: Flight software due to the NASA TM by 6/15/2015. Ground support equipment software updates due 1/31/2016.**

<span style="font-family: 'Times New Roman';">&lt;span style="font-size: small;"> &lt;/span&gt; </span>

### **3.0 Special Requirements**

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 to January 31, 2014.

Milestones are defined by assigned deliverables as established by the TM and agreed to by the contractor at monthly meetings.

**Mod 2: The new Period of Performance is February 1, 2013 to January 31, 2016.**

### **5.0 Deliverables/Reporting Requirements**

Deliverables are defined by task in section 2.0.

The contractor shall provide informal status reports to the Task Monitor (TM) to summarize the work completed and future plans, at an agreed upon schedule and format between the NASA TM and the contractor.

## **6.0 Other Information Needed for Performance of Task**

Travel requirements for this task are outlined in section 2.0 and additional travel information will be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-094\_Mod7 CY2

**Task Order Title:** Proposal Support

**1.0 Technical POC (TPOC):**

Name: kimberly.cannon  
Organization: E302:Climate Science Branch  
Email Address: Kimberly.a.cannon@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

This task is for Proposal Management support of upcoming proposal efforts (e.g., Earth Venture instrument, airborne, and missions, HOPE, Instrument Incubator Program, R&A, ASCENDS instrument AO, etc.).

The proposal teams will develop the concept and mission requirements, threshold and baseline mission concept, instrument concept, and a preliminary cost estimate for the mission.

The primary objectives that this task are:

1. Manage the proposal development effort to ensure successful team coordination and performance.
2. Plan proposal development tasks and milestones and provide progress updates for the plan.
3. Coordinate proposal development activities with NASA proposal team partners from industry and/or other NASA Centers.
4. Develop tools, techniques and templates to facilitate the proposal development process (e.g., proposal outline and compliance matrix, storyboard development, etc.) based on lessons learned from previous proposal efforts.

The contractor shall:

- Ensure the LaRC proposal process is followed.
- Support the development of capture plans, which focus on the steps necessary to transition from opportunity discovery to proposal development. Typical elements of a capture plan include opportunity description, customer analysis,

competitive analysis, internal analysis of technology readiness level/cost/risk, win strategy development. Identify appropriate tasks/milestones and provide periodic updates on progress for the plans.

- Manage cross-functional proposal teams in creating proposal deliverables; ensures that appropriate resources are available to the proposal team; participates in researching, writing and editing of proposal. Provides team leadership, assisting the Proposal Manager in identifying work that needs to be accomplished, tracking the progress of this work, and assuring assigned tasks are completed in a timely manner.
- Facilitate formal review teams (Blue, Red, Gold) with senior and executive level managers.
- Serve as main POC for all internal and external team members.
- Analyze solicitation requirements and prepares proposal plans: outlines, tasks, schedules, and responsibilities.
- Work with PI and proposal team to develop and identify proposal win strategies, differentiators, and strengths.
- Validate proposal compliance with RFP requirements.
- Ensure that the cost/price volume is consistent with the technical volume.
- Act as a resource in the business development process as needed, assisting all team members.
- Provide project scheduling expertise, specifically developing the Mission Master Schedule and developing, tracking, and assessing the Proposal schedule.
- Provide marketing and effective communication consultation with the team members as the proposal is written.
- Provide risk management support, specifically the integration of identified technical and programmatic risks with cost and schedule management.
- Assist the Proposal Manager in developing effective and implementable risk mitigations and developing a reserve strategy to manage these risks.
- Assess cost and schedule realism of the proposal, identifying areas where reserves will be needed to mitigate risks.
- Assist the team in developing effective and persuasive sections, graphics, and presentations for the proposal

In addition to the usual MS Word and Excel skills, expertise in MS Project for schedule assessments and options is required. It is highly desired that the candidate have familiarity and experience with NASA and Langley Research Center, as the proposal team will have to work within many of the existing NASA systems.

**Mod 1: The purpose of this modification is to add a Primary Objective above to include proposal support for 4 additional upcoming Earth Venture proposals:**

**5. Assemble a proposal development team for 4 additional Earth Venture proposals focusing primarily on pre-solicitation planning, developing a Rough Order of Magnitude (ROM) budget, coordinate feasibility studies (as needed), defining roles and responsibilities of team members, and an action tracking document.**

**Mod 2: The purpose of this modification is to add a Primary Objective above to include the *formulation and post-submittal phase* of the Earth Venture Proposals described in Mod 1.**

**6. Consult with proposal teams to develop technical strategies and solutions, and translate technical details into proposal content. Verify business and technical solutions to fulfill customer requirements. Support the proposal team through the proposal development process: from kickoff; to section outlines; to initial drafts; and to finished proposal copy. Assist with all elements of the proposal offering: proposal outline and compliance matrix; storyboard development; team member responsibilities and customer interfaces; technical and management solutions; cost volume; and all other deliverables required by specific solicitations.**

**Mod 3: The purpose of this modification is to change the TM from Rosemary Baize to Kimberly Cannon as of June 7, 2013.**

**Mod 4: The purpose of this modification is to add a Primary Objective above to include the Earth Venture-Instrument Chronos Proposal:**

**7. Develop compliant and persuasive proposals in alignment with Science Mission Directorate needs. Participate in the *formulation and post-submittal phase* of the Instrument proposal. Consult with proposal teams to develop technical strategies and solutions, and translate technical details into proposal content (focusing on content for investigation implementation, mission implementation, and project management sections). Verify business and technical solutions will fulfill customer requirements. Support the proposal team through the proposal development process: from kickoff; to section outlines; to initial drafts; and to finished proposal copy.**

**Mod 5: The purpose of this modification is to add a Primary Objective above to include the Atmospheric Carbon and Transport Study America (ACT-NA) proposal in response to Earth Venture Suborbital Instrument-2:**

**8. Support development of the Atmospheric Carbon and Transport Study America (ACT-NA) proposal in response to EVS-2. Specifically, lead development of the Appendices section of the proposal. Consult with proposal teams to develop technical strategies and solutions, and translate into proposal content that supports the investigation implementation, mission implementation, and project management sections and is responsive and compliant to the AO. Support the proposal team through the proposal development process to finished proposal copy. Analyze solicitation requirements and prepares proposal plans: outlines, tasks, schedules, and responsibilities. Validate proposal compliance with RFP requirements.**

**Mod 6 : The purpose of this modification is to add additional support to review and respond to the LaRC Red Team recommendations, as well as prepare proposals for final submission.**

**Mod 7: The purpose of this modification is to add Primary Objectives above to include Proposal Management Lead requirements and proposal training and team mentoring:**

**9. Support LaRC proposal development activities as the Proposal Management Lead. Work with LaRC Business Development Managers to understand strategic opportunities and plans for capturing those**

**opportunities while staying consistent with Center strategy and planning. Participate in Proposal Team activities in an advisory role to develop compelling, compliant proposals and define proposal win strategies in achieving Center goals. Working closely with Directorates and Center Business Development Managers, assist in identifying and qualifying next generation of Proposal Managers and create Proposal Manager training and development plans. Gather and analyze lessons learned from proposal development activities in order to recommend and implement solutions. Liaison between Proposal Teams and OUMs to facilitate business development process and strategic planning for upcoming opportunities.**

**10. Provide assistance to LaRC's proposal teams in developing competitive process expertise, proposal planning, proposal format, knowledge sharing, including proposal organization, win strategy and theme development, storyboarding and compliance assessment. Depending upon the complexity and scope of the project, and the experience level of the proposal team, different levels of proposal support shall include, but are not limited to: training, guidance, facilitation, expert support, and mentoring for the development and management of the proposal, as set forth below:**

**The Contractor shall provide:**

**a. Proposal Training: The Contractor shall provide a training package (PowerPoint charts, training manual and other training tools) used to train and guide the proposal team through the entire proposal development process. Course content includes, but is not limited to the following topics:**

- 1. Assessment of Customer Needs (provides team with an understanding of who the customer is and what's being solicited)**
- 2. Strengths, Weaknesses, Opportunities and Threats Analysis (provides a basic understanding of LaRC capabilities and how they overlap with the customer's needs in order to develop win themes for the proposal)**
- 3. Identification of "Win Themes"**



4. **Proposal Layout/Outline**
5. **Identification of Proposal Section Responsibilities**
6. **Storyboarding**
7. **Ghosting (i.e., comparative technology assessment)**
8. **Proposal writing (i.e., formatting, strong topic sentences, concise graphics)**
9. **Technical, management and cost reviews**

**B. Post-Training Team Mentoring:** The Contractor shall continue to provide mentoring support to the proposal team including planning, strategy development, theme development, section map development, focused just-in-time training, and ongoing one-on-one mentoring sessions with the team to support proposal management. The Contractor shall assist the proposal team in structuring, writing and reviewing the Government proposal in response to the AO. Possible proposals being developed may respond to the following AOs:

1. **Discovery**
2. **New Frontiers**
3. **Earth Venture (EVM-2 and EVI-3)**
4. **Hands On Project Experience (HOPE-5)**
5. **Research Opportunities in Space and Earth Sciences (ROSES 2014)**
6. **Advanced Component Technology (ACT)**
7. **Airborne Instrument Technology Transition (AITT)**
8. **Instrument Incubator Program (IIP)**
9. **Maturation of Instruments for Solar System Exploration (MISSE)**
10. **ARMD Seedling Fund**
11. **Technology Demonstration Missions**
12. **NASA Innovative Advanced Concepts (NIAC)**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data : Yes: ITAR and SBU

### **4.0 Schedule/Milestones/Period of Performance**

Period of performance of this task  
October 1, 2012 through January 31, 2014.

**Mod 5: The new overall period of performance for this task is October 1, 2012 through January 31, 2016.**

**The period of performance end date for the Mod 5 work only is January 31, 2014.**

**The period of performance end date for the Mod 7 work only is September 30, 2014.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide the following deliverables:

1. Proposal development plans and schedules, delivered to the NASA TM electronically via email in a Microsoft Word document quarterly.
2. Monthly reports of accomplishments, delivered to the NASA TM electronically via email in a Microsoft Word document.

**Mod 5: The contractor shall provide the following additional deliverables pertaining to Mod 5:**

**1. Monthly reports of accomplishments, delivered to the NASA TM electronically via email in a Microsoft Word document by the 5th of each month.**

**2. Announcement of Opportunity (AO) -compliant Appendices Section for ACT-NA proposal as determined by proposal development schedule.**

**Mod 7:**

**The contractor shall provide the following deliverables pertaining to Mod 5:**

**1. Proposal development plans and schedules, delivered to the NASA TM electronically via email in a Microsoft Word document (due quarterly).**

**2. Proposal Management training plan delivered to the NASA TM electronically via email in a Microsoft Word document (due September 30, 2014)**

**3. Monthly reports of accomplishments, delivered to the NASA TM electronically via email in a Microsoft Word document (due by the 5th of each month).**

**4. Proposal Training Package, including copies of presentation material, delivered as requested by TM**

**5. Relevant books, tools and templates, as appropriate, delivered as requested by TM.**

**6. Monthly reports of accomplishments, delivered to the NASA TM electronically via e-mail in a Microsoft Word document (due by the 5th of each month)**

## **6.0 Other Information Needed for Performance of Task**

no travel needed on this task.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be

assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-096\_Mod2 CY4

**Task Order Title:** TEMPO Instrument Document Development

**1.0 Technical POC (TPOC):**

Name: wendy.pennington  
Organization: E6:Flight Projects Directorate  
Email Address: wendy.f.pennington@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The Tropospheric Emissions: Monitoring of Pollution (TEMPO) is an instrument project under the Earth Venture Mission Series Programs of the Earth Science System Pathfinder Program Office. The contractor shall provide project management and system engineering support to the TEMPO Project to accommodate the TEMPO Integrated Baseline Review (IBR) and the Preliminary Design Review (PDR) to Confirmation. The contractor shall assist in the development of key documentation, plans, and schedules for the implementation of the TEMPO Project, as set forth below.

The contractor shall:

1. Perform analysis on the Ball contract schedule and integrate risks with schedule;
2. Identify risk areas in implementation plans;
3. Identify risk mitigations for early implementation to avert future schedule slips and cost growth;
4. Prepare technical management reports that use Ball contract deliverable data metrics for inclusion into the monthly HQ reporting;
5. Provide expert analysis of PDR related products.
6. Conduct review of TEMPO instrument development calibration and integration test work flow.
7. Provide analysis of the products provided in the review and recommendations to the sponsor designated by the TEMPO Project

Manager, to include integrated technical schedule plans and staffing projections provided by the TEMPO Instrument Contractor prior to an Integrated Baseline Review.

**Mod 1: The purpose of this mod is to add requirements to conduct a review of the instrument development calibration and testing plans, as specified below:**

**8. Conduct review and provide analysis of instrument development calibration and testing and verification plans.**

**9. Conduct review and perform consolidation of reviewer comments for characterization and calibration plan, and provide recommendations to the TEMPO Chief Engineer.**

**10. Conduct review of additional Data Requirements Descriptions (DDR) as required prior to the TEMPO project preliminary design review.**

**Mod 2: The purpose of this mod is to add requirements to review PDR documents for work to be completed by July 31, 2014, as specified below:**

**11. Review environmental test plan documents and provide comments.**

**12. Participate in PDR dry-run meetings during PDR Methodology presentations.**

**13. Assist with preparation, final PDR documents, and monitor PDR Methodology discussions.**

### **3.0 Special Requirements**

None

### **4.0 Schedule/Milestones/Period of Performance**

The period of performance is March 21, 2014 through September 30, 2014.

## **Mod 1: The period of performance for Mod 1 only is June 20, 2014 through July 25, 2014**

### **5.0 Deliverables/Reporting Requirements**

Below are the deliverables required for this task - all documentation shall be emailed electronically to the TM in Microsoft Office or compatible format:

1. Assist in completing all Required Documentation to pass through Key Decision Point-B (March 28, 2014)
2. Report of recommended risk areas and mitigation steps for preparation of Integrated Baseline Review (March 28, 2014)
3. Recommended integrated Master Schedule updated incorporating risk mitigations (March 28, 2014)
4. Documentation of TEMPO risk posture with mitigation strategies (April 3, 2014)
5. List of TEMPO instrument development calibration and integration test work flow documents reviewed (April 8, 2014)
6. Report of TEMPO instrument development calibration and integration test work flow; the report shall include recommended implementation risks in the approach taken, risk areas recommended to mitigate (April 8, 2014)
7. List of questions specific to the documents provided (April 8, 2014)
8. Report any recommendations of mitigations to problem areas (April 18, 2014)
9. Monthly HQ's technical management reports using data metrics provided (by 10th of each month)
10. Analysis report of the PDR related products (May 15, 2014)

### **Mod 1: The following deliverables are required for this mod:**

**11. Report summary of documentation reviewed to include implementation risks seen and recommended mitigations (June 30, 2014)**

**12. Initial List of recommendations for the next maturity level to the document (June 30, 2014)**

**13. Final List of recommendations for the next maturity level to the document (July 7, 2014)**

## **6.0 Other Information Needed for Performance of Task**

All Government-furnished items will be made available to the contractor at the time of task award, unless otherwise specified.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number: A-097\_Mod1 CY3**

**Task Order Title: CATS Lidar Support**

### **1.0 Technical POC (TPOC):**

Name: ali.omar  
Organization: E304:Atmospheric Composition Branch  
Email Address: Ali.h.omar@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The NASA Cloud-Aerosol Transport System (CATS) is a lidar instrument currently being developed at NASA GSFC for deployment to the International Space Station (ISS) in summer 2014. The CATS lidar will provide range-resolved profile measurements of atmospheric aerosols and cloud distributions and properties. The primary objective of the CATS Lidar Support task is to use the CATS measurements to augment and extend the long-term data record established by CALIPSO.

- a. The contractor shall enable the generation of CALIPSO-like Level 2 products using CATS Level 1 data and the CALIPSO Level 2 algorithm set.
- b. The contractor shall provide analysis to evaluate the geolocation and calibration of CATS Level 1 data and support the validation of the CATS CALIPSO-like data products. The data products shall be produced and archived at the LaRC Atmospheric Science Data Center (ASDC) and shall use the CALIPSO Automated Processing System (CAPS) as the primary data ingest and processing facility.
- c. The contractor shall modify existing CAPS software scripts and CALIPSO Level 2 program elements as required to create a processing subsystem that will ingest CATS Level 1 data and create a CALIPSO-like Level 2 data record.
- d. The contractor shall perform analyses needed to assess the geolocation and calibration accuracies of the CATS Level 1 data products.
- e. The contractor shall produce the CATS CALIPSO-like data products on a schedule that will not impact the standard/expedited CALIPSO data production schedule.
- f. The contractor shall conduct validation analysis of CATS CALIPSO-like Level 2 data products.
- g. The contractor shall participate in CATS science team and algorithm implementation meetings with the GSFC CATS team as determined by the TM.
- h. The contractor shall provide a monthly status report and provide a schedule of planned activities.

Specific requirements include:

- i. In consultation with representatives from the CATS (GSFC) and CALIPSO (LaRC) teams, the contractor shall develop:
  - (a) a Software Requirements Document that fully specifies all top level requirements that the resulting CATS CALIPSO-like data production code must satisfy;

(b) a comprehensive Data Products Catalog for the CATS CALIPSO-like Level 2 data products; and  
(c) a Software Development Schedule that ensures timely delivery of all software, data products and documentation specified in the software requirements document.

(d) The Software Requirements Document, the Data Products Catalog and the Software Development Schedule shall be submitted to the TM for review and approval. Delivery of these documents shall occur according to a schedule agreed upon by the contractor and the TM.

ii. Guided by the Software Requirements Document and the Data Products Catalog, the contractor shall create Software Design Documents that describe all aspects of the CATS-CALIPSO processing system. Formal design reviews shall be held for each document. Upon completion of the review process, all software design documents shall be submitted to the TM for review and approval.

iii. The contractor shall develop a phased and modular Software Test Plan that assures software quality and correctness at each stage of the development cycle. Upon completion, the Software Test Plan(s) shall be submitted to the TM for review and approval.

iv. The contractor shall develop and adhere to a Configuration Management Plan that implements the best practices of software engineering; the elements addressed by this plan shall include, but not be limited to, the use of bug tracking software (e.g., *Bugzilla*) and a version control system (e.g., *Subversion*). Upon completion, the Configuration Management Plan shall be submitted to the TM for review and approval.

v. The contractor shall develop a Data Production Plan for the CATS CALIPSO-like Level 2 data products and submit it for review and approval by the TM. The plan shall be submitted within a schedule agreed upon between the contractor and the TM,

vi. The contractor shall use the CATS CALIPSO-like data production software to produce CATS CALIPSO-like data products. These products shall be delivered to the LaRC ASDC according to schedules agreed upon by the contractor and the TM.

vii. The contractor shall create and deploy a web-based Data Users' Guide. This users' guide shall be updated prior to each public release of the CATS CALIPSO-like data products. The Data User's Guide shall be submitted to the TM for review and approval prior to its public release.

viii. Prior to a public release of the CATS CALIPSO-like Level 2 data products, the contractor shall deliver to the TM all source code and supporting documentation for the CATS CALIPSO-like data production system.

ix. The contractor shall ensure that all required documents and software comply with all contract requirements, are delivered within schedules agreed upon between the contractor and the TM, and are archived at the ASDC.

x. A report evaluating accuracies of the CATS Level 1 geolocation and calibration shall be submitted to the TM for review and approval and delivered within a schedule agreed to by the contractor and TM.

xi. A report on the validation of the CATS CALIPSO-like Level 2 data products shall be submitted to the TM for review and approval and delivered within a schedule agreed to by the contractor and TM.

**Mod 1: The purpose of this modification is to change the TM from Kathleen Powell to Ali Omar as of June 25, 2013.**

### 3.0 Special Requirements

1. Access to Sensitive or ITAR Data: Yes

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance is June 25, 2013 through January 31, 2016.

Schedules shall be agreed upon during monthly meetings held during the first week of each month with the TM.

## **5.0 Deliverables/Reporting Requirements**

1. The contractor shall provide monthly reports (Microsoft Word document delivered to the TM via email) which include completed and projected accomplishments, significant issues, and metrics reflecting the contractor's success in meeting the CATS performance standards described in Section 2.
2. The contractor shall prepare, deliver (via email in a Microsoft Word document) and maintain a document that lists requirements and schedule once it has been approved/accepted by the TM. The document shall be delivered within a month of the start of the performance period and reviewed on a monthly basis with the TM.
3. The contractor shall provide oral or written status reports as determined by the TM.
4. The contractor shall provide CATS software tools and supporting documentation for the analysis and display of CATS CALIPSO-like data as determined by the TM.
5. The contractor shall participate in the development of CATS publications and presentations for the CATS Science Team and other technical meetings as determined by the TM.

## **6.0 Other Information Needed for Performance of Task**

None

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be

assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-098\_Mod1 CY3

**Task Order Title:** CAPABLE and SAGE III Support

**1.0 Technical POC (TPOC):**

Name: doreen.neil  
Organization: E303:Chemistry & Dynamics Branch  
Email Address: Doreen.O.Neil@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

I. Background Information: NASA Langley Research Center (LaRC), in collaboration with the U.S. Environmental Protection Agency (EPA) Office of Research and Development, established and operates the Chemistry and Physics Atmospheric Boundary Layer Experiment (CAPABLE) research site location on NASA Langley Research. Efforts at the CAPABLE research site are focused on linking science and applications associated with geostationary and low earth orbit trace gas and aerosol measurements to assess the relationship between total column measurements and surface air quality as measurement by ambient monitors. This is accomplished through the collection of routine and systematic measurements of key air quality related trace gas and aerosol column densities (NO<sub>2</sub>, O<sub>3</sub>, SO<sub>2</sub>, HCHO, and AOD) coincident with EPA Federal Reference or Equivalent Methods (FRM/FEM) (NO<sub>2</sub>, O<sub>3</sub> and SO<sub>2</sub>) to investigate linkages between column (including LEO and GEO satellite) and surface air quality. The surface air quality measurements are collection via U.S. EPA research instruments in addition to ambient air quality measurements from the Virginia Department of Environmental Quality (VADEQ), which operates a dedicated monitoring shelter at the CAPABLE site. The VADEQ monitor site is an official air quality monitoring site for the Hampton Roads Region with a suite of analyzers operated in accordance with U.S. EPA FRM/FEM requirements. Column density measurements are made at the CAPABLE site using a Pandora spectrometer and AERONet Cimel operated and maintained by NASA Langley Research Center. Additional measurements operated and maintained by NASA LaRC include ozonesondes and surface meteorological measurements.

II. The CAPABLE research site is a unique asset to the NASA Langley Science Directorate (SD) because it is located on center and provides a suite of measurements which are relevant to satellite missions being led or managed out of the SD, **Stratospheric Aerosol and Gas Experiment (SAGE)-III** International Space Station (ISS) and Tropospheric Emissions: Monitoring of Pollution (TEMPO) EV-I. Since 2009, NASA Langley has maintained and operated a ground-based spectrometer system (Pandora) developed by scientists at NASA Goddard Space Flight Center (GSFC). The Pandora system has been validated against similar sun-tracking instruments [Wang et al., 2010] and Ozone Monitoring Instrument (OMI) [Herman et al., 2009]. The Pandora provides vertical-column amounts of NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub> and H<sub>2</sub>O from direct sun observations and serves as a proxy measurement for satellite trace gas observations, and provides high time (2-minute) resolution data allowing direct comparison of in-situ/column observations throughout the day as boundary-layer dynamics and chemistry change. For the future TEMPO instrument the ground-based Pandora will serve as a primary validation instrument.

III. Beginning in 2013, LaRC SD has worked with GSFC to build three (3) additional Pandora spectrometers to be operated and maintained by LaRC SD. Two of the Pandoras will be operated in support of air quality related research being conducted in collaboration with the U.S. EPA and directly relevant to the TEMPO EV-I mission and the Decal Survey mission GEOstationary Coastal and Air Pollution Events (GEO-CAPE). One of these two Pandora instruments will be deployed to the CAPABLE research site while the other instrument will be deployed to the U.S. EPA research air monitoring site located on EPA's Campus in Research Triangle Park, NC. The third Pandora instrument will be operated in support of SAGE-III ISS and used to develop stratospheric retrievals of trace gases for validation of SAGE-III. Operation of the SAGE-III Pandora will be at various locations to be determined by the SAGE-III science team.

IV. The primary work to be performed under this task is to lead the operate, calibrate, maintain, and repair the collection of current and future Pandora instruments in support of research activities at NASA LaRC SD and provide on-site support of additional monitoring instrument at the CAPABLE research site as needed, and based upon technical directive from the task monitor. The contractor support shall include, but is not limited to, site and instrument set-up, calibration, daily operation, and data retrieval for high time resolution instruments and integrated samplers located at the CAPABLE site at NASA LaRC. Specific tasks include:

- Collect and analyze air-quality data
- Operate, calibrate, maintain, and repair air-quality instruments (API NO<sub>x</sub>, Pandora, AERONET, weather station, sounding system)

- Perform regular O3 and met sonde launches
- Prepare and condition O3 sondes for launch
- Process sonde, Pandora, meteorological, and surface data
- Write code for automated data retrieval from remote computers and processing
- Coordinate with outside groups (e.g. DISCOVER-AQ, GSFC, and SAGE-III) for sonde launches, instrument deployment (including troubleshooting/repair), data processing/reporting, and QA/QC data prior to posting for public access (including documenting revisions)
- Keep up to date with current literature and identify opportunities for data analysis that will be beneficial to the community
- Present data at meetings (internal and external) and in peer-reviewed journals
- Coordinate field-research logistics, and participate in field research
- Perform radiometric calibrations, characterization, and validation of SAGE-III flight instrument
- Perform validation sonde flights coordinated with SAGE-III overpasses

**Mod 1: The purpose of this modification is to increase the number of spectrometers being built in Section 2.0 above, as well as extend the period of performance:**

**III (a) The contractor shall work with GFSC to build up to 2 additional Pandora spectrometers to be operated and maintained at the CAPABLE site and used in field deployments in support of SAGE validation.**

### **3.0 Special Requirements**

No access to ITAR or sensitive data

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is May 1, 2013 through September 30, 2013.

**Mod 1: The new period of performance is May 1, 2013 through January 31, 2016.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide data products (data retrieval for high time resolution instruments and integrated samplers located at the CAPABLE site at NASA Langley Research Center and other locations as described in section 2.0), documentation for the operations of instruments at the CAPABLE site, and analysis reports (analysis reports include calibration, operations, and maintenance logs of the CAPABLE site) produced in this task electronically to the NASA Technical Monitor within the agreed upon format and timeframe.

The contractor shall provide a monthly report outlining the progress on the task assignments. This report should be provided to the NASA Technical Monitor electronically by the end of each month.

## **6.0 Other Information Needed for Performance of Task**

A limited amount of travel is anticipated under this task. If travel is needed, the dates and circumstances necessitating travel will be specified by Technical Monitor.

## **7.0 Data Rights**

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## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-099\_Mod0 CY3

**Task Order Title:** Advanced Technology and Research

**1.0 Technical POC (TPOC):**

Name: constantine.lukashin  
Organization: E3:Science Directorate  
Email Address: constantine.lukashin-1@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

Background: This task supports advanced technology and research at NASA LaRC. This work is associated with the development of advanced technologies within NASA's Internal Research And Development (IRAD) and Earth Science Technology Office (ESTO) projects, and new science methodologies within the Science Innovation Fund (SIF) and Research Opportunities in Space and Earth Sciences (ROSES) projects. This task will be updated with details for each proposal after selection process has been completed.

The contractor shall perform tasks to support the development of technology and research methods defined in the project(s) specified below.

**A. Earth Science Data Fusion Workflow Engine (DFWE):** DFWE is a data-object oriented approach that allows users to massively scale processes on multi-CPU computing systems by efficiently managing the IO data flow. The proposed approach shall provide an intelligent way to optimize the IO for the data fusion projects. This feature shall provide efficient solution for processing data from the future multi-satellite constellations. Massive computing scaling: long-running single-node jobs partitioned into smaller parallel tasks running in a distributed environment to optimize use of computer resources. The tasks include, but are not limited to, the following technology and research areas:

1. Research the current and future requirements for the data merging at the NASA Earth's Science.
2. Research state-of-the-art existing technology solutions for the massive data fusion/data merging: both in hardware and software.
3. Evaluate advanced data merging technology applicable to the NASA Earth's Science observation data.
4. Estimate the required effort for creating a new Data Fusion Framework for NASA Earth's Science applications.

The contractor shall assist the NASA LaRC team in planning and readiness for all major reviews of the project. More specifically, it is expected that the contractor shall assist LaRC team in the following:

1. Compiling and presenting research results at the project team meetings (two per month).
2. Compiling and presenting research results at mid-term (April 2014) and final (October 2014) project reviews.
3. Summarizing research results into the technology report.

### **3.0 Special Requirements**

None

### **4.0 Schedule/Milestones/Period of Performance**

Task Period of performance: January 2, 2014 - October 31, 2014

### **5.0 Deliverables/Reporting Requirements**

All research and development results shall be delivered by the contractor to the TM within the agreed upon timeframe and the format required.

Software shall be delivered in a public releasable format with adequate instructions to compile, install, and test (October 2014)

## **6.0 Other Information Needed for Performance of Task**

n/a

## **7.0 Data Rights**

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## **8.0 Safety**

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## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-100\_Mod0 CY4

**Task Order Title:** MIIC Framework Deployment

**1.0 Technical POC (TPOC):**

Name: jon.currey  
Organization: E302:Climate Science Branch  
Email Address: Jon.C.Currey@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The Multi-Instrument Intercalibration (MIIC) Framework is a distributed tiered framework built on top of the OPeNDAP software to support intercalibration and intercomparison science studies. The MIIC Framework predicts near co-incident measurements with matched viewing geometries for instruments on separate spacecraft and efficiently acquires these data from remote data servers using OPeNDAP and server-side functions. MIIC-2 will extend the features of MIIC-1 to include intercomparison, data mining, and OSSE data access. MIIC software will be deployed at the NASA Atmospheric Science Data Center (ASDC) and National Climatic Data Center (NCDC) data centers.

The contractor shall:

- (a) Provide the follow-on MIIC-2 Framework software design and implementation based on the technical section of the MIIC Framework;
- (b) Develop the Extensions and Deployment proposal jointly with the NASA Technical POC (TPOC);
- (c) Develop the software requirements jointly with the NASA TPOC;
- (d) Support software integration and upgrades to deploy MIIC services at the ASDC and NCDC data centers;
- (e) Maintain all software in a code repository on a NASA specified server;
- (f) Implement software to support all tiers of the operational system, which includes client-side code (code that runs in browser or REST client), MIIC Application tier, and OPeNDAP server-side functions. Build 1 to include generalization of all code (end-to-end) to support all identified data products for deployment including VIIRS, CrIS, ATMS, CERES, and CALIPSO products. Data to be staged on disk and accessed from OPeNDAP servers within the NCDC and ASDC facilities. Demonstrate the LEO-GEO use case using NPP VIIRS (hdf5) and GOES (netCDF3) data from NCDC. Extend the Event Prediction services to support data mining; i.e., acquire data from one or more instruments that fly over a defined Earth geographic site. Refactor GEO view angle generation software using C. Rothmayr defined algorithm. Develop server-side functions to include full resolution (N-tuple) parameter acquisition and filtering. Extend the MIIC application tier to support non-intercalibration workflows;
- (g) Deploy and test all software on the collaborative ASDC/NCDC web services data systems;
- (h) Develop client-side histogram analysis and plotting using open source packages such as JAIDA or SCAVIS. Extend the database tiers to operate on both ASDC and NCDC servers;
- (i) Use web-based tools to track bugs and release progress and provide visibility to NASA TPOC and NCDC and ASDC team members;

- (j) Document the enhanced MIIC Framework architectural design, installation instructions, performance and deployment test results, user guide and reference application programming interface (API) manuals;
- (k) Ensure that the final software package is self-contained, deployable, and adheres to NASA open source policies;
- (l) Deliver all MIIC Framework software tested and verified;

### **3.0 Special Requirements**

None

### **4.0 Schedule/Milestones/Period of Performance**

Period of performance is 05/19/2014 through 01/31/2015.

General schedules are as-agreed between the contractor and the NASA TPOC.

- Participate in Kickoff meeting with ASDC and NCDC – May 2014
- Capture Build 1 Algorithm Requirements – May 2014
- Generate Software Build Plan and Schedule – May 2014
- First Integration of MIIC software on ASDC hardware – August 2014
- First Integration of MIIC software on NCDC hardware – August 2014

- First Integrated MIIC test w/ both ASDC and NCDC – September 2014
- Mid term Progress report - due September 30, 2014
- MIIC Build 1 Final Test – December 2014
- Final Build 1 Documentation - due January 30, 2015
- Final Build 1 Software delivery - due January 30, 2015

#### **5.0 Deliverables/Reporting Requirements**

All items shall be delivered by the contractor to the NASA TPOC within the agreed upon timeframe and the format required. Software shall be delivered in a public releasable format with adequate instructions to compile, install, and test.

Contractor shall provide the following deliverables upon completion:

Deliver all items to the TPOC within the agreed upon time frame and the format required.

Mid-term progress report.

Deliver self-contained and deployable MIIC Framework software that adheres to NASA open source policies.

Provide draft versions of MIIC Framework architectural design, and performance and deployment test results documentation to the TPOC in a mutually-agreed-upon format.

Provide draft versions of MIIC Framework installation instructions, user guide, and reference API manuals to the TPOC in a mutually-agreed-upon format.

Final versions of MIIC framework architecture, installation instructions and user related documentation in a mutually-agreed-upon format.

## **6.0 Other Information Needed for Performance of Task**

All software will be reviewed by the government according to the NASA Software Process Review

## **7.0 Data Rights**

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## **8.0 Safety**

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## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** A-101\_Mod1 CY4

**Task Order Title:** Radiation Budget Instrument (RBI) FM-1

**1.0 Technical POC (TPOC):**

Name: kory.priestley  
Organization: E607:FPD/CERES Project  
Email Address: kory.j.priestley@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall support the design, development, analysis, integration, test, calibration, Mission Operations planning and algorithm development for the Radiation Budget Instrument (RBI) Flight Model 1 (FM1) instrument and Ground Support Equipment (GSE) planned for flight on the Joint Polar Satellite System -2 (JPSS-2) satellite. This specifically includes support to the RBI FM1 instrument optical requirements and design, instrument sensor design, observational strategies, radiometric performance, data acquisition strategies, instrument calibration including support to the requirements and design of both the RBI Flight and ground calibration elements, and electrical and electronics requirements and design.

**2.1 Design and Analysis Support:** The contractor shall provide design and analysis support to objectively confirm and assure that the implemented design meets the operational and performance requirements specified by the RBI contract to include the following:

(a) Examination and assessment of RBI instrument electrical and optical design concepts and proposed designs, schematics, modeling, process and production paths, test and verification plans and procedures, analyses and trade studies.

(b) Comprehension of the JPSS-2 to RBI electrical interface requirements and support to the development of RBI FM1 electrical interface control documentation. The contractor shall assist in assessing other documentation as determined by the NASA TPOC to assure the

implemented designs achieve specified requirements and performance expectations and are documented properly.

(c) Electrical and optics design support to the RBI FM1 System Requirements Review (SRR), supporting the RBI project office, the Chief Engineer, and the Project Scientist in evaluating the RBI prime contractor's readiness for the SRR and assistance in preparing and presenting materials at reviews. The contractor shall address and close out any actions resulting from this review related to RBI FM1 electrical and optical design and performance requirements.

(d) Support as necessary during RBI development testing as determined by the NASA Technical Point-of-Contact (TPOC).

2.2 Instrument Radiometric Performance and Calibration Support: The contractor shall provide instrument radiometric performance and calibration support to objectively confirm and assure that the implemented design meets the operational and performance requirements specified by the RBI contract to include the following:

(a) Examination and assessment of RBI instrument sensor concepts and proposed designs, modeling, process and production paths, test and verification plans and procedures, analyses and trade studies.

(b) Examination and assessment of RBI FM1 instrument ground calibration subsystem designs to objectively confirm and assure that the implemented designs meet the RBI FM1 calibration and characterization needs. This support shall include examination and assessment of RBI ground calibration subsystem concepts and proposed designs, modeling, analyses and trade studies, calibration/validation plans and procedures, and ground calibration source and subsystem development, supporting also RBI ground calibration source and subsystem development testing as determined by the TPOC.

(c) Support to the RBI FM1 SRR, supporting the RBI project office, the Chief Engineer, and the Project Scientist in evaluating the RBI prime contractor's readiness for the SRR; assistance in preparing and presenting materials at reviews and address close out actions related to the RBI FM1 sensor radiometric and calibration design and performance requirements.

(d) Support as necessary during RBI development testing as determined by the NASA TPOC.

2.3 Mission Operations Planning Support: The contractor shall provide support to mission operations planning and routine operational procedure development to include:

(a) Examination and assessment of the nominal on-orbit concept of operations for the RBI FM1 instrument for consistency with the associated JPSS ground system and mission operations team

(b) Support to the development of routine operational procedures (ROPS) to be executed on-orbit.

2.4 Science Algorithm Development Support: The contractor shall provide support to the development of algorithms for the Level 0 to Level 1 data processing. The contractor shall review the anticipated RBI telemetry formats (i.e. packet structures) and:

(a) Assess the feasibility of re-using heritage CERES algorithms for L0 to L1 processing; and

(b) Provide assessments/recommendations to the RBI Project Office of the telemetry formats to optimize the re-use of existing resources and minimize the risk of introducing algorithm shock into the climate record.

**MOD 1: The purpose of this mod is to provide consultation and modeling capabilities in Section 2.0 as set forth below:**

**2.5 Consultation: The contractor shall provide consultation on the management and implementation of this task based upon experience and knowledge of the heritage CERES program.**

2.6 Dynamic Electrothermal Modeling: The contractor shall build, test, evaluate and document analytical models, compatible with the Monte Carlo Ray Trace (MCRT) environment, for (a) diffraction, (b) aberration, and (c) polarization of light passing through the RBI optical train.

**(a) Each of these phenomena shall be wavelength dependent and different approaches shall be assessed in the different wavelength bands.**

**(b) The potential impact of each of these optical phenomena, expressed as a percentage of overall signal power, shall be assessed with the possibility that appropriate remedial optical train design modifications shall be identified.**

**(c) The contractor shall utilize these analytical models to compose, evaluate, and document an end-to-end dynamic electrothermal performance model of all three instrument channels.**

### **3.0 Special Requirements**

3.1 Access to Sensitive Data: Yes. The contractor shall be required to access and evaluate Sensitive But Unclassified (SBU) data, ITAR material, or other contractor proprietary data.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: June 15, 2014 through January 31, 2015

**Mod 1: The new period of performance is June 15, 2014 through January 31, 2016**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide a monthly summary report to the TPOC via email (by the 5th of each month), produced in a format agreed upon between the contractor and the TPOC, and shall include the reporting requirements listed in the sub-tasks below.

5.1 Subtask 2.1 Design and Analysis Support: The contractor shall summarize all work related to examinations, evaluations, and assessments of reviewed material; the support provided to meetings and exchanges with NASA and other NASA contractors; and the status on maturity of documentation and hardware in support of planned reviews.

- 5.2 Subtask 2.2 Instrument Radiometric Performance and Calibration Support: The contractor shall summarize all work respective to data capture, plotting, assessment, and trending of data as required; the support provided to meetings and exchanges with NASA, with NASA contractors, and with other CERES and stakeholders; and other deliverables include data plots and documented data trending assessments.
- 5.3 Subtask 2.3 Mission Operations Planning Support: The contractor shall summarize the support provided in this area, specifically, support to meetings and interactions with all stakeholders, as well provide status on maturity of documentation and hardware in support of planned reviews.
- 5.4 Subtask 2.4 Science Algorithm Development Support: The contractor shall summarize the support provided in this area, specifically, support to meetings and interactions with all stakeholders, as well provide status on maturity of documentation and hardware in support of planned reviews.

**Mod 1: The following deliverables are required:**

**5.5 Subtask 2.6 Dynamic Electrothermal modeling: The contractor shall summarize the support provided in this area, specifically, support to meetings and interactions with all stakeholders, as well as shall provide status on maturity of the modeling. The deliverables at the end of the first-year would be (a) documentation of suitable MCRT-compatible numerical models for accurately representing wavelength-dependent diffraction, aberration, and polarization effects in the baseline instrument; and (b) estimates of the impact of each of these phenomena on instrument performance.**

## **6.0 Other Information Needed for Performance of Task**

- 6.1 Subtask 2.1 Design and Analysis Support: Travel:
- Technical Interchange Meeting (TIM), Fort Wayne, IN - 3 travelers, 3 days including travel days
  - Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days

- System Requirements Review (SRR), Fort Wayne, IN - 3 travelers, 4 days including travel days

6.3 Subtask 2.2 Instrument Radiometric Performance and Calibration Support: Travel :

-Technical Interchange Meeting (TIM), Fort Wayne, IN - 3 travelers, 3 days including travel days

-Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days

- System Requirements Review (SRR), Fort Wayne, IN - 3 travelers, 4 days including travel days

6.4 Subtask 2.3 : Mission Operations Planning Support: Travel:

-Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days

-Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days

6.5 Subtask 2.4 : Science Algorithm Development Support: Travel:

-Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days

-Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days

## **Mod 1: The following additional travel is required:**

### **6.1 Subtask 2.1 Design and Analysis Support:**

#### **Travel:**

- Technical Interchange Meeting (TIM), Fort Wayne, IN - 3 travelers, 3 days including travel days

**- Preliminary Design Review (PDR), Fort Wayne, IN - 3 travelers, 4 days including travel days**

### **6.3 Subtask 2.2 Instrument Radiometric Performance and Calibration Support: Travel :**

- Technical Interchange Meeting (TIM), Logan, UT - 3 travelers, 5 days including travel days

- Radiometric Test Model Test Support, Fort Wayne, IN – 3 travelers, 5 days including travel days
- Preliminary Design Review (PDR), Fort Wayne, IN - 3 travelers, 4 days including travel days
- Scientific Meetings (SPIE, CalCon etc), Various – 4 travelers, 5 days including travel days

#### **6.4 Subtask 2.3: Mission Operations Planning**

##### **Support: Travel:**

- Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days
- Preliminary Design Review (SRR), Fort Wayne, IN - 1 travelers, 4 days including travel days

#### **6.5 Subtask 2.4: Science Algorithm Development**

##### **Support: Travel:**

- Technical Interchange Meeting (TIM), Fort Wayne, IN - 2 travelers, 3 days including travel days
- Preliminary Design Review (SRR), Fort Wayne, IN - 1 travelers, 4 days including travel days

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## **8.0 Safety**

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## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** B-001\_Mod7 CY3

**Task Order Title:** Atmospheric Sciences Data Center (ASDC)

**1.0 Technical POC (TPOC):**

Name: john.kusterer  
Organization: E301:Atmospheric Science Data Center  
Email Address: John.M.Kusterer@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**2.1 ASDC Operations**

- a. The contractor shall provide ingest, archive, distribution, and data management services for various satellite and data missions. Ingest is the electronic receipt and required processing of data to enable the data to be placed in an archive system. Support shall be for the active missions plus required mission data reprocessing. The contractor shall collaborate with instrument teams, Atmospheric Sciences Data Center (ASDC) Management, and others as required to ensure system upgrades and enhancements meet planned archival and distribution levels.
- b. The contractor shall provide data production support including, but not limited to, processing requests; work with data providers to generate metadata to provide supporting information required for the ASDC's data access systems; providing documentation of procedures and background information; and performing quality assurance.
- c. The contractor shall maintain existing data holdings and acquire new data holdings in the area of Clouds, Aerosols, Radiation Budget, and Tropospheric Chemistry and other areas as identified by the NASA Technical Monitor (TM). This includes, but is not limited to, the transition of legacy Science Directorate (SD) holdings into ASDC as directed by the NASA TM.
- d. The contractor shall provide support to science teams to add new data to existing project/mission holdings or to replace with reprocessed data products. The contractor shall organize data sets for efficient search and order, including extracting metadata or

subsetting. The contractor shall inspect all data entering the archive for conformance to supplied documentation.

- e. The contractor shall provide data management support including but not limited to obtaining the input data required to support processing and providing documentation of procedures and background information, obtaining data products for distribution; delivering products to customers; maintaining data holdings inventory; managing the logistics of filling orders; and providing documentation of procedures and background information.
- f. The contractor shall collaborate with ASDC Management to develop cost effective plans for migration of data holdings from current technology to new technology. The contractor shall evaluate and revise metadata as part of the technology migration. The contractor shall document new search and order techniques. The contractor shall collaborate with Instrument Teams, ASDC Management, and others as required to ensure system upgrades and enhancements meet planned production levels.
- g. The contractor shall collaborate with Instrument Teams to develop tools and techniques to verify quality of data products.
- h. The contractor shall report data production levels, provide additional reports as requested by ASDC Management, and develop internal schedules for ASDC managed processing and reprocessing activities.
- i. The contractor shall report data holdings by project: including each project's total data volume, number of granules, number of orders for each project, and total volume distributed.
- j. The contractor shall report data statistics including, but not limited to archive volume, total distribution, and non-science team distribution. The contractor shall also provide additional data operations status and statistics reports as requested by NASA TM in response to ad hoc inquires.
- k. The contractor shall perform physical property management including but not limited to performing property custodian functions, space management of assets in coordination with the NASA Task Monitor, supporting property audits, and maintaining a current inventory of assigned property assets.
- l. The contractor shall maintain up-to-date data regarding systems, configurations, and interfaces to the Center and Agency databases to support efficient and accurate system administration and management.
- m. The contractor shall record all maintenance actions taken on each piece of tagged equipment in the appropriate system as identified by the NASA TM.

## **2.2 ASDC Engineering and Development Support**

- a. The contractor shall work with the NASA TM to evolve the assigned systems, consistent with Federal, NASA, Langley Research Center and SD policies and practices. The contractor shall employ system engineering practices to the development and maintenance of ASDC software systems.
- b. Practices shall include, but are not limited to:
  - i. Achieving established project goals and objectives
  - ii. Continuous identification and management of risks
  - iii. Adherence to established schedules
  - iv. Developing and maintaining project resource plans
- c. The contractor shall work with other NASA contractors and the NASA Technical Monitor to address and resolve issues relating to interoperability, compliance with policies and guidelines, system defects, and requirements relating to customer requirements.

### **2.3 Systems Engineering**

- a. The contractor shall apply accepted industry standard Systems Engineering practices. Where practical, the contractor shall tailor these practices to the requirements of the specific system development project.
- b. The contractor shall support management boards required to support system engineering practices including documenting results.
- c. The contractor shall provide engineering assessments to support the ASDC including providing trade-off analysis to support the ASDC planning processes.
- d. Configuration Management
  - i. The contractor shall continue to implement configuration management of the ASDC and Scientific Compute Facility (SCF) systems. The contractor shall continue to refine the ASDC Configuration Management Plan.
  - ii. The contractor shall define configuration identification for systems and components. The contractor shall conduct configuration change control of systems and components.

iii. The contractor shall monitor configuration status and perform audits of systems to ensure that configurations identified in the configuration management system matches the actual configuration of the systems.

e. Risk Management

i. The contractor shall identify risks to the cost, schedule and technical performance of the ASDC systems for which it has administration and/or operations responsibilities. Risks shall be managed and the degree of risk and its potential impact on the system development process evaluated and mitigated.

f. Planning and Scheduling of Engineering Projects

i. The contractor shall develop plans for significant efforts detailing technical approaches and schedules and have these plans reviewed and approved by the NASA TM. These plans shall include but are not limited to detailed analysis of risks. The contractor shall analyze the technical approach and schedule for sensitivity to various changes and recommend methods for improving schedule performance during the development/deployment process. The contractor shall perform continuous risk management for significant efforts.

g. Track Actual Performance of work against Project or Development Plans

i. The contractor shall monitor development activities against the planned activities and evaluate progress. The contractor shall identify problems and issues related to performance against the critical path.

h. Documentation

i. The contractor shall produce and maintain documentation for all software and hardware systems and ensure the documentation remains current. Documentation shall include but is not limited to as built systems and in-use procedures.

ii. The contractor shall maintain a digital library of documentation for all software and hardware systems.

iii. The contractor shall maintain the currency and accuracy of an electronic FAQ (Frequently Asked Questions).

iv. The contractor shall maintain an access controlled electronic library of documentation for all software and hardware systems.

i. Information Technology Security (ITS)

i. The contractor shall incorporate IT security requirements into all software and hardware sufficient to maintain an authorization to operate in accordance with Agency and Center IT Security requirements.

j. Development

i. The contractor shall develop systems and related components to support the ongoing stewardship of the assigned data products, and the assets of the ASDC and SCF.

k. Conduct Analysis of Systems of Current and Potential Customers

i. The contractor shall provide recommendations to the NASA TM for improvements and investments for the ASDC. The contractor shall identify areas to reduce cost while enhancing products and services; researching state-of-the-art alternatives and selecting the best option for near term impact; assessing the usefulness of the system for operations.

ii. The contractor shall provide technical information and consultation to support the development of policies, security plans and procedures that promote optimal use of the ASDC resources.

l. Design Systems and Components in Response to Government Approved Requirements

i. The contractor shall translate requirements into system design and evaluate how well they are met. The contractor shall support requirements and design reviews.

m. Develop Systems and Components and integrate them into the System

i. The contractor shall maintain and document consistent configuration and usage procedures for all Atmospheric Sciences Competency mission critical systems.

n. Test and Evaluate Systems and Components

- i. The contractor shall test and evaluate system components in accordance with formal documented procedures developed and maintained by the ASDC or provided with the system(s) when the system(s) is delivered from outside the ASDC. Testing methodologies shall follow system engineering practices.

- o. Deploy Systems and Components

- i. Upon completion of the required testing and the Operations Readiness Review, the contractor shall deploy the system/components and promote them into operations.

- p. Perform Engineering support to operational systems

- i. The contractor shall conduct monitoring and ongoing evaluation of system performance to identify system defects and issues. The contractor shall troubleshoot issues and disposition results utilizing ASDC procedures supporting work processes maintained in the ASDC Sharepoint instance.

- q. Communications Requirements

- i. The contractor shall provide status of efforts based on the project plans baselined in agreement with the NASA TM and ASDC Contractor staff and maintained in the ASDC Sharepoint instance.

- r. System Development Communications

- i. The contractor shall conduct meetings periodically for discussion of the technical aspects and issues of a project as it evolves.

- ii. The contractor shall support joint technical on-site training in specific technologies as directed by the NASA TM.

- s. ASDC User Services

- i. The contractor shall provide outreach, market research, and consulting.

- ii. The contractor shall develop outreach materials and support a variety of outreach activities to educate scientists and the general public about the Atmospheric Science Data Center.

iii. The contractor shall provide broad visibility of data holdings and services.

iv. The contractor shall provide information about the projects the data center supports.

v. The contractor shall promote the access to and use of atmospheric science data by commercial customers and state and local governments as well as other Federal agencies.

vi. The contractor shall participate in the customer sponsored working groups to provide outreach through the development of materials and the participation in related events.

vii. The contractor shall provide educational outreach support to atmospheric science missions.

viii. The contractor shall provide support for meetings to support the mission of the ASDC.

ix. The contractor shall market data center products and services to increase the overall benefit to the American taxpayer and science community.

x. The contractor shall analyze and utilize on-line data visualization and analysis technologies to provide capabilities for quick and accurate data retrieval determinations and minimal data downloads to enhance productivity for Earth Science researchers and students.

xi. The contractor shall identify new areas of opportunity where the ASDC may add value; present possible scenarios to the ASDC Management; and upon approval by the NASA TM, develop strategies for exploiting new areas of opportunity to attract customers, increase funding, or increase capability.

xii. The contractor shall identify potential partnerships; present possible scenarios to ASDC Management; and upon approval by the NASA TM, provide technical consulting in a variety of areas including, but not limited to management of large data sets, data production management, web development, and e-commerce.

xiii. The contractor shall provide Data Provider Support, Data User Support, Metrics Tracking and Prediction, Outreach Materials, and Visualization Capability.

xiv. The contractor shall provide Data Provider Support including but not limited to developing documentation; performing Science Software Integration and Testing; providing Data Management/Analysis. Data Management/Analysis includes but is not limited to inspecting and verifying data integrity; working with data provider to develop sample read programs for data products and establishing requirements for services processing requests.

xv. The contractor shall collaborate with Instrument Teams and Data Mission Teams to develop tools and techniques to verify quality of data products. The contractor shall provide information to enable the timely search and order of publicly available data products. The contractor shall collaborate with Instrument Teams or Data Mission Teams to develop strategy to manage limited archive space.

xvi. The contractor shall provide data user support including providing sample read programs for data holdings; providing data products and support services; providing broad visibility of data holdings and services, providing information about the projects the data center supports; and performing Data Management/Analysis.

xvii. The contractor shall support efforts to broaden visibility for ASDC data holdings by employing standards to make ASDC metadata more accessible to the world.

xviii. The contractor shall support efforts to further develop infrastructure to allow more automated mechanisms for the efficient creation, review and update of ASDC Projects and Datasets descriptions.

xix. The contractor shall support efforts to create subsetting software for end users, as well as working with Principal Investigators on data management issues. The contractor shall report inspection anomalies to the data producer and resolve any outstanding issues.

xx. The contractor shall provide a Service/Help Desk to respond to Data Provider and Data User inquiries and to provide definition of available services. Inquiries shall be received via email or phone call. The Service/Help Desk shall be staffed Monday through Friday 8:00 AM to 4:30 PM Eastern Standard Time (EST) excluding Federal Holidays.

xxi. The contractor shall track customer contacts, number of unique data customers, data distribution, and user satisfaction. Data customers and distribution demographics shall be reported as a data



center total, a total per state for all domestic requests, per country for all international orders.

xxii. The contractor shall support development of advanced visualization capability utilizing interactive, immersive visualization hardware and software to aid in the study of atmospheric science.

xxiii. The contractor shall report data center metrics quarterly as required by the Government Performance Reporting Act (GPRA). Contractor shall provide additional reports as requested by ASDC Management in response to ad hoc inquiries. These reports shall be provided electronically by the contractor to the NASA TM.

xxiv. The contractor shall support the ASDC User Working Group (UWG) meeting by providing travel support to out-of-the-area attendees including supporting travel arrangements and providing reimbursement for allowable costs.

## **2.4 SD System Administration Support**

- a. The contractor shall work with other contractors and customers in addressing SD IT related user issues that fall outside the responsibility of other Center contractors including but not limited to specialized software support and connectivity support to Science Directorate managed assets.
- b. The contractor shall provide system administration support to authorized systems and peripherals and to users, both onsite and offsite and in field campaign or travel situations, consistent with Federal, NASA, Langley Research Center and SD policies and practices.
- c. The contractor shall perform standard, industry-practice system administration functions for assigned systems.
- d. System Administrators are responsible for:
  - i. Initial configuration of the system, and installation of standard service packages.
  - ii. Installation of user applications and special application packages upon user request and NASA TM approval.
  - iii. Installation of all OS upgrades and patches and application upgrades, as required, to ensure safe and proper operation.

iv. Notification to the Users of all configuration changes, including the provision of an interpretation of the impact on the Users.

v. Periodic review, on at least a semi-annual basis of platform configuration to identify any unauthorized alteration or attempts to break into the system.

vi. Ordering maintenance of the hardware, both preventive and corrective.

vii. Report to the NASA Task Manager and the Task Monitor inappropriate or unauthorized usage of the system.

viii. Monitor system usage and planning for system configuration changes or expansions necessary to ensure system availability to the users.

ix. Maintain NASA approved certifications current for the operating systems assigned as determined by the NASA TM.

x. Conduct, with the NASA Task Monitor and the Branch ITS Officer, a review of all user accounts for re-authorization on an annual basis.

xi. Schedule system outages to minimize impact on the users and providing advance notification of these outages.

xii. Maintain database servers with redundancy and mirroring.

xiii. Support, as a minimum, the SD authorized software list not covered by other contracts. The contractor shall provide online documentation for these software systems.

xiv. Support the development and maintenance of websites and dynamic data delivery tools upon request by authorized SD users identified by the NASA TM.

xv. Provide assistance to the authorized users of assigned systems, in response to requests by the users, through a common help request system. All requests shall be logged by either users

or Systems Administrators. The majority of requests are for information or troubleshooting problems with user systems; any requests involving policy formulation/change and programming shall be referred to the NASA TM for authorization. Any requests involving Agency Consolidated End-user Services (ACES) issues shall be referred to ACES for support. All help requests entries shall be closed out in ten business days unless otherwise authorized by the NASA TM. A business day and business hours are defined as Monday through Friday 7:00 AM to 6:00 PM Eastern Standard Time (EST) excluding Federal Holidays.

e. The contractor shall be accountable for the following for assigned systems:

i. User accounts are created only with proper authorization from NASA TM.

ii. Ensure that all OS and application patches are installed according to the configuration management plan and all security patches are installed within prescribed timeframes.

iii. Perform Configuration Management (CM) in accordance with SD IT CM Plans. Maintain accurate configuration identification of the systems involved, including architectures, manuals, and diagrams. As required, obtain waivers for deviations from approved system configurations and maintain all documentation of approval. The TM will approve the waivers. The contractor shall maintain an inventory of license installation and currency of maintenance.

iv. Maintain accurate inventories of hardware, software and network configurations.

v. Maintain the accuracy and currency of the authorized user account tracking system, including the authorization forms for each user account.

vi. The contractor shall respond to 98% of the SD User Support Help Desk tickets within 1 working hour. Close tickets by

completing the required work to restore full service, not by generating new tickets. Report all tickets which have been open longer than 3 business days to the NASA Task Monitor on a daily basis.

vii. The contractor shall respond to production work stoppages related to the ASDC archive systems and production processing systems during business hours immediately upon discovery until production operations is returned to a service level acceptable to the NASA TM or to the original nominal state and shall provide status to the NASA TM and all of the ASDC Government staff upon discovery and at least every 2 hours during business hours and every 12 hours during non-business hours until the issues are corrected.

viii. The contractor shall respond to production work stoppages related to ASDC archive systems or production processing systems during non-business hours by initiating work to address the issues within two hours of discovery and shall provide status to the NASA TM and all of the ASDC Government staff upon discovery, at least every 12 hours during non-business hours and at least every 2 hours during business hours, and upon return of the system(s) to an acceptable state until the issues are corrected.

ix. When a production work stoppage related to ASDC archive systems or production processing systems arises and is addressed, the contractor shall obtain approval from the NASA TM before identifying the system(s) operations as nominal unless the system(s) is/are returned to the identical state as before the issue was encountered.

f. The contractor shall perform ITS support for SD

i. The contractor shall monitor and report on the day to day activities related to IT Security. The contractor shall maintain detailed knowledge of ITS policy and practices relevant to systems at Langley Research Center. The contractor shall provide recommendations as to the means for implementing policies. The contractor shall ensure that equipment which has been reconfigured for use off the Center

network is properly configured before it is re-attached to the network. Any deviations shall be covered by waiver requests.

ii. The contractor shall provide recommendations as to modifications of the IT Security Plan. The contractor shall process and evaluate all requests for waivers to policy and maintain records of waiver approval.

iii. The contractor shall prepare documentation recommending personnel approval for access to SD systems. The contractor shall maintain records associated with these approvals.

iv. The contractor shall develop ongoing strategies for user account authorization and authentication and the integration of the SD requirements along with the Center and Agency requirements and systems.

v. The contractor shall oversee System Administration processes related to ITS breaches and all preventive measures. The contractor shall monitor scans and address "high" and "medium" vulnerabilities (vulnerability levels as identified by the NASA Langley Research Center Office of Chief Information Officer (OCIO)) on an urgent basis.

vi. The contractor shall be responsible for assigned Lab and Field Equipment

g. The contractor shall be responsible for supporting the following requirements:

i. Initial installation and configuration of operating system (OS) and OS/network services and standard software.

ii. Verifying installation of patches and correcting any missing patches within prescribed timeframes for the OS and standard applications.

iii. Creating user accounts for only those users with proper authorization and maintaining the records of these accounts.

iv. Periodic testing of account passwords to ensure compliance with applicable NASA IT policy requirements.

v. Maintaining backup copies of OS, application and user files, current within prescribed timeframes.

vi. When requested by the user, installing properly licensed software and maintaining records for each machine of their installation and associated authorization.

vii. Periodic review of platform configuration and logs to identify any unauthorized alteration, hardware or software failures or attempts to break into the system.

viii. Monitoring the ITS Scanning website and, within 1 business day of the notification of a scanning vulnerability, correcting the problem or disconnecting the system until corrective action can be accomplished and notifying the SD ITS Officer of any such vulnerabilities and actions.

ix. Conducting, coordinating with the NASA TM, a review of all user accounts for re-authorization on at least an annual basis.

x. Initial configuration of OS and applications consistent with Center policies;

xi. Maintaining the currency of OS configurations and patches and application updates, as appropriate;

xii. Maintaining current backups of user data to restore data storage in the event of a disk failure, hacker attack or user error in deleting files;

xiii. Maintaining records of which applications are installed on each workstation and what license and registration information is used;

xiv. Reporting system failures, faults or inappropriate usage when they are discovered;

xv. Maintain records of all network services running from a machine and who turned them on and when;

xvi. Ordering maintenance of the hardware, either preventive or corrective.

xvii. System Administrators of Lab and Field

Equipment shall not impede proper use of the equipment by authorized users.

h. Episodic After-hours Support

i. The contractor shall be available to be contacted directly by customers outside of business hours, during episodic date ranges defined by the NASA Task Monitor, to address issues with systems pre-defined by the NASA Task Monitor.

ii. The contractor shall initiate work on addressing system issues during episodic date ranges defined by the NASA Task Monitor, with systems pre-defined by the NASA Task Monitor within two (2) hours of receipt of contact from the customer during episodic outside of the business hours requirement.

iii. The contractor shall respond to the customer with status and/or resolution at least once a day while the system(s) is having issues.

iv. The contractor's performance shall be evaluated on:

1. Adherence to policies, rules and regulations with respect to Information Technology Security.
2. Computer systems and database maintenance is accomplished in a manner to ensure continuity of services.
3. Software testing and configuration management activities are emphasizing reliability and availability of systems.
4. Participate in science team meetings, or other activities in support of the data providers and educational outreach.

## 2.5 Travel

Travel is required in support of this task to:

- a. Develop outreach materials and support a variety of outreach activities to educate scientists and the general public about the Atmospheric Sciences Data Center (ASDC).

- b. Participate in the customer sponsored working groups to provide outreach through the development of materials and the participation in related events.
- c. Provide support for meetings as approved by the NASA TM.
- d. Participate in science team meetings, or other activities in support of the data providers and educational outreach.
- e. Earth Science Distributed Information System (ESDIS) Support; Participate in the ASDC User Services Working Group (USWG).
- f. Specific trips include but are not limited to:
  - i. JBOSS World Conference; annually located in Boston, MA
  - ii. PostgreSQL Conference; annually located in New York, NY
  - iii. Earth Science Data Systems Working Group (ESDSWG) Meeting, location is To Be Determined (TBD) and alternates annually.
  - iv. Multi-angle Imaging SpectroRadiometer (MISR) Science Team Meeting, annually located in Pasadena, CA
  - v. American Geophysical Union (AGU) Fall Meeting, annually located in San Francisco, CA
  - vi. Clouds and the Earth's Radiant Energy System (CERES) Science Team Meeting, location is TBD and alternates annually.
  - vii. Splunk Training, location is TBD and alternates annually.
  - viii. SUSE Linux Conference, AURA Platform Science Team meeting, location is TBD and alternates annually.
  - ix. EOSDIS (Earth Observing System Data and Information System) Evolution and Development (EED) contractor Technical Interchange Meeting (TIM), annually located in Riverdale, MD



x. Super Computing Conference, annually located in Salt Lake City, UT

The number of people per trip, trip durations, and TBD locations will be communicated by the NASA TM to the contractor. Other trips may be required and will be communicated to the contractor by the NASA TM.

**Modification 1: This Mod is to add the following Subtask under 2.3.a:**

i. The contractor shall provide consultation and coaching in agile software development techniques and processes.

**Modification 2: This Mod is to add the following Subtasks under 2.3:**

**Subtask 2.3.k:**

iii. The contractor shall provide assistance in evaluating scientific analysis tools, other clients, and applied math techniques for the ASDC to help estimate ASDC load and performance, which will then be utilized as input to requirements for future improvements in data discovery, access, and understanding capabilities.

**Subtask 2.3.s.xxii:**

1. The contractor shall provide expertise to support the evaluation, experimentation, and implementation of Esri.

**Modification 3: The purpose of this Mod is to add the following Subtask under 2.3.d.i above, due to a new requirement needed to the ASDC Configuration Management Plan:**

iv The contractor shall provide expertise to apply industry best practices and experiences to the development of the ASDC Configuration Management Plan.

**Modification 4: The purpose of this Mod is to add the following Subtask under 2.3.j above, due to a new requirement needed for Systems Engineering Development:**

ii. The contractor shall develop an online application to support the DEVELOP Program's Student Application process using Agile methods.

**Modification 5: The purpose of this Mod is to extend the period of performance of Subtask 2.3.s.xxii from modification 2 in order to complete the implementation and expanded use of Esri for the duration of this task.**

**Modification 6: The purpose of this Mod is to provide specific science expertise required to ensure science validity of an ontology under Section 2.3.s.xii above:**

- a. The contractor shall provide additional science analysis of ASDC data products, specifically focusing on the chemistry theme, and develop an ontology to fit within the existing framework.**

**Modification 7: The purpose of this Mod is to add the following Subtask under 2.3.d.i above, due to a new requirement needed to the ASDC IT plans:**

- v. The contractor shall provide expertise in the areas of Configuration Management, IT, Service Management (ITSM), and IT Infrastructure Library (ITIL). The subcontractor shall provide guidance in these areas and assist with the development of a Configuration Management Plan for the ASDC software and systems.**

**And to add the following to Subtask 2.3.s.xxii:**

**The subcontractor shall provide GIS analysis for the ACCESS A36 deliverables:**

- a. Technology Analysis of Alternative (AOA): A report summarizing the findings of the AoA to provide decision-makers a definite value and use of the technology. (FY14Q2)**

- b. Testing/Validation Report: Interactions with various user communities in government and industry to formats and usage for optimization. (FY15Q2)**

## **c. User Manual: Guided document on how to use the tool or application. (FY16Q2)**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: Yes, the certain members of the systems administration staff shall provide system administration support to systems housing SBU/ITAR information.

Other (Specify): N/A

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is February 1, 2013 through January 31, 2016

MOD 2: The period of performance for mod 2 ONLY is from the modification award date through November 30, 2013.

**MOD 5: The period of performance for MOD 2 is extended from November 30, 2013 through January 31, 2016.**

### **5.0 Deliverables/Reporting Requirements**

- 5.1 The contractor shall ensure operations of the ASDC as described in Section 2.0 under ASDC Operations, ASDC Engineering and Development Support, System Engineering, and SD System Administrative Support.
- 5.2 The contractor shall document the detailed projected growth of ASDC data stores based on known factors to support growth planning in a report. Data stores include, but are not limited archives, DPO (Data Products On-line), and Order Cache. The contractor shall deliver the report in Microsoft® Office Word to the NASA TM via email at an agreed upon time between the NASA TM and the contractor.
- 5.3 Re-occurring deliverables:
  - a. The contractor shall provide weekly technical progress reports in Microsoft® Office Word format on the first business day of each work week detailing highlights of work performed the previous week to the NASA TM via email.
  - b. The contractor shall provide monthly reports in Microsoft® Office Word format by the tenth business day of each month with the metrics identified below to the NASA TM via email.

#### 5.4 Metrics:

- a. Production jobs run by month over the past year by project
- b. Production daily average by month over the past year by project
- c. Archive ingest metrics including number of files, volume, daily average number of files, and daily average volume by archive system for the past two months
- d. Distribution metrics including number of users, number of orders, number of granules, and volume by archive system for the past two months
- e. Number of successful ANGe subscriptions, by month, over the past year
- f. Data Files Retrieved from ASDC via daacget including number of attempts, number of successes, number of users, success rate, and volume, by month, over the past year
- g. Data migrated (as applicable) as part of the data migration project including daily granule average, total count, and cumulative file count by month since the start of the project
- h. Total current archive volume and file count for each archive system
- i. Total archive growth, by archive system, over the past year
- j. DPO population/growth including number of files and volume by month over the past year
- k. DPO total including number of files and volume by month over the past year
- l. DPO population by Project including volume by month over the past year
- m. ECS data pool total including number of files and volume by month over the past year
- n. Production hours available for each subsystem over the last two months
  - i. Ingest subsystem by archive system
  - ii. Archive subsystem by archive system
  - iii. Distribution subsystem by function/service
  - iv. Clouds and the Earth's Radiant Energy System (CERES) production subsystem
  - v. Multi-angle Imaging SpectroRadiometer (MISR) production subsystem
  - vi. SCF, node by node

- o. New data available, by project, to ASDC customers including number of granules and visibility
- p. Number of visitors to the ASDC website including new and unique visitors by month over the past year
- q. Visitors to the AMAPS application including new and unique visitors by month over the past year
- r. Number of “kudos” and “complaints” received related to ASDC orders by month over the past year
- s. Response times for external user requests, including number closed with user concurrence within 5 business days, by month over the past year
- t. Number of JIRA tickets returned for re-work by month over the past year
- u. Number of blocker (JIRA term) tickets issued by month over the past year
- v. Initial response time to tickets received from SD users (RT or JIRA) measured in standard work hours by month over the past year
- w. Response time for initial assessment of all production system faults alerts (target: 2 hours includes days, nights and weekends) by month over the past year
- x. Number of nodes not in automated status monitoring system
- y. Configuration Management
  - i. Number of changes made to Configuration Items (CIs):  
documented
  - ii. Number of changes made to Configuration Items (CIs):  
undocumented
- z. Project status
  - i. milestones met
  - ii. milestones missed
  - iii. milestones rescheduled

## 6.0 Other Information Needed for Performance of Task

None

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-004\_Mod1 CY3

**Task Order Title:** Advanced LIDAR Systems

**1.0 Technical POC (TPOC):**

Name: farzin.amzajerdian  
Organization: D208:Laser Remote Sensing Branch  
Email Address: F.Amzajerdian@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide engineering and scientific support for development of advanced laser and lidar systems as follows:

- a. Provide laser and LIDAR support to ongoing development efforts for planetary exploration and science programs. NASA's goals are to develop new lidar systems with improved performance over prior art while achieving decreased size, increased efficiency, and decreased operating costs. Technical thrusts of support shall include design, development, and deployment of coherent and direct detection LIDAR systems.
- b. Support design, integration, implementation, and testing of coherent lidar systems Design and perform experiments involving lasers and lidar systems meeting the objectives of Science Mission and Exploration Systems Mission Directorates programs.
- c. Support design, integration, implementation, and testing of a laser altimeter for future landing missions to the Moon and Mars.
- d. Characterize 3-D Imaging lidar components and subsystems, and evaluate their performance in an integrated lidar instrument.
- e. Develop models and lidar data analysis software for analyzing different lidar systems and predicting their performance in achieving specified requirements for landing missions to the Moon and Mars.
- f. Participate in development of advanced lidar concepts for Earth and Planetary science applications.

g. Support technical meetings and NASA review meetings.

## 2.1 Performance Standards:

- a. System designs are completed on a schedule to meet the major project milestones.
- b. Systems, subsystems, and components tests are completed within schedules agreed to by the contractor and the Task Monitor (TM)
- c. Software for data acquisition and associated documentation are developed and checked out within schedules agreed to by the contractor and the TM.

**Mod 1: The purpose of this modification is to (1) extend the period of performance for the entire task through January 31, 2016 to provide continuing support for the development of lidar instruments for ongoing and upcoming projects as described in Section 2.0; and (2) replace 2.0.b as set forth below; and (3) add 2.0.h as set forth below:**

## 2.0

**b. Support design, integration, implementation, and testing of lidar systems meeting the objectives of Science Mission and Exploration Systems Mission Directorates programs. Design and perform experiments involving lasers and lidar systems demonstrating the performance of these lidar systems.**

**h. Participate in space flight qualification activities for landing lidar sensors (3-D Imaging Flash Lidar, Navigation Doppler Lidar, and Laser Altimeter)**

## 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): No

## 4.0 Schedule/Milestones/Period of Performance

Period of Performance: February 1, 2013 - January 31, 2014

**Mod 1: The new period of performance is February 1, 2013 – January 31, 2016**

The contractor shall support and align efforts with the project milestones. The contractor's milestones are listed below:



1. 03/01/2013 Process and analyze Coherent Doppler Lidar and Laser Altimeter data acquired from helicopter flight tests
2. 04/01/2013 Complete tests of second unit Laser Altimeter, Doppler Lidar, and Flash Lidar systems
3. 08/30/2013 Process and analyze Coherent Doppler Lidar and Laser Altimeter data acquired from free-flyer flight tests
4. 11/30/2013 Complete design analyses of Laser Altimeter and Doppler Lidar sensors for Mars landing vehicles
5. 01/31/2014 Design analysis of a Mars orbiting atmospheric lidar

**Mod 1: The additional deliverables/milestones are below:**

6. **Process and analyze landing lidar sensors data collected from flight tests onboard terrestrial free-flyer vehicles;**
7. **Complete characterization of Laser Altimeter, Doppler Lidar, and Flash Lidar systems built under Autonomous Landing and Hazard Avoidance (ALHAT) project;**
8. **Simulate the operation of the landing lidar sensors for Mars and Moon landing maneuvers during the descent phase, and analyze the lidar sensors performance;**
9. **Identify and analyze assembly and system level design changes resulting from performance enhancement and SWaP (size, weight, and power) reductions upgrade options;**
10. **Assemble an advanced hybrid fiber/free-space laser resonator operating at 1.5 micron wavelength region and characterize its performance.**

**Additional milestones and schedules are as-agreed between SSAI and the Technical Monitor. The milestones and schedules will be defined as soon as the plans for the related NASA projects are established.**

## **5.0 Deliverables/Reporting Requirements**

The experimental data, and modeling and data processing software shall be provided per milestone schedule above.

The contractor shall submit Monthly status reports submitted electronically to the TM and an annual report submitted electronically to the TM at the end of each contract year describing experiments performed, performance level achieved, lessons learned, and recommendations for further improvements in system and future work. The report shall include summary of the experimental data and supporting documentation and copies of publications.

## **6.0 Other Information Needed for Performance of Task**

This work will require interaction with various NASA groups, industry, and other government agencies, extended travels for integration of lidar instruments into aircraft and rocket-powered free-flyer vehicles and conducting flight tests, and attending scientific and technical meetings. The forecasted trips includes:

1. 2 trips each about 3 days in duration for technical meetings;
2. 2 trips each 5 to 10 days in duration for flight tests;
3. 2 trips to other meetings/conferences including one international travel each 5 days in duration;
4. Trips typically include east coast, southwest and west coast destinations and one trip to overseas.

Additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM.

### **Mod 1: Additional travel required is set forth below:**

**The forecasted trips include:**

- 5. 2 trips each for 3 days in duration for technical meetings;**
- 6. 2 trips each 5 to 10 days in duration for flight tests;**
- 7. 2 trips to other meetings/conferences each 5 days in duration.**

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-005\_Mod1 CY3

**Task Order Title:** Mid-IR Laser Technology Development

### **1.0 Technical POC (TPOC):**

Name: jirong.yu  
Organization: D208:Laser Remote Sensing Branch  
Email Address: Jirong.Yu-1@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

2.1 The contractor shall perform mid-infrared solid state laser research and development. Tasks shall include but are not limited to, theoretical calculations, computer modeling and simulation, and perform laboratory experiments in the areas of solid state laser oscillators, solid state laser amplifiers, pump laser diodes, optics alignment and optimization, and performance characterization as required for the research. The contractor shall also develop technologies leading to space-qualifiable lasers by investigating the areas of material out gassing and contamination, radiation damage, vibration resistance, and vacuum operation. In addition, the contractor shall develop and implement laser frequency stabilization and control techniques to mid-infrared lasers.

2.2 The contractor shall support concurrent design projects in four laboratories located in the Engineering Directorate at LaRC. The contractor shall perform optical design, electrical design, and laser operation optimization for continuous-wave and pulsed, diode-pumped, solid-state 2-micron lasers. The contractor shall collaborate with LaRC researchers in the enhancement of the 2-micron pulsed laser technology focusing in the areas of pulse energy, beam quality, wall-plug efficiency, compactness, ruggedness, and lifetime; with the goal of simultaneously achieving 250-1500 mJ pulse energy, < 1.4 x diffraction limit beam quality, 1.4% wall plug efficiency, compactness, ruggedness compatible with autonomous aircraft flight, and 0.1 – 1 billion shot lifetime.

2.3 The contractor shall contribute to the development of Lidar Technologies to include but not limited to detectors covering the 1-2 micron wavelength range, both diffraction-limited and non-diffraction-limited telescopes with diameters from 10-25 cm, conical step-stare scanners with diameters from 10-25 cm, alignment technologies for both coherent and noncoherent (direct) lidar systems covering wavelengths from 1-2 microns, custom power supplies, custom electronic control circuitry, specialized test set ups, by performing theoretical analyses, operating relevant computer software written in C, C++, LabView, and Visual Basic, and performing the supporting laboratory experiments in the appropriate Engineering Directorate lab as determined by the task monitor.

#### **2.4 Performance Standards:**

The contractor performance shall be evaluated on:

- The developments of mid-infrared solid state laser are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor

- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing support for solid state laser research and development in Section 2.0 above.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): No

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance: February 1, 2013 through January 31, 2014

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016**

### 5.0 Deliverables/Reporting Requirements

All deliverables shall be provided electronically to the TM as agreed upon with the contractor and TM.

- Monthly report providing current status and accomplishments for the task to be provided electronically.
- The design drawings, analysis and hardware of high repetition Ho laser, September 2013.
- The design drawings, analysis and hardware of engineering hardened 2-micron laser, January 31, 2014
- Quarterly electronic report describing experiments performed, performance level achieved, lessons learned, and recommendations for further improvements in system and future work as required by NASA Technical Monitor
- Experimental data and supporting documentation provided electronically as required by the NASA Technical Monitor
- Publications and presentations provided electronically as required by the NASA Technical Monitor

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## **6.0 Other Information Needed for Performance of Task**

travel to one domestic conference/year, duration of one week.

additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-006\_Mod3 CY3

**Task Order Title:** Compact Laser Development

### **1.0 Technical POC (TPOC):**

Name: jirong.yu  
Organization: D208:Laser Remote Sensing Branch  
Email Address: Jirong.Yu-1@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

2.1 The contractor shall perform mechanical design, thermal design, and robust packaging design for continuous-wave and pulsed, diode-pumped, solid-state 2-micron lasers, telescope for 2-micron pulsed Integrated Path Differential Absorption lidar, wavelength control hardware, and integrated lidar structure. The contractor shall perform telescope, beam expander and after optics design for the lidar instrument by using optical softwares. The contractor shall provide coordination for the lidar aircraft integration; lidar development and integration schedule creation, report the progress to upper management and prepare reviews for aircraft flight. The contractor shall contribute to the laser/lidar system level integration and control by investigating the optimum mechanical and thermal requirements of each subsystem and devising subsystem interconnection approaches. The contractor shall collaborate with LaRC in designing mod 2: and developing an engineering hardened 2-micron lidar system capable of aircraft flight, and in designing a system to control the lidar system operation by computer. The 2-micron airborne lidar system includes lidar structure, telescope, receiver subsystem, and the modification for the laser. The contractor shall also provide integrateion of the lidar instrument into the LaRC research airplanes, which includes airplane integration structure support and hardness.

2.2 The contractor shall develop technologies leading to space-qualifiable 2-micron lasers by investigating the areas of material out gassing and contamination, radiation damage, vibration resistance, and vacuum operation.

#### **2.3 Performance Standards:**

The contractor performance shall be evaluated on:

- The design of instrument suites are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor
- The deliverables meet the schedule, cost, performance requirement, and quality control agreed upon by the NASA Technical Monitor and contractor.

**Mod 3: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing support for compact laser development in Section 2.0 above.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): No

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 through January 31, 2014

**Mod 3: The new period of performance is February 1, 2013 through January 31, 2016**

### **5.0 Deliverables/Reporting Requirements**

- Monthly reports (electronic format) on accomplishments, plans, progress, and issues delivered to the Technical Monitor (TM) by the end of each month.
- Monthly financial reports (electronic format) to the Technical Monitor (TM) by the end of each month. The financial reports shall provide separate financial information if there is sub-contract involved in the report.
- Design drawings, analysis and hardware of laser components delivered within 2 weeks of completing the work
- Report describing experiments performed, performance level achieved, lessons learned, and recommendations for further improvements in system and future work. The report shall be delivered (electronic format) to the TM quarterly (March, June, Sept, Dec)
- Experimental data and supporting documentation delivered to TM within 1 month after completion of experiment or on other schedule as agreed upon between the contractor and the TM.
- Publications and presentations as appropriate to document and present results

**Mod 1: The purpose of this modification is to add the following deliverable to Section 5.0 only based on an increase in the requirements for lidar-specific components:**



- **Design drawings, analysis and hardware of lidar including laser detector, telescope, and the integration of all these components, delivered within 2 weeks of completing the work**

**Mod 2: The purpose of this modification is to add the following deliverable to Section 5.0 only based on an increase in the requirements for additional design drawings and hardware deliveries needed to accomplish compact laser development:**

- **Design drawings, analysis and hardware deliveries for additional compact laser development components. Individual orders and deliveries shall be made via requests for quotes with specific part numbers, descriptions and quantities by the TM.**

## **6.0 Other Information Needed for Performance of Task**

Travel is required for this task. Three day domestic trip twice per year for design review type meetings.

additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-007\_Mod3 CY3

**Task Order Title:** ASCENDS CarbonHawk Experiment Simulator (ACES) Conceptual Study

## **1.0 Technical POC (TPOC):**

Name: michael.obland  
Organization: E304:Atmospheric Composition Branch  
Email Address: Michael.D.Obland@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

The ASCENDS CarbonHawk Experiment Simulator (ACES) project will demonstrate the measurement of column CO<sub>2</sub> mixing ratios with a high-altitude airborne laser instrument architecture with sensitivity, spatial and temporal resolutions required by the National Research Council (NRC) Decadal Survey for Active Sensing of Carbon Dioxide (CO<sub>2</sub>) over Nights, Days and Seasons (ASCENDS) Mission.

2.1 The ACES project will use the Multifunction Fiber Laser Lidar (MFLL) from current ongoing ASCENDS activities; new technology from ongoing NASA technology development efforts; and a full physics model of the updated fiber-laser-based instrument to investigate atmospheric effects (cloud/aerosol influences, surface reflectivity, etc.) on active sensing of CO<sub>2</sub> mixing ratio measurements. Extensive ground testing of the CarbonHawk instrument components and subsystems followed by airborne demonstrations will validate the instrument model and quantify the system performance to reduce risks for space application of the ACES system. During phase 1 of ACES, a cryogenically cooled high bandwidth detector subsystem and a hybrid encoding for cloud/aerosol desensitization will be added to the MFLL. In phase 2, the power-aperture product of MFLL will be further increased by the addition of multiple transmitters (including an O<sub>2</sub> transmitter with a novel fiber seeder plus amplifier), multiple telescopes, and advanced avionics signal processing. This will be demonstrated by ground and flight tests. The ACES project delivers a Global Hawk-compatible version of the MFLL (CarbonHawk) advanced to an exit TRL of 5 in three years.

2.2 The ACES instrument is being developed in partnership with Exelis, AER, NP Photonics, EM4 Inc. and University of Oklahoma. The goal of the project is to configure the ACES instrument for flights aboard NASA's Global Hawk aircraft. Initial plans include the use of a pressure-retaining environmental enclosure previously designed (but not fabricated) for the Global Ozone Lidar Demonstrator (GOLD) instrument. This enclosure mounts in the unpressurized Zone 25 of the NASA Global Hawk aircraft. Minor design modifications to the

GOLD environmental enclosure (EE) per High Spectral Resolution Lidar (HSRL) lessons learned may be implemented if they are determined to be sufficiently useful for ACES.

2.3 The ACES instrument concept includes three 175mm (nominal) diameter nadir viewing telescopes. These telescopes are fiber coupled to a detector array that will be accommodated within the environmental enclosure. The concept includes an array of 5 transmit collimators. Transmit collimators are fiber coupled to laser amplifiers which will also be accommodated within the environmental enclosure. Transmit and receive optics (collimators and telescopes) must be co-aligned to image the earth surface.

2.4 This task, outlined below, will provide preliminary and final designs of the ACES telescopes and GOLD EE, and the telescope and GOLD EE hardware, including an attachment and alignment mechanism(s) for the telescopes and collimators. It will address issues including but not limited to attachment of the telescope/collimator assembly to the GOLD EE, the alignment mechanism to adjust and hold alignment of the individual collimators to the nominal telescope optical axis, and initial estimates of telescope/collimator assembly weights. The nominal telescope optical axis defines the center axis of the combined fields-of-view of the three telescopes and is no more than 15 microradians from any of the individual telescope optical axes (15 microradians is a calculated value that assumes performance specification number 5 is met). It will also better define the fabrication costs for the telescopes and the GOLD EE, as well as the schedules for those activities.

2.5 Completion of a GOLD EE Critical Design Review (CDR) is a requirement under this Task Order. Powerpoint and engineering program presentations via Virtual Webex-based review are acceptable. However, travel for live participation in the reviews may be required. If travel to the review location is necessary, it will be communicated to the contractor by the NASA TM.

2.6 The contractor shall provide a cost estimate for fabricating the integrated GOLD EE including telescope mounts, collimator mounts, aligned telescopes and collimators (to themselves and each other), fiber optic connectors, and mounted and aligned fibers. The contractor shall also provide a “confidence factor” on this estimate. This confidence factor can be expressed as a percentage uncertainty on the estimate.

2.7 The contractor shall provide a schedule for the fabrication of the integrated GOLD EE including telescope mounts, collimator mounts, aligned telescopes and collimators (to themselves and each other), fiber optic connectors, and mounted and aligned fibers.

2.8 The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The format of technical progress reports (see Deliverables) shall be established with the TM. These reports shall be used to confirm priorities and adherence to schedule constraints. Metrics for delivery

schedules shall be established and evolved through the planning mechanism of the technical progress reports.

## 2.9 The Contractor shall:

- 1) Fabricate 3 telescopes (per design performed under this task using a Langley provided optical prescription provided to the contractor by the NASA TM).
  - 2) Design a permanent null/alignment reference.
  - 3) Fabricate a permanent null/alignment reference.

Perform GOLD environmental enclosure (EE) design modifications as determined by the NASA TM for the ACES configuration (per HSRL lessons learned regarding the WMD pre-existing design).

Perform GOLD environmental enclosure (EE) design modifications as determined by the NASA TM for the ACES configuration (to accommodate DC-8 interfaces/integration). Any modifications will be determined prior to and presented as part of the GOLD EE CDR.

- 6) Fabricate a GOLD environmental enclosure (EE) for ACES (per ACES design modifications).

As a sub-element of "Fabricate a GOLD environmental enclosure (EE) for ACES (per ACES design modification)", the contractor shall provide metal materials to fabricate the ACES GOLD EE.

- 7) Design mounting hardware to mount the 3 telescopes to the GOLD environmental enclosure that provide for having a permanently aligned system (the 3 telescopes to each other) upon delivery.
- 8) Fabricate mounting hardware to mount the 3 telescopes to the GOLD environmental enclosure.
- 9) Design fiber-optic connector interfaces and placement selections/orientations that enable each telescope's optical axis to be aligned within 25 microradians of each other.
  - 10) Provide fiber-optic connector interfaces.

- 1) Design the telescope system (including telescopes, mounts, and fiber-optic connector interfaces) to minimize stray light effects.

Design a mount that is capable of holding 5 fiber optic collimators (for transmitting ACES' 5 lasers) that minimizes the need for alignment adjustments.

- 13) Fabricate fiber optic collimator mounts that allow for each of 5 transmit beams to be individually, actively steered using Risley prism alignment hardware.

Assemble, integrate, and align as necessary all parts and the NASA-provided hardware into the ACES GOLD EE (the NASA TM will provide the NASA hardware to the contractor). The NASA TM will be responsible for transporting and operating the NASA provided lasers.

Support interface definition as determined by the NASA TM between the contractor and NASA-provided parts.

16) Verify, through written documentation (Word document) and informal oral discussions (via test, analysis, inspection, demonstration, or a combination of these methods) that the performance specifications defined below have been met.

7) Provide Risley prisms (10 primary and 10 spares), Risley prism motorized optical rotation stages (5 primary), Risley prism rotation stage control/driver electronics boards (1 primary logic board and 1 spare logic board, 3 primary amplifier boards and 1 spare amplifier board), Turning mirrors (9 primary and 9 spares), and Turning mirror mounts (9 primary).

#### 2.10 Performance specifications:

1. Each telescope optical (primary and secondary, gold coated) surface throughput shall be ~98%. Mechanical and other obscuration effects are to be minimized.

The spot size of the focused spot at the focal plane for the full-aperture collimated input beam shall be no more than 40 micrometers in diameter that contains at least 90% of the encircled energy.

3. All telescope optical axes co-aligned within 25 microradians relative to each other.

4. Telescope optical axes alignment known to within 25 microradians relative to the null/alignment reference axis.

5. All collimator optical axes aligned within 25 microradians relative to each other.

3. All collimator optical axes capable of being aligned to the nominal telescope optical axis within 25 microradians.

The nominal telescope optical axis shall be parallel to a normal of the nadir facing telescope mounting plate to within +/- 1 milliradian (point being to have traceability to the Global Hawk viewing geometry).

#### 2.11 NASA-provided hardware (Government Furnished Equipment, GFE):

1. Lasers

2. Collimators

3. GOLD EE optical aperture window

**Mod 1: The purpose of Mod 1 is to: (1) include the fabrication of custom beam expanders due to the fact that the original commercial beam expanders do not meet the government's specifications; (2) include new work due to the DC-8 aircraft being down for maintenance at the time of our flights. The Langley Hu-25 Falcon aircraft will now have to be used instead. Additional items are needed**

due to the change in aircraft; (3) extend the period of performance until January 31, 2014 due to the change in aircraft; (4) clarify who is responsible for the re-wiring of optical stages to match the wiring of the control boards. Modifications to Section 2.0 above are set forth below:

**Section 2.4:** This task will also address new issues of expansion and collimation of the transmitted laser beams, delivery of a polished, wedged, and Anti-Reflected (AR)-coated at 1262.5 nm and 1571.1 nm Infrasil 302 optical glass viewport, and design and fabrication of mounting adapters to attach the instrument environmental enclosure to the Langley Hu-25 aircraft for test flights scheduled to occur in January, 2014.

**Section 2.6:** The contractor shall also provide a cost estimate for fabricating beam expanders, Infrasil 302 optical glass that is wedged, polished, and AR-coated at 1262.5 nm and 1571.1. nm, a bellows between the GOLD EE window portal and aircraft mounting plate that forms the pressure boundary between the aircraft cabin and the atmosphere, and mounting fixtures for attaching the GOLD EE to the aircraft cabin.

**Section 2.7:** The contractor shall provide a nominal schedule for the fabrication of beam expanders, Infrasil 302 optical glass that is wedged, polished, and AR-coated at 1262.5 nm and 1571.1. nm, a bellows between the GOLD EE window portal and aircraft mounting plate that forms the pressure boundary between the aircraft cabin and the atmosphere, and mounting fixtures for attaching the GOLD EE to the aircraft cabin.

**Section 2.9:**

17) Specifically, the Risley prism motorized optical rotation stages shall include modified wiring to interface with the rotation stage control/driver electronics board.

**18) Design 5 beam expanders using a government-provided optical prescription.**

**19) Fabricate 5 beam expanders using a government-provided optical prescription. Optical lenses will be procured by the government.**

**20) Procure, wedge, polish, and AR coat Infrasil 302 optical glass (for 1262.5 nm and 1571.1 nm) according to government-provided specifications.**

**21) Design mounting fixtures for attaching the GOLD EE to the aircraft via a government-provided seat-track adapter.**

**22) Fabricate mounting fixtures for attaching the GOLD EE to the aircraft via a government-provided seat-track adapter.**

**23) Design a bellows between the GOLD EE window portal and aircraft mounting plate that forms the pressure boundary between the aircraft cabin and the atmosphere.**

**24) Fabricate a bellows between the GOLD EE window portal and aircraft mounting plate that forms the pressure boundary between the aircraft cabin and the atmosphere.**

**25) Provide handles for the GOLD EE to aid in aircraft integration.**

**Mod 2: The purpose of Mod 2 is to: (1) include the design, analysis, and fabrication of custom mounting beams that connect to the mounting fixtures attached to the ACES environmental enclosure, and then connect the enclosure**



to the seat rails of the Langley Hu-25 aircraft; (2) clarify that procurement of a standard, commercial bellows is an option in addition to the option of full fabrication of a custom bellows; (3) include machine work needed to add an o-ring groove to a government-provided mounting plate; and (4) extend the period of performance until April 1, 2014 to accommodate a change in the ACES flight schedule. Modifications to Section 2.0 above are set forth below:

**Section 2.9:**

**26) Design and analyze mounting fixtures for attaching the GOLD EE to the aircraft via a seat-track adapter.**

**27) Fabricate mounting fixtures for attaching the GOLD EE to the aircraft via a seat-track adapter.**

**28) Fabricate or procure a bellows between the GOLD EE window portal and aircraft mounting plate that forms the pressure boundary between the aircraft cabin and the atmosphere.**

**29) Design and analyze mounting beams that connect to the mounting fixtures attached to the ACES environmental enclosure, and then connect the enclosure to the seat rails of the Langley Hu-25 aircraft.**

**30) Fabricate mounting beams that connect to the mounting fixtures attached to the ACES environmental enclosure, and then connect the enclosure to the seat rails of the Langley Hu-25 aircraft.**

**31) Machine a groove to accommodate an o-ring within a government-provided mounting plate designed to mate with the Hu-25 fuselage and the contractor-provided bellows assembly.**

**Mod 3: The purpose of this mod is to provide a no cost extension through July 31, 2014, due to the**

# **delay of the test flights required for instrument integration.**

## **3.0 Special Requirements**

Access to Sensitive or ITAR Data: The ACES system includes export-controlled technology. No foreign nationals are used on this task.

Proprietary Information: The ACES system includes sensitive proprietary information from proposal partners. The contractor shall be required to sign a commercial non-disclosure agreement as required by partners.

## **4.0 Schedule/Milestones/Period of Performance**

Additional task milestones and schedule details will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings. Period of Performance is February 1, 2013 through October 31, 2013.

**Mod 1: The period of performance is February 1, 2013 until January 31, 2014**

**The wedged, polished, and AR-coated Infrasil 302 optical glass (in Section 2.9, #20) shall be delivered by December 9, 2013. All other hardware shall be delivered by July 31, 2013.**

**Mod 2: The new period of performance is February 1, 2013 until April 1, 2014.**

**The mounting fixtures, mounting beams, and bellows assembly (in Section 2.9, #26 through and including #31) for interfacing the ACES enclosure to the Hu-25 aircraft shall be delivered by January 31, 2014.**

## **Mod 3: The new period of performance is February 1, 2013 through July 31, 2014**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide quarterly progress reports (in the form of a Microsoft Word document) of the task status of accomplishments electronically to the NASA TM via email. The status of ongoing tasks, results, and issues shall be reported to the TM through weekly status meetings. The contractor shall provide the following deliverables at GOLD EE CDR:

- i. Updated cost estimate detailing the cost to fabricate all deliverables for use by ACES. Confidence factor on the cost estimate is requested.
- ii. Schedule estimate for fabricating and delivering integrated GOLD EE including telescope mounts, collimator mounts, aligned telescopes and collimators (to themselves and each other), fiber optic connectors, and mounted and aligned fibers.
- iii. Mass estimate of integrated GOLD EE including telescope mounts, collimator mounts, aligned telescopes and collimators (to themselves and each other), fiber optic connectors, and mounted and aligned fibers.
- iv. Documentation: Delivery of preliminary and final design documentation; including drawings, e-drawings, analyses reports (if any), and solid models. The documentation shall be delivered via email to the NASA TM. Note: Telescope manufacturing drawings are not required.
- v. Telescope design information for any changes made to that design since the Telescope CDR delivered via email to the NASA TM.
- vi. The contractor shall provide designs for review by NASA TM upon contractor completion of the designs in order to avoid delay in manufacturing. Parts that are ready for review prior to established schedules will be conducted by other means, including but not limited to, teleconferences or table-top reviews as agreed upon between the contractor and the NASA TM.

5.1 The contractor shall provide the following final deliverables:

- i. Integrated GOLD EE including telescope mounts, collimator mounts, aligned telescopes and collimators (to themselves and each other), fiber optic connectors, and mounted and aligned fibers.
- ii. Integrated GOLD EE measured mass.
- iii. Documentation: Delivery of as-built documentation; including drawings, e-drawings, analyses, test plans, test procedures, test reports (if any), solid models, integration plans, integration procedures, alignment plans, and alignment procedures. Note: Telescope manufacturing drawings are not required.
- iv. The contractor shall present the status of the telescope and GOLD EE work (webex/telecon is anticipated) in support of the Earth Science Technology Office (ESTO) reviews (Fiscal Year (FY) 13 annual review in Mar 2013 and FY14 semi-annual review in October 2013). The exact date of the ESTO 6 month interim review is not final yet. When this date is finalized, it will be communicated to the contractor by the NASA TM. The contractor shall deliver the powerpoint charts and pictures at an agreed upon time between the contractor and the NASA TM, pending the date of the ESTO 6 month interim review.
- v. The contractor shall provide a status of the telescope and GOLD EE work via powerpoint charts and pictures in support of the ESTO 6 month interim review.

**Mod 1: The following deliverables are added to Section 5.0 above:**

**vi. Schedule estimate for fabricating and delivering integrated GOLD EE also includes beam expanders, optical glass, bellows, mounting fixtures, and handles.**

**vii: Documentation: Mass estimate of integrated GOLD EE also includes beam expanders, optical glass, bellows, mounting fixtures, and handles.**

**Section 5.2:**

**The contractor shall also provide beam expanders, wedged, polished, and AR-coated at 1262.5 nm and 1571.1 nm Infrasil 302 optical glass, bellows, mounting fixtures, and handles.**

**Mod 2: the following deliverables are added to Section 5.0 above:**

**viii. Schedule estimate for fabricating and delivering mounting fixtures, mounting beams, and bellows assembly for interfacing the ACES enclosure to the Hu-25 aircraft.**

**ix. Documentation: Mass estimate of mounting fixtures, mounting beams, and bellows assembly for interfacing the mounting fixtures to the Hu-25 aircraft.**

**Section 5.3:**

**The contractor shall also provide mounting fixtures, mounting beams, and bellows assembly for interfacing the mounting fixtures to the Hu-25 aircraft.**

## **6.0 Other Information Needed for Performance of Task**

Some travel (minimal) may be required to accomplish the objectives of this Task. This includes 2 trips from the contractor location to NASA Langley.

Additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-009\_Mod4 CY3

**Task Order Title:** Mechanical Design Engineering Support for ASCENDS CarbonHawk Experiment Simulator (ACES) IIP effort

**1.0 Technical POC (TPOC):**

Name: steven.gayle  
Organization: D202:Mechanical Systems Branch  
Email Address: steven.w.gayle@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

- I. The Active Sensing of CO<sub>2</sub> Emissions over Nights, Days, and Seasons (ASCENDS) mission consists of simultaneous laser remote sensing of CO<sub>2</sub>, O<sub>2</sub> and CO on a global scale using a satellite platform in earth orbit. The mission will result in the first global column measurement of CO<sub>2</sub> that will aim to determine the land and ocean sources and sinks of CO<sub>2</sub>. In a 2007 report entitled "Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond", the National Research Council (NRC) supported a mission launch date for ASCENDS in the 2019 timeframe. NASA LaRC is working on the Modulated Fiber Laser Lidar (MFLL) technique, also known as Intensity Modulated CW (IMCW) based laser absorption spectrometer (LAS), for past several years. The contractor shall provide technical support to develop instrument performance models, conduct hardware development, and support field testing. This field testing shall include extensive aircraft flights demonstrating the CO<sub>2</sub> and O<sub>2</sub> measurement in a variety of surface and atmospheric conditions from various altitudes. The major elements of this effort include, but not limited to, development of performance models, LAS instrument design and development, aircraft specific payload design and assembly, aircraft integration, data collection and analysis, and hardware risk reduction activities. Langley Research Center was recently awarded NASA ROSES IIP titled ASCENDS CarbonHawk Experiment Simulator (ACES). The objectives of the ACES effort are as follows:
  - a. Demonstrate measurements of column CO<sub>2</sub> mixing ratios with a high-altitude (GlobalHawk) airborne instrument architecture scalable to the ASCENDS mission requirements.
  - b. Develop full physics model of the instrument to support investigation of atmospheric effects (cloud/aerosol influences, surface reflectivity, etc.) on active CO<sub>2</sub> mixing ratio measurements.
  - c. Conduct ground and flight tests of the instrument to validate model and quantify instrument performance.
  - d. Enhance the performance of the MFLL airborne system by insertion/replacement of components from the Advanced Component Technology (amplifiers/telescope) and Small Business Innovative Research (DFBs/modulators/amplifiers) Programs.

- II. The scope of work for this activity includes mechanical engineering design support for the ongoing ACES IIP effort. The contractor shall support the development of:
- a. Mechanical engineering design models of ACES transmitter and receiver assemblies and telescope
  - b. Assist in engineering design efforts related to telescope fabrication, assembly, alignment, testing, and integration efforts
  - c. Evaluate mechanical and thermal specifications of the ACES instrument subassemblies and associated accessories and develop requirements for flight integration and airborne experiments pertaining to Global Hawk, UC 8 and DC 12 aircraft platforms
  - d. Perform thermal and structural analyses as required by the ACES effort

**Mod 1:**

- e. **Perform Structural Analysis of the ACES Gold Box Design.**
- f. **Provide a Fabrication Liaison for the ACES Gold Box Fabrication.**

III. Responsiveness will be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known.

**Mod 2: The purpose of this mod is to extend the period of performance end date to match the updated ACES schedule due to rephasing and furlough impact.**

**Mod 3: The purpose of this mod is to extend the period of performance to April 30, 2014 to allow the government additional time to provide the final dimensions to the contractor in order for the contractor to complete their required technical reports.**

**Mod 4: The purpose of this mod is to extend the period of performance to May 31, 2014 to allow the government additional time to provide the final dimensions to the contractor in order for the contractor to complete required drawings.**



### 3.0 Special Requirements

The ACES instrument system includes export controlled technology. No foreign nationals are used on this task. The Carbon hawk system includes sensitive proprietary information. The contractor shall be required to sign a commercial non-disclosure agreement. ACES related documents will be provided by NASA TM.

### 4.0 Schedule/Milestones/Period of Performance

The Period of Performance for this task is February 1, 2013 through January 31, 2014.

**Mod 2: The new Period of Performance is February 1, 2013 through February 28, 2014.**

**Mod 3: The new period of performance is February 1, 2013 through April 30, 2014.**

**Mod 4: The new period of performance is February 1, 2013 through May 31, 2014.**

### 5.0 Deliverables/Reporting Requirements

Task Deliverables:

1. Development of Computer Aided Design (CAD) engineering models of mechanical systems design concepts of proposed flight experiments that meet technical requirements as provided by the Engineering Development Team Lead
2. Development of technical reports and presentations describing technical specifications and features of systems under consideration and how these specifications meet technical, resource, and schedule requirements as related to mechanical, thermo-structural, and associated interfaces and interactions.
3. Monthly progress reports.

**Mod 1:**

**4. Stress Analysis Summary/Report delivered via email in Word or PDF format by: 5/01/13**

**5. ACES Gold Box Fabrication completed by: 7/29/13**

## **6. Generate/update engineering documents to support project meetings and proposal development as required by the TM.**

The format, delivery method and due date of the deliverables will be communicated by the NASA TM to the contractor.

### **6.0 Other Information Needed for Performance of Task**

Travel Requirements: Shall travel twice a year to evaluate telescope design and fabrication process. Additional travel information will be provided to the contractor by the TM.

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-011\_Mod1 CY3

**Task Order Title:** Mobile Lidar Systems

### **1.0 Technical POC (TPOC):**

Name: larry.petway  
Organization: D208:Laser Remote Sensing Branch  
Email Address: larry.b.petway@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide engineering and scientific support for development of advanced laser and lidar systems as follows:

1. Currently NASA Langley has a Ce:LiSAF ozone DIAL lidar system that is being refurbished with the intention of making ground based atmospheric profile measurements of ozone. The lidar once operational will be placed in an existing Langley trailer to allow routine atmospheric measurements at various locations. This system may become part of a national ozone network in the future. This task will accomplish the following objectives:
  - a. All necessary equipment, labor and travel will be funded under this task.
  - b. The Ce:LiSAF ozone lidar will be integrated into the trailer and successfully tested at Langley.
2. NASA Langley is developing a coherent lidar instrument concept for planetary missions. Under this sub-task, the contractor shall develop lidar models and perform design and performance analyses for various candidate system concepts.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015, to provide continuing engineering and scientific support for the development of advanced laser and lidar systems as described in Section 2.0 above.**

### **3.0 Special Requirements**

none

#### 4.0 Schedule/Milestones/Period of Performance

Period of performance: February 1, 2013 through January 31, 2014

#### **Mod 1: The new period of performance is February 1, 2013 through January 31, 2015**

Provide laser and LIDAR support to ongoing development efforts for Earth and planetary science programs. Technical thrusts of support shall include coherent detection lidar and Differential Absorption Lidar (DIAL) design, analyses, and systems development. The top-level milestones of this task are provided below.

Task 1:

06/1/2013 - The Ce:LiSAF ozone lidar will be integrated into the trailer and successfully tested at Langley.

Task 2

04/01/2013 Specification of preliminary operational parameters of planetary coherent lidar instrument

01/31/2014 Projected performance of the planetary coherent lidar instrument in measuring Mars atmospheric parameters

#### 5.0 Deliverables/Reporting Requirements

The contractor shall deliver monthly status reports submitted electronically to the TM, for both task 1 & 2

For task 1:

The contractor shall integrate the Ce:LiSAF ozone lidar into the trailer and successfully tested at Langley to ensure successful operability.

For Task 2:

The contractor shall deliver to the TM the developed lidar models and performance analyses for candidate lidar system concepts. This information should be delivered to the TM electronically.

The government will keep all the information developed under this the contract.

## **6.0 Other Information Needed for Performance of Task**

There is no travel associated with this task.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-012\_Mod1 CY3

**Task Order Title:** Doppler Lidar Signal Processing

### **1.0 Technical POC (TPOC):**

Name: glenn.hines  
Organization: D207:Flight Software Systems Branch  
Email Address: glenn.d.hines@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide engineering and scientific support for development of advanced signal processing algorithms for a Doppler lidar system as described below:

The signal processing algorithms are targeted for an existing Doppler lidar system. This includes the development of a Welch Periodogram signal processing intellectual property (IP) core for embedding in a field programmable gate array (FPGA). The IP core will be provided to NASA LaRC. All necessary pre/post processing, and system interface components will also be developed including front-end data collection from the system analog to digital converters (three channels, 14-bit, 200 – 500 MHz sample rate), application of a window function (Hamming/Hanning/Blackman/etc.), fourier transformation of the windowed function, magnitude detection, ratio application, and peak detection. This IP will be targeted to a FPGA (eg. Xilinx Virtex 5) architecture interfaced to one or more DDR and/or QDR memory banks and to a host processor via PCI/PCIe. Each input channel is divided into three segments in time and processed separately. Each segment may also be filtered using a pre-defined filter. All processing must occur in real-time (up to 30 data acquisition cycles per second).

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing engineering and scientific support for the development of**

**advanced signal processing algorithms for a Doppler lidar system described in Section 2.0 above.**

### **3.0 Special Requirements**

None.

### **4.0 Schedule/Milestones/Period of Performance**

Period of performance: February 1, 2013 through January 31, 2014.

## **Mod 1: The new period of performance is February 1, 2013 through January 31, 2016**

Milestones:

1. Complete development of three channel, three segment Welch periodogram (on 64K points) Power Spectral Density estimation core, and associated processing.
2. Remove 3L GUI build dependencies from the current NASA LaRC algorithm and add Xilinx ChipScope to capture internal FPGA state.
3. Build Periodogram Processing Infrastructure onto FPGA hardware including all required interfacing to memories and host.
4. Add Periodogram processing to FPGA hardware.
5. Extend the length of the 64K periodogram up to 256K depending on system hardware resources.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall deliver monthly status reports electronically to the technical monitor (TM) in a format and schedule agreed upon between the NASA TM and the contractor.

The contractor shall deliver periodogram IP source code to the technical monitor (TM) in a format and schedule agreed upon between the NASA TM and the contractor.

### **6.0 Other Information Needed for Performance of Task**

The IP core shall be verified through logic simulation. Simulation of the processing core shall be performed via behavioral logic simulation using source RTL code. Stimulus is provided by the

fixed-point model. Timing simulation shall be performed using the synthesized placed and routed netlist to verify operation with worst-case timing modeled. Results shall be post-processed and verified against floating-point and fixed-point models. The output shall be verified for exact bit accuracy, while the final magnitude output shall be verified via signal to noise ratio check. This work shall attempt to leverage NASA Langley's current Doppler lidar signal processing firmware to the fullest extent possible in order to expedite development. The contractor shall provide support for integration of the core into the Doppler lidar system through telecons, iterative source deliverables, email, and up to two trips to NASA LaRC if required as determined by the TM and additional travel information will be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-015\_Mod3 CY3

**Task Order Title:** Ultra Long Single Precision Floating Point FFT for Xilinx Virtex FPGA

**1.0 Technical POC (TPOC):**

Name: tak-kwong.ng  
Organization: D203:Electronic Systems Branch  
Email Address: tak-kwong.ng-1@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide engineering and scientific support for the development of advanced signal processing algorithms for the High-Speed On-Board Data Processing for Science Instruments (HOPS) project as described below:

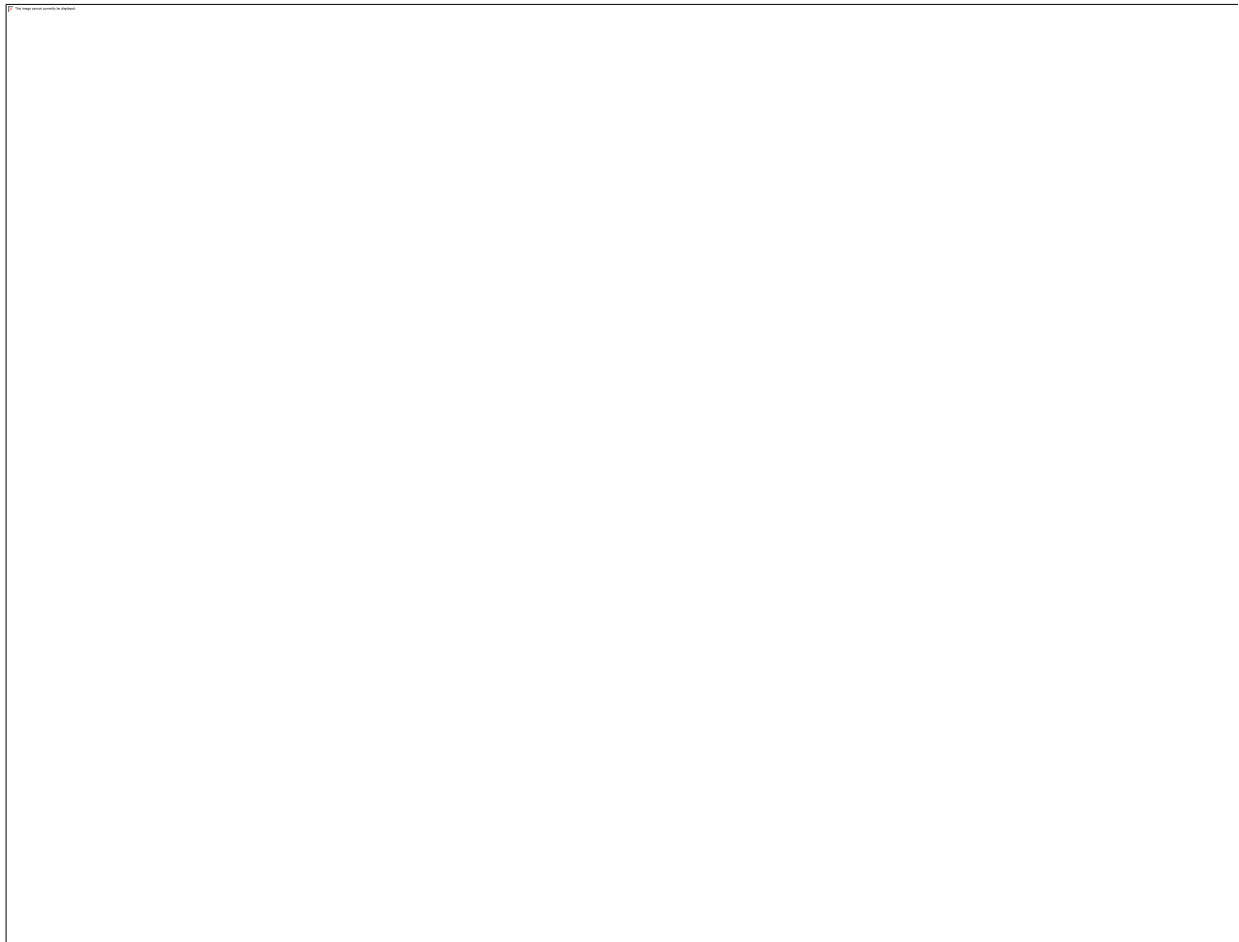
The signal processing algorithms are targeted for HOPS. This includes the development of a single-precision floating point (IEEE 754) FFT intellectual property (IP) for embedding in a Xilinx Virtex-5 and Virtex-6 field programmable gate array (FPGA) interfaced to one or more DDR and/or QDR memory banks and to a host processor via PCI/PCIe. The length of the FFT is base lined at 64K points, but it may be extended up to 1M points. All processing shall occur in real-time with a base lined sampling rate of 200 million samples per second. All necessary pre/post processing, and system interface components shall also be developed.

**Mod 1: The purpose of this modification is to include the engineering efforts required to implement the ASCENDS Air-Borne HDL.**

**A. The contractor shall provide engineering and scientific support for the engineering efforts to implement the ASCENDS Air-Borne Hardware Descriptive Language (HDL) as described below:**

1. The contractor shall start with the existing 64K ultra long single precision floating point Fast Fourier Transform (FFT). Input frames are written into the Double Data Rate 2 (DDR2) memory via the host interface. A FFT is performed on each frame with the result saved. Four sets of complex coefficients are stored in Quad Data Rate (QDR) memory. For each set, a complex multiply with the stored FFT results followed by an Inverse Fast Fourier Transform (IFFT). The magnitude of each IFFT result is taken and the peak of each IFFT frame is determined and saved together with the corresponding index for the host interface.

2. The following block diagram shows the hardware implementation of the ASCENDS Air-Borne algorithm.



**Mod 2: The purpose of this modification is to include additional engineering efforts required: to enhance the precision of the products computed by the ASCENDS Air-Borne algorithm implemented on the field programmable gate**

array (FPGA) board and the reusability of the hardware description language (HDL) modules; to develop the hardware implementation of the 3D Winds algorithm; and to port and to develop new HDL modules to the NASA developed FPGA board (HOPS Custom Board), as described below:

1. The contractor shall start with the existing HDL modules and substitute the floating point operators with the functional equivalent modules provided by Xilinx. The contractor shall update the math models to match the calculation performed by Xilinx floating point operators.
2. The contractor shall update the ultra-long fast Fourier transform (FFT) module to utilize a single clock source. The contractor shall update the HDL modules to adhere to HOPS' generic HDL interface. The contractor shall remove the build dependencies on the script provided by 4DSP Inc.
3. For the 3D Winds algorithm implementation, the contractor shall make use of existing HDL modules. Input sample set, up to 64K data points, written into the memory at a rate between 10 to 20 sample sets per second. A FFT shall be performed on a segment that is formed by overlapping samples and zero padding. A frequency power spectrum shall be computed on the FFT output. The power spectrums for the first r segments are accumulated. The accumulated power spectrum is normalized and peak detection is performed. If the peak is outside of the pre-defined frequency range, the remaining segments are discarded and the next sample set will be processed. Otherwise the peak frequency is recorded as the reference peak frequency. The power spectrums of the next k segments are computed. The power spectrum is shifted based on the difference between the peak frequency and the reference peak frequency. It will be accumulate in the k Power Spectrum B bins. After processing N sample data sets, normalized peak detections are performed on the k Power Spectrum B bins. The peak values and the peak frequencies are the data processing products.

The following block diagram shows the hardware implementation of the 3D Winds data processing algorithm for Mod 2:



4. The contractor shall support the hardware development of HOPS custom board by providing inputs to the FPGA pin-outs.

5. The contractor shall support the implementation of data processing algorithms on HOPS custom board by developing Quad Data Rate II-Plus (QDRII+) static random access memory (SRAM) controller HDL module, Double Data Rate 2(DDR2) synchronous dynamic random access memory (SDRAM) controller HDL module, host interface HDL module, and simulation structure.

6. The contractor shall port the HDL modules targeted for the 4DSP FC6301 FPGA board to the HOPS custom board.

7. The contractor shall document and deliver all HDL modules in VHSIC Hardware Description Language (VHDL).

**Mod 3: The purpose of this modification is to include additional engineering requirements needed to support the testing of 3D Winds algorithm on HOPS COTS board; to port ULFFT\_DEMO, ASCENDS, and 3D Winds algorithm and to develop new VHDL modules to the NASA developed FPGA board (HOPS custom board), and to support the testing on HOPS custom board, as described below:**

**1. The contractor shall support the testing and changes of 3D Winds algorithm for HOPS COTS board.**

- 2. The contractor shall develop QDR2+ controller in VHDL for HOPS custom board with a minimum operating speed of 200 MHz.**
- 3. The contractor shall develop DDR2 controller in VHDL for HOPS custom board with a minimum operating speed of 200 MHz.**
- 4. The contractor shall develop stand-alone QDR2+ and DDR2 test function for HOPS custom board.**
- 5. The contractor shall port and support testing of ULFFT\_DEMO, ASCENDS, and 3D Winds algorithm to HOPS custom board.**
- 6. The contractor shall document and deliver all HDL modules in VHDL.**

### **3.0 Special Requirements**

none.

### **4.0 Schedule/Milestones/Period of Performance**

Period of performance: February 1, 2013 through January 31, 2014

#### **Milestones:**

1. Functional FFT ready for hardware integration
2. Logic ready to run on hardware.
3. Support hardware testing and make modifications.

**Mod 2: The purpose of this Mod is to extend the period of performance for the entire task to: February 1, 2013 through October 31, 2014.**

**Mod 3: The new period of performance for this task is February 1, 2013 through June 30, 2015.**

### **5.0 Deliverables/Reporting Requirements**

Monthly status reports are submitted electronically to the technical monitor (TM).

Deliverables:

1. Synthesizable ultra long floating point FFT IP VHDL source code targeted for Xilinx Virtex-5(and/or Virtex-6) FPGA

2. Test bench for the ultra long floating point FFT IP in VHDL

Format and schedules for the deliverables shall be agreed upon between the NASA TM and the contractor.

**Mod 1: The purpose of this modification is to include the following deliverables required to implement the ASCENDS Air-Borne HDL.**

3. SystemC models for the CplxMult and Magnitude Peak Detect.

4. Synthesizable VHDL source codes targeted Xilinx Virtex-6(and/or Virtex-5) FPGA implementing the ASCENDS Air-Borne algorithm.

**Mod 2: The purpose of this modification is to include the additional deliverables required to enhance the precision of the products computed by the ASCENDS Air-Borne algorithm implemented on the field programmable gate array (FPGA) board, the reusability of the hardware description language (HDL) modules, to develop the hardware implementation of the 3D Winds algorithm, to port and to develop new HDL modules to the NASA developed FPGA board (HOPS Custom Board):**

5. **C functions for Xilinx floating point operators that are utilized in the contractor's developed HDL modules (due January 31, 2014).**
  
6. **Updated ultra-long FFT HDL module reflecting a single clock source implementation (due January 31, 2014).**
  
7. **Updated ASCENDS air-borne HDL modules adhering to HOPS' generic HDL interface (due January 31, 2014).**
  
8. **Updated ASCENDS air-borne top level module reflecting the removal of build dependencies on the 4DSP scripts (due January 31, 2014).**
  
9. **3D Winds HDL modules (due January 31, 2014).**
  
10. **HOPS custom board FPGA memory interface and host interface pin-outs (due January 31, 2014).**
  
11. **QDRII+ SRAM controller HDL module, DDR2 SDRAM controller HDL module, host interface HDL modules for HOPS custom board. All adhere to HOPS' generic HDL interface (due July 31, 2014).**

12. Simulation structure (due July 31, 2014).

13. All HDL modules that are ported to HOPS custom board (due September 30, 2014).

14. Documentation (Microsoft Office via email) for all delivered HDL modules (due September 30, 2014).

**Mod 3: The purpose of this modification is to include the change of due date for #14 above, and add a deliverable required to support the testing of HOPS custom board, as described below:**

**14. Documentation (Microsoft Office via email) for all delivered HDL modules (due December 31, 2014).**

**15. Stand-alone QDR2+ and DDR2 test function for HOPS custom board (due July 31, 2014).**

#### **6.0 Other Information Needed for Performance of Task**

The IP core should be a single clock domain design for Xilinx Virtex-5 and Virtex-6 implementation. This work shall attempt to leverage NASA Langley's current Doppler lidar signal processing firmware to the fullest extent possible in order to expedite development.

The IP shall be verified through logic simulation. Simulation of the processing core shall be performed via behavioral logic simulation using source RTL code. Stimulus is provided by the floating point model. Timing verification of the placed and routed netlist



should be performed using standard Xilinx ISE tool against the worst-case timing model. Timing simulation shall be performed using the placed and routed netlist to verify operation with worst-case timing model. Results are post-processed and verified against floating-point models.

The contractor shall provide support for integration of the core into HOPS through telecons, iterative source deliverables, email, and up to two trips to NASA LaRC if required as determined by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-016\_Mod3 CY3

**Task Order Title:** Design and Testing of Metamaterial-Backed Patch Antenna Array

**1.0 Technical POC (TPOC):**

Name: Anne.Mackenzie  
Organization: D319:Electromagnetics & Sensors Branch  
Email Address: Anne.Mackenzie-1@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

Background: This task supports the C&I Tier II program, "Metamaterial-Backed Conformal Antennas for Space Exploration," which has been awarded funding for the Fiscal Year 2013 to perform the second phase of the research. Based on results of the first year's work, it has been recommended to change the name to "Metamaterial-Enhanced Conformal Antennas for Space Exploration." In the second year's work, the modeling, fabrication and testing methods developed during the first year will be implemented to continue attempting to build a successful metamaterial-enhanced patch antenna.

2.1 Task Description: This task requires an experienced microwave engineer and consists of three parts.

- a) The first part is to assist with the fabrication and testing of single patches and metamaterial arrays that will be fabricated during fiscal year 2013. The purpose of the testing is to determine the resonant frequencies of the fabricated patch antennas and metamaterials.
- b) The second part is to build a feed network suitable for an array of X-band metamaterial-enhanced patches, in accordance with the Contactor's design notes from the first year's work. The design should make use of lightweight and physically small components, such as MMIC components, where practical, and should be laid out with the idea of placement on the external surface of a spacecraft. When a suitable combination of patch and metamaterial has been achieved as determined by the Task Monitor, the antenna will operate in the metamaterial stop band.
- c) The Contractor shall then build at least one channel of the feed network required for a small metamaterial antenna array to operate in the receive mode.

**Mod 1:** The purpose of this modification is to replace Section 2.0, b and c of the task as set forth below. This change is needed in order to re-define the work:

**b)** The second part is to build a feed network suitable for an array of X-band metamaterial-enhanced patches. The contractor will have access to the previous design notes from the first year's work for optional use upon start of task. The design shall make use of lightweight and physically small components, such as MMIC components, where practical, and shall be laid out with the idea of placement on the external surface of a spacecraft. When a suitable combination of patch and metamaterial has been achieved as determined by the Task Monitor, the antenna will operate in the metamaterial stop band.

**c)** The contractor shall design, build, and test enough of the antenna receiver to demonstrate the integration of two patch antennas into an array for which a pattern can be measured.

**Mod 2:** The purpose of this modification is to extend the period of performance by an additional two weeks to allow for the completion of a final written report.

**Mod 3:** The purpose of this modification is to extend the period of performance to allow for additional hardware development that increases the functionality and level of integration of the receiver system. The Contractor has completed the fabrication and functional testing of the two-channel receiver to demonstrate the active array metamaterial phased array concept under development by NASA.

**2.2 Additional Task Description:** The Contractor shall support (1) the integration of the completed receiver, (2) the NASA-provided metamaterial array, (3) the development of a multi-channel receiver. These additional requirements shall include three areas of investigation as set forth below:

**a)** Antenna chamber testing of metamaterial phased array: The Contractor shall provide support during NASA testing of the prototype metamaterial phased array. The Contractor shall integrate the two-channel demonstration receiver and the NASA provided antenna array and support the installation of the array into the antenna

**chamber. Antenna testing and antenna pattern measurements will be performed by NASA.**

**b) Receiver mixer/IF module design for the metamaterial receiver: The Contractor shall design a down conversion module and intermediate frequency amplifier module for the metamaterial array. The design shall be compatible with the bandpass filter (BPF) and low noise amplifier (LNA) preamplifier (preamp) demonstrated previously. The design shall include four channels and shall further integrate the preamp to reduce the size and weight. The output of the completed receiver shall be compatible with a commercial high speed data acquisition system and shall enable algorithms for agile beamforming to be demonstrated, albeit not in real time.**

**c) Fabricate and test a four-channel LNA/feed network: The Contractor shall build and test four BPF/LNA preamp modules and a four-channel antenna receiver. A data acquisition system shall be developed to provide “off line” processing and beamforming. The contractor shall measure the final performance and characterize the performance of the receiver. This receiver shall then be combined with the metamaterial phased array for NASA antenna pattern characterization and end-to-end testing of the metamaterial/active feed phased array concept.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: None

Other (Specify): None

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 through September 30, 2013.

Mod 2: The purpose of this modification is to change the period of performance:

Period of Performance: February 1, 2013 through October 14, 2013.

**Mod 3: The new period of performance is February 1, 2013 through October 14, 2014.**

### **5.0 Deliverables/Reporting Requirements**

At the conclusion of the task (September 30, 2013), the Contractor shall provide a written report describing the finished feed network design and its performance and deliver it electronically via email to the NASA TM. The report shall include recommendations for fabrication of a similar but larger antenna array.

**Mod 2: The purpose of this modification is to change the delivery date of a final written report for the above deliverable:**

**At the conclusion of the task (October 14, 2013), the Contractor shall provide a written report describing the finished feed network design and its performance and deliver it electronically via email to the NASA TM (in Microsoft Office format). The report shall include recommendations for fabrication of a similar but larger antenna array.**

**Mod 3: During the performance of the task, the Contractor shall meet with the NASA TM at least once monthly to review progress on the task. By the conclusion of the task (October 14, 2014), the Contractor shall provide a written report describing the results of testing the two-channel design and also the design and performance of the four-channel receiver and deliver it electronically via email to the NASA TM (in Microsoft Office format). The report shall include a brief discussion of considerations for implementing the metamaterial antenna and receiver design on a single chip having a common high-permittivity substrate. In addition, the Contractor shall provide a white paper discussing possible applications of band gap metamaterials by October 14, 2014.**

## **6.0 Other Information Needed for Performance of Task**

The Government will provide a workspace for the Contractor to perform the building and testing of the array feed network.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-018\_Mod1 CY3

**Task Order Title:** Ultra-Low Temperature Mechanism Research and Development

**1.0 Technical POC (TPOC):**

Name: bo.trieu  
Organization: D202:Mechanical Systems Branch  
Email Address: Bo.C.Trieu@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

2.0 The objective of this task is to provide research and development capabilities in the areas of multi-disciplinary system design, analysis, simulation and prototyping of ground-based, airborne and space-borne laser/lidar remote sensing and related technologies.

2.1 The contractor shall perform frequency up-conversion device research and development. Tasks shall include but are not limited to, theoretical calculations, computer modeling and simulation, and perform laboratory experiments in the areas of solid state lasers, non-linear devices, optics alignment and optimization, and performance characterization as determined by the NASA TM for the research. The contractor shall develop and implement laser frequency stabilization and control techniques to the up-conversion device. In particular, the contractor shall:

1. Develop a theoretical model for simulating the up-conversion efficiency, and acceptance bandwidth based on the nonlinear property of PPMgOLN. A resonantly enhancement ring-cavity will be designed for pump power enhancement.
2. Design and procure PPMgOLN crystals. The period of PPMgOLN will be calculated considering nonlinearity and dispersion. The efficiency and bandwidth will be determined.
3. Develop a pump enhancement sum-frequency cavity, and demonstrate frequency up conversion. Two upconversion devices will be demonstrated; one is to convert 1.57micron photons to 0.634micron photons, and the other is to convert 2.05micron photons to 0.7micron photons. The conversion efficiency of both devices will be measured. The expected up-conversion efficiency shall be > 65%.

Success criteria for this task shall be successfully demonstration of the upconversion process, efficiently detection of infrared signals with Si-APD via the upconversion device, approaches for improving the efficiency and packing the device.

2.2 The contractor shall support concurrent design projects in 2-micron laboratories located in the Engineering Directorate at LaRC. The contractor shall perform optical design, electrical design, and laser operation optimization for continuous-wave and pulsed solid-state lasers and nonlinear optics devices. The contractor shall collaborate with LaRC researchers in the enhancement of the 2-micron pulsed laser technology focusing in the areas of pulse energy, beam quality, wall-plug efficiency, compactness, ruggedness, and lifetime testings.

2.3 The contractor shall contribute to the development of Lidar Technologies to include but not limited to detectors covering the 1-2 micron wavelength range, both diffraction-limited and non-diffraction-limited telescopes with diameters from 10-40 cm, conical step-stare scanners with diameters from 10-25 cm, alignment technologies for both coherent and noncoherent (direct) lidar systems covering wavelengths from 1-2 microns, custom power supplies, custom electronic control circuitry, specialized test set ups, by performing theoretical analyses, operating relevant computer software written in C, C++, LabView, and Visual Basic, and performing the supporting laboratory experiments in the appropriate Engineering Directorate lab as determined by the task monitor.

#### 2.4 Performance Standards:

The contractor performance shall be evaluated on:

- The developments of Up-conversion devices are accomplished by schedules agreed upon by the NASA Technical Monitor and contractor
- Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor
- Required documents are received within time period requested by NASA Technical Monitor
- Data bases, web sites, and graphical products are created within time period requested by NASA Technical Monitor

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing support for ultra-low temperature mechanism research and development requirements in Section 2.0 above.**



### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): No

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance: February 1, 2013 through January 31, 2014

## **Mod 1: The new period of performance is February 1, 2013 through January 31, 2016**

### 5.0 Deliverables/Reporting Requirements

All deliverables shall be provided electronically to the TM as agreed upon with the contractor and TM. The contractor shall deliver data products including designs, documentation, test/evaluation plans, modeling techniques, software source code, characterization results, and analysis to the TM in an agreed upon time and format between the NASA TM and the contractor. The data products shall be delivered within 1 month after completion or as agreed upon between the contractor and the TM electronically or other media as agreed upon between the NASA TM and the contractor. The contractor shall deliver the following in an agreed upon format between the NASA TM and the contractor:

- Monthly report providing current status and accomplishments for the task to be provided electronically in an agreed upon schedule between the NASA TM and the contractor.
- Analysis and design drawings of the up-conversion device by June 30, 2013.
- The laboratory setup for the upconversion device by Sep. 30, 2013
- Demonstration of up-conversion device by December 31, 2013
- Experimental data and supporting documentation provided electronically as required by the NASA Technical Monitor.

### 6.0 Other Information Needed for Performance of Task

Government Furnished Equipment, Facilities and Procedures

- Laboratory, necessary lab equipment and instrument for experimental tasks.
- Travel to one domestic conference/year, duration of one week.
- As need arise, additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM
-

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-019\_Mod1 CY3

**Task Order Title:** Data Processing for Lidar Ranging Systems

**1.0 Technical POC (TPOC):**

Name: farzin.amzajerdian  
Organization: D208:Laser Remote Sensing Branch  
Email Address: F.Amzajerdian@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

I. Signal processing and image reconstruction is needed for the various lidar systems tested at NASA LaRC's Sensor Test Range (STR) and in the field from aircraft and rocket-powered free-flyer platforms. Because of the various system architectures and technologies used in the design of these lidar systems, most signal processing algorithms and image reconstruction methods will require system specific analysis of the system under test.

II. The contractor shall perform analyses of lidar performance data and derive/present their performance characteristics. This activity shall include, but is not limited to:

1. Range measurement accuracy.
2. Range measurement precision.
3. Range resolved resolution.
4. Angular resolution.
5. Radiometric analysis.

III. In addition, any systematic errors or observations discovered about the sensor shall be analyzed and reported. The goal of this task is to understand the strengths and limitations of the lidar systems through experimental data analysis and develop new signal processing algorithms accordingly.

**2.1 Performance Standards**

The contractor performance shall be evaluated on:

1. Analysis and interpretation of science data are documented and/or presented within established time frames agreed upon between the NASA Technical Monitor and contractor

1. Required documents are received on time based on schedules and agreements agreed upon during monthly meetings between the NASA TM and the contractor.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016 to provide continuing algorithm development, lidar signal processing, and performance analyses for the lidar experiments described in Section 2.0.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify): Yes

### 4.0 Schedule/Milestones/Period of Performance

Period of Performance: February 1, 2013 through January 31, 2014

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016.**

### 5.0 Deliverables/Reporting Requirements

1. Monthly report of accomplishments shall be delivered in electronic format (Microsoft Office) to the TM by the end of the following month.

2. The Contractor shall meet with the Task Monitor during the first week of each month to set schedules and priorities for data processing for that month. Priorities depend on instrument performance and analysis of previous results and cannot be determined in advance. The contractor shall not be expected to process all data received from the instrument provider; rather the contractor shall analyze the data subset selected in concert with the TM in their monthly schedule/priority meetings.

3. The contractor shall discuss analysis results with the TM and other technical personnel within 1 week after results are obtained and prepare the results for presentation and/or distribution as appropriate on schedules agreed to by the contractor and TM.

## **6.0 Other Information Needed for Performance of Task**

This work will require at least one travel for attending a technical conference in California. Additional travel information will be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-022\_Mod3 CY3

**Task Order Title:** ACCESS Project, Engineering Services and Prototyping

**1.0 Technical POC (TPOC):**

Name: craig.cleckner  
Organization: D1:Research Services Directorate  
Email Address: Craig.S.Cleckner@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

A. The NASA Alternative-Fuel Effects on Contrails and Cruise Emissions (ACCESS) experiment is designed to investigate fuel effects on aircraft cruise emissions and contrail formation. The scientific measurements enabling this experiment are the responsibility of the Science Directorate (Dr. Bruce Anderson, PI). Although the composition of exhaust from gas-turbine engines burning synthetic fuels has been thoroughly documented in recent ground-based studies, because of the difficulty in simulating low pressure and temperature conditions in ground tests, there is still great uncertainty regarding how the fuels will effect emissions at flight altitudes. To fill this information gap, the ACCESS Project will conduct a series of flight experiments using the LaRC HU-25 Falcon Jet aircraft to make detailed measurements of gas, aerosol and ice particles in the near-field behind the NASA DC-8 aircraft burning either standard petroleum-based fuel or fuels composed of varying fractions of synthetic alternatives manufactured from renewable carbon feed stocks.

B. The identified chase plane, the NASA LaRC HU-25 Falcon jet, will be outfitted with a suite of sampling probes and insitu instruments. The effort described under this task order deals with the design, analyses, and prototyping of these subsystems.

C. This task supports the Alternative-Fuel Effects on Contrails and Cruise Emissions (ACCESS) experiment. Support includes mechanical design, analyses of engineering designs, and prototyping of aircraft-related hardware. Combinations of these services may include complete design-to-fabrication solutions by the contractor, and build-to-print prototyping of NASA-provided designs.

D. The contractor shall provide the technical staff and work processes to accomplish the requirements specified in the Task Order. Responsiveness shall be an important metric for task performance. The contractor shall keep the government informed of all activities, such as work successes, problems, and potential problems, as soon as they are known. The format of technical progress reports (see 6.0, Deliverables) shall be established with the TM to provide maximum value. These reports shall be used to confirm priorities and adherence to schedule constraints. Metrics for delivery schedules shall be established and evolved through the planning mechanism of the technical progress reports.

**Mod 1: The purpose of this modification is to add the following to section 2.0 above:**

**The contractor shall provide materials, fabrication, and prototyping required to meet task order requirements including HSRL diffuser air system components, window cell components and cover plates, and other aircraft-related hardware as identified. Specific components and quantities will be specified by NASA as design details are finalized.**

**Mod 2: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015 to match the updated ACCESS Project Plan due to schedule rephasing, anticipation of additional project phases, as well as furlough impact.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: None

### **4.0 Schedule/Milestones/Period of Performance**

Additional task milestones and schedule details will be established by the TM and agreed to by the contractor in monthly planning and coordination meetings. Period of Performance is February 1, 2013 through January 30, 2014.

Kick-Off meeting

February 2013

**Mod 2: The new period of performance is February 1, 2013 through January 30, 2015.**

**Mod 3: The new deliverable for the four aircraft racks added under mod 3 shall be delivered NLT May 30, 2014.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide quarterly progress reports of the task status of accomplishments electronically to the NASA TM. The status of ongoing tasks, results, and issues shall be reported to the TM through weekly status meetings. At the completion of each subtask, the contractor shall provide the following deliverables:

- Design data for contractor-led design tasks; including drawings and supporting analyses.
- Prototype services for contractor and NASA-provided designs.
- Documentation: Delivery of drawings, analyses reports, and material certifications shall be in both paper and electronic format.

**Mod 1: The purpose of this mod is to add the following to section 5.0 above:**

- **Delivery of materials, fabrications, and prototypes for aircraft-related HSRL components.**

**Mod 3: The purpose of this mod is to add the following to section 5.0 above:**



- **The Contractor shall fabricate four additional aircraft 15U racks, identical to previous racks fabricated under this task order. Minor improvements are allowed.**
- **Delivery of material traceability, certifications, and drawings showing any changes to the standard rack design required in Mod 3. (A drawing set is not required if these racks fully conform to previous models.)**

## **6.0 Other Information Needed for Performance of Task**

Some travel (minimal) may be required to accomplish the objectives of this Task. For purposes of estimation, the contractor may assume two one-day trips to NASA during the Period of Performance.

Additional travel information will be provided to the contractor by the TM.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-023\_Mod1 CY3

**Task Order Title:** MEDLI Mission Operations Manager

### **1.0 Technical POC (TPOC):**

Name: Christopher.Kuhl  
Organization: B103:Science & Flight Projects Contract Branch  
Email Address: christopher.a.kuhl@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall be responsible for the development and implementation of the MEDLI Mission Operations Plan (MOP) at LaRC, ARC, Lockheed Martin Space Systems Corp. (LMSSC) (Denver), JPL and KSC. The MOM will monitor and document all MEDLI mission operations activities. During mission activities, the MOM will interface with MSL Mission Operations team to provide input into the activities as related to MEDLI Mission Operations. The MOM will also work closely with MEDLI Science and Engineering to assure procedures are being followed completely.

Description of Work  
The contractor shall:

1. Participate in and support technical and operations interchange meetings with NASA, JPL, and LMSSC in which Mission Operations issues are addressed. In person support shall be provided when needed.
2. Support MEDLI Integration and Test activities at LaRC, LMSSC, JPL, and KSC.
3. Review Mission Operations procedures and data with NASA. In person support shall be provided when needed.
4. Provide analyses, as required, to assess the impact of mission operations on mission success.
5. Develop plans for data archival

Performance Standards

The contractor performance shall be evaluated on:

1. Establishing a rapport and regular communication with the MSL Mission Operations Team
2. Completes reports and documents on time
3. Effectively interfaces with MSL Mission Operations
4. Successfully archive the MEDLI and ancillary flight data

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015, to provide continuing support for the MEDLI Mission Operations requirements in Section 2.0 above.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data: No Other(Specify): No

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 through January 31, 2014

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2015**

### **5.0 Deliverables/Reporting Requirements**

- The contractor shall submit status report bi-monthly electronically via email to Technical Monitor by the last business day of the month in Microsoft word format.
- The contractor shall provide a MEDLI Mission Operations lessons learned report to the Technical Monitor at an agreed upon schedule and format between the NASA TM and contractor.

### **6.0 Other Information Needed for Performance of Task**

Travel is required to complete this task. It is estimated that there will be travel to JPL to support final mission operations. At this time, 1-2 trips with durations of 4 days or less each are anticipated.

additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM.

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-024\_Mod1 CY3

**Task Order Title:** CERES FM6 JPSS-1 FVTS Simulators

## **1.0 Technical POC (TPOC):**

Name: joseph.delcorso  
Organization: D206:Structural & Thermal Systems Branch  
Email Address: joseph.a.delcorso@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall perform tasks in support of the Clouds and the Earth's Radiant Energy System (CERES) project design, development, fabrication, assembly, test, and delivery of CERES Flight Model (FM) 6 Joint Polar Satellite System (JPSS)-1 simulators for integration with the JPSS-1 Flight Vehicle Test Suite (FVTS). This specifically includes support to CERES FM6 JPSS-1 simulator overall definition and architecture, electrical engineering design and electronics parts selection, software design and construction, systems engineering, support to design fabrication, assembly, test, and delivery, as well as support to documentation production and design life cycle reviews. Two types of simulators are being developed for the JPSS-1 FVTS: one electronics based hardware simulator (EDU) and one electronics based operations simulator (Ops). The tasks requiring support during this performance period are:

- 2.1 Design and Development Support: The contractor shall support NASA LaRC in implementing a CERES FM6 JPSS-1 EDU and Ops simulator design and development effort with the intent to meet the operational and performance requirements specified by the JPSS-1 Flight Project FVTS subsystem. This shall include support in examination of government provided specifications and requirements for the JPSS-1 instrument simulators, development of concepts and architectures to satisfy the specifications and requirements, electrical and electronics design including electrical parts selection, software design and development, and support to simulator development and development testing consistent with a concept/preliminary design and critical design development phases. The contractor shall as part of this effort provide support to the CERES FM-6 JPSS-1 simulator document definition and document development as specified by the Technical Monitor (TM) The contractor

shall also provide support to and participate in internal design and development reviews and reviews with JPSS.

2.2 Systems Engineering Support: The contractor shall provide support to the CERES FM6 JPSS-1 simulator design and development systems engineering effort assisting NASA in formulating, managing, and tracking FM6 JPSS-1 simulator requirements, and requirements verification and validation activities. The contractor shall support NASA in defining a requirements solution baseline for the FM6 JPSS-1 simulators that satisfies the JPSS-1 FVTS physical and functional interface assisting in assessments and evaluation of proposed JPSS-1 FVTS -to- FM6 JPSS-1 Simulators interface control documentation (ICD) and other JPSS satellite controlling systems engineering documentation. The contractor shall support NASA design reviews with appropriate documentation. Note: documents to be provided by TM and/or access will be made available to a central server where documents reside].

### 2.3 Performance Standards

#### 2.3.1 Performance Standard for Design and Development Support:

2.3.1.1 PDR Level: The contractor shall support an evaluation of CERES FM6 Simulator design (e.g., hardware and software design evaluation, FVTS instrument simulator specifications, requirements validation, alignment to NASA standards, etc.) at a Preliminary Design Review (PDR) for relevance and for validation of a design solution and authority to proceed for both the EDU and the Ops simulator.

2.3.1.2 CDR Level: The contractor shall support an evaluation of CERES FM6 Simulator at a Critical Design Review (CDR) by the end of the period of performance. The contractor shall produce and document design concept architectures, and trade studies, and by the end of the performance period produce designs and an engineering development unit (EDU) level product of the hardware (EDU) and software (OPs) simulators.

2.3.1.3 Other: The contractor shall summarize monthly its work related to examinations, evaluations, and assessments of reviewed material, report on its status respective design and development, report on its support to meetings and exchanges with NASA and other NASA contractors, and as well provide status on maturity of documentation in support of the design and/or support documentation required at internal and external design reviews.

2.3.2 Performance Standard for Systems Engineering Support: The contractor shall support via review and assessment the CERES FM6 JPSS-1 simulator requirements and specifications and from this develop a preliminary requirements data base and requirements verification matrix in support of the PDR and an updated document to support CDR by the end of the

performance period. The contractor shall also support NASA in the development of documentation to capture the physical and functional interface between the FM6 JPSS-1 simulators and the JPSS-1 FVTS subsystem. The contractor shall summarize monthly via written report its work respective to this area of performance as well as report on its support to meetings and exchanges with NASA and with NASA contractors in support of CERES FM6 JPSS-1 simulators.

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2015, to provide continuing support for CERES FM6 JPSS-1 FVTS Simulator requirements in Section 2.0 above and to add an additional Performance Standard for Design and Development Support:**

**2.3.1.4 Deliverable Products: The contractor shall support test readiness reviews, and system acceptance review (SAR) by the end of the period of performance. The contractor shall support, produce and document test procedures and design specifications supporting successful completion of all test readiness reviews, build test cycles, and the system acceptance review prior to delivery of products to JPSS, and by the end of the performance period produce designs and an engineering development unit (EDU) level product of the hardware (EDU) and software (OPs) simulators**

### **3.0 Special Requirements**

- 3.1 Access to Sensitive Data: Yes. The contractor may at times be required to access and evaluate Sensitive But Unclassified (SBU) data, ITAR material, or other contractor proprietary data and as such will require a Non-Disclosure Agreement (NDA).
- 3.2 Design and Development Support and Systems Engineering Support: Members of this team will support the CERES FM6 Deputy Project Manager for the CERES FM6 JPSS-1 Simulators in response to work requirements defined by the Deputy Project Manager for the CERES FM6 JPSS-1 Simulators or his delegated discipline team leads.

## 4.0 Schedule/Milestones/Period of Performance

Period of Performance : Date of Award - 1/31/2014

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2015**

## 5.0 Deliverables/Reporting Requirements

The contractor shall provide a monthly summary report to the TM that includes the response to the reporting requirements listed in the sub-tasks below. The due date of the deliverables, unless stated below, will be communicated by the TM to the contractor.

- 5.1 Subtask 2.1 Design and Development Support: The contractor shall summarize in a monthly report composed in Microsoft Word and delivered electronically to the NASA TM its work related to examinations, evaluations, and assessments of reviewed material, report on its support to meetings and exchanges with NASA and other NASA contractors, and as well provide status on maturity of documentation and hardware in support of planned reviews. The contractor shall produce documented designs in accordance with NASA standards and formats culminating by the end of the performance period documented preliminary designs for both the hardware and operations simulators. The contractor will document by the PDR a preliminary electronics parts list for both the hardware (EDU) and the operations (Ops) simulator designs. The contractor will by the end of the performance period update the EDU and Ops electronics parts list in-line with the CDR level design and build solutions.
- 5.2 Subtask 2.2 Systems Engineering Support : The contractor shall summarize monthly via written report composed in Microsoft Word and delivered electronically to the NASA TM its work respective to examinations, evaluations, and assessments of reviewed material and its progress toward establishing and documenting a CERES FM6 JPSS-1 simulator requirements database, requirements verification matrix, and the physical and functional interface between the CERES FM6 JPSS-1 simulators and the JPSS-1 FVTS subsystem..

## 6.0 Other Information Needed for Performance of Task

Access to Government owned computing systems in government facilities, consistent with the CERES FM6 JPSs-1 Simulator design and development and systems engineering support requirements will be provided based on appropriate IT security authorizations and system owner approval. Each user account will be authorized either by the Flight Projects Directorate, Science Directorate, or Engineering Directorate system owner, who will coordinate the approvals for the various machines with the TM.



#### 6.1 Travel for Subtask 2.1 Design and Development Support:

1. 4 travelers to FVTS TIM with JPSS, at GSFC, Greenbelt, MD, for three days. (total days per traveler including travel days)
2. 4 travelers to Peer review of PDR level EDU and OPS units, at GSFC, Greenbelt, MD, for four days. (total days per traveler including travel days)
3. 4 travelers to FVTS Review with JPSS, at GSFC, Greenbelt, MD, for two days.(total days per traveler including travel days)

#### 6.2 Travel for Subtask 2.2 Systems Engineering Support:

1. 1 traveler to the FVTS TIM with JPSS, at GSFC, Greenbelt, MD, Three days (total days per traveler including travel days)
2. 1 traveler to Peer Review of PDR level EDU and OPS units, at GSFC, Greenbelt, MD, four days (total days per traveler including travel days)
3. 1 traveler to FVTS Review with JPSS, at GSFC, Greenbelt, MD, 2 days (total days per traveler including travel days)

TIM: Technical Integration Meeting

Additional travel information will be provided to the contractor by the TM.

## 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## 8.0 Safety

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## 9.0 Risk

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-025\_Mod1 CY3

**Task Order Title:** CERES FM-5 Electronics Parts and Component Engineering

### **1.0 Technical POC (TPOC):**

Name: john.pandolf  
Organization: D203:Electronic Systems Branch  
Email Address: John.E.Pandolf@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide support for the CERES (FM5/FM6 and CERES-C) Instrument project's Electrical, Electronic, and Electro-mechanical (EEE) parts review effort. This shall include, but is not limited to, providing technical support for existing parts in the CERES (FM5/FM6 and CERES-C) payload as well as possible new EEE activities including selection of new hi-reliability parts for any additional instrument modifications and/or the FM6 flight instrument effort. Support shall include researching EEE parts and providing recommendations (oral & written) on their use for the intended environment and providing analysis on parts application in designs to mitigate risk associated with the use of those EEE parts. The contractor shall make parts recommendations to the NASA TM based on component technical performance, schedule criticality and cost trade-offs. Analysis tasks shall include Government-Industry Data Exchange Program (GIDEP) search alerts and recommendations as well as other environmental and quality component issues. Component radiation performance shall be reviewed for parts suitability in the various instrument electronics assembly applications. Routine work product and deliverable task items shall be in MS Office format. Support shall include office meetings - routine, technical interchanges, parts control board and program reviews. When necessary as determined by the NASA TM, parts analysis, review and design application shall include communication with the CERES (FM5/FM6 and CERES-C) prime instrument support contractor(s) for the necessity to aid the selection or substitution of necessary EEE parts for project usage. The aforementioned support level shall be extended to cover recommendations to the LaRC Office of Safety & Mission Assurance (SMA) as well as other Langley center activities which also support the CERES (FM5/FM6 and CERES-C) project program(s). The contractor shall provide EEE Parts support knowledge unique to the understanding of the longevity of the FM5/FM6 instrument and the risks associated with utilizing the components contained in the CERES (FM5/FM6 and CERES-C) flight hardware. This support shall enable the identification of critical items, their prioritization and timely review for risk assessment purposes. In addition, analysis & reports of information in support of the CERES (FM5/FM6 and CERES-C) EEE Parts Program shall be used to aid the preliminary parts engineering effort for CERES (FM5/FM6 and CERES-C) instrumentation risk assessment PM&P activities.

#### **Performance Standards**

- Reporting of accomplishments to be made monthly to the Technical Monitor (TM), within 5 business

days of completion of the reported period

- Parts are researched, analyzed, reviewed and possibly selected with recommendations provided as agreed upon with the TM
- Designs are analyzed and recommendations provided to support EEE parts issues as required by the TM
- Documentation provided to support parts analysis and recommendations on risk assessment

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing support for the CERES FM5/6 and CERES-C EEE Parts review requirements in Section 2.0 above.**

### **3.0 Special Requirements**

- Field activities (support may be required by administering LaRC efforts at Instrument Subcontractor Worksite (, i.e. program meetings or reviews, technical interchanges, as determined by the TM)
- Meeting support for programs as required, typically 3 domestic trips total required, average duration being 1.5 days. Additional travel information will be provided to the contractor by the TM.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 - January 31, 2014

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016**

Monthly report of accomplishments submitted electronically to TM . Schedules for specific activities will be agreed upon between the contractor and the TM in formal weekly meetings typically held on Tuesday morning of each week.

### **5.0 Deliverables/Reporting Requirements**

The contractor shall deliver Parts Plans, Work Break down analysis, Reports, Parts Lists, Component and Circuit Analysis to the NASA TM in an agreed upon format and schedule between the NASA TM and contractor. The contractor shall participate in Meeting/teleconferences in support of EEE parts activities as determined by the NASA TM. The contractor shall deliver monthly reports of accomplishments electronically via email to TM in an agreed upon format between the NASA TM and the contractor.

### **6.0 Other Information Needed for Performance of Task**

Parts list information and other instrument sub-component related information provided by the NASA TM

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-041\_Mod1 CY3

**Task Order Title:** SAGE-III on ISS & MISSE-X Electronic Parts and Component Engineering

### **1.0 Technical POC (TPOC):**

Name: john.pandolf  
Organization: D203:Electronic Systems Branch  
Email Address: John.E.Pandolf@nasa.gov

### **2.0 Description of Work to be Performed and Performance Standards**

The contractor shall provide support for the SAGEIII on ISS & MISSE-X Instrument project's Electrical, Electronic, and Electro-mechanical (EEE) parts review effort.

This shall include efforts for providing technical support for existing parts in the SAGEIII on ISS & new design MISSE-X payloads as well as possible new EEE activities including selection of new hi-reliability parts for any additional instrument modifications or new designs. Support shall include researching EEE parts and providing recommendations (oral & written) on their use for the intended environment and providing analysis on parts application in designs to mitigate risk associated with the use of those EEE parts.

The EEE Parts support shall provide efforts for improving operations in the area of receiving inspection(R&I) and bonded stores for various projects past, present and forecasting needs for new project requirements in early life cycle phases. This support shall require interface with the procurement office, mission assurance personnel and various levels of project management. Efforts for R&I shall require purchase order review and receiving inspection paperwork compliance review.

The contractor shall make parts recommendations based on component technical performance, schedule criticality and cost trade-offs. Analysis tasks shall include Government-Industry Data Exchange Program (GIDEP) search alerts and recommendations as well as other environmental and quality component issues. Component radiation performance shall be reviewed for parts suitability in the various instrument electronics assembly applications. Assessments and Recommendations on radiation testing shall be required to support project alternate path to

flight requirements. Routine work product and deliverable task items shall be in MS Office format.

Support shall include office meetings - routine , technical interchanges, parts control board and program reviews. When necessary, as determined by the TM, parts analysis , review and design application shall include communication with the SAGEIII on ISS & MISSE-X prime instrument support contractor(s) for the necessity to aid the selection or substitution of necessary EEE parts for project usage.

The aforementioned support level shall be extended to cover recommendations to the LaRC Office of Safety & Mission Assurance (SMA) as well as other Langley center activities which also support the SAGEIII on ISS & MISSE-X project program. The contractor shall provide EEE Parts support knowledge unique to the understanding of the longevity of the SAGE III on ISS & MISSE-X instrument and the risks associated with utilizing the components contained in the SAGEIII on ISS & MISSE-X flight hardware. This support should enable the identification of critical items, its prioritization and timely review for risk assessment purposes.

Additional performance criteria:

- Maintains & improves, as determined by the TM, the EEE Parts Approved Vendor List
- Reviews Received Project Parts Lists for compliance with the Approved Vendors List
- Organizes compliance paperwork for incorporation into project end-item-data package to satisfy mission assurance project requirements
- Reviews parts received during receiving inspection and bonded stores phase for the purpose of suggesting additional compliance testing or verification efforts as necessary as determined by the TM.
- supports Center AS9100 – counterfeit parts mitigation efforts for EEE parts assurance.
- Reporting of accomplishments to be made monthly to the Technical Monitor (TM), within 5 business days of completion of the reported period
- Parts are researched, analyzed, reviewed and possibly selected with recommendations provided as agreed upon with the TM
- Designs are analyzed and recommendations provided to support EEE parts issues as required
- Documentation provided to support parts analysis and recommendations on risk assessment
- Ability to multi-task and provide variable support for Tiger Teams and part failure analyses for such projects such as CALIPSO, CERES, IRVE III, and NEPP related activities.

- Provide continuing support for Center AS9100 EEE Parts process refinement and implementation related activities. Task items may include updating approved parts/vendors/distribution lists and coordination with the LaRC Office of Safety & Mission Assurance (SMA).

**Mod 1: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing support for the SAGE III and MISSE-X EEE Parts review requirements in Section 2.0 above.**

### 3.0 Special Requirements

Access to Sensitive or ITAR Data: No Other(Specify):

- Field activities (support may be required by administering LaRC efforts at Instrument Subcontractor Worksite (, i.e. program meetings or reviews, technical interchanges)
- Meeting/conference support for programs as required, typically 1 or 2 domestic trips total required annually, averaging 3 days per trip.

additional information regarding the details of travel and/or additional travel requirements shall be provided to the contractor by the TM

### 4.0 Schedule/Milestones/Period of Performance

. Schedules for specific activities shall be agreed upon between the contractor and the TM in formal weekly meetings typically held on Tuesday morning of each week.

. Period of Performance is 2-1-2013 through 1-31-2014.

**Mod 1: The new period of performance is February 1, 2013 through January 31, 2016.**

### 5.0 Deliverables/Reporting Requirements

The contractor shall deliver a monthly report of accomplishments submitted electronically via to TM in an agreed upon format.

The contractor shall deliver Parts Plans, Work Break down analysis, Reports, Parts Lists, Component and Circuit Analysis to the NASA TM in an agreed upon format and schedule as agreed between the TM and the contractor. Meeting/teleconferences shall be conducted in support of EEE parts activities as required. Update communications on Receiving Inspection & Bonded stores activities should be provided to the TM on a regular basis for coordination of Quality Support and EEE Parts Production support inventory readiness.

### 6.0 Other Information Needed for Performance of Task

Parts list information will be provided by the NASA TM.



## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_. Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-060\_Mod2 CY3

**Task Order Title:** Hypersonic Inflatable Aerodynamic Decelerators (HIAD) Project

**1.0 Technical POC (TPOC):**

Name: melinda.cagle  
Organization: E6:Flight Projects Directorate  
Email Address: melinda.f.cagle@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The Contractor shall provide project management and system engineering support to the HIAD Earth Atmospheric Reentry Test (HEART) Project. The Contractor shall assist in the development of key documentation, plans, and schedules for the implementation and integration of the HIAD and HEART Projects.

2.1 The Contractor shall assist with the following HEART activities:

- a. Update the Project Implementation Plan
- b. Draft interagency agreement for ballistic range testing between NASA-Aberdeen
- c. Support the development of the Operational Concept document.
- d. Assist in the development of the EVM plan
- e. Support Project Reviews by assisting the HEART PM in development/review of the presentation packages.

**Mod 1: The purpose of this modification is to change the TM from Alan Little to Melinda Cagle as of June 21, 2013.**

**Mod 2: The purpose of this modification is to (1) extend the period of performance through September 30, 2014 (no cost time extension); (2) descope the task to remove HEART requirements due to the HEART project being cancelled; and (3) add updated requirements for HIAD:**

**2.2 The contractor shall perform the following HIAD activities:**

- a. Update/maintain the project Implementation Plan;**
- b. Support project outreach activities by developing posters and displays for use in center tours; providing logistic support for tours occurring about once per month;**
- c. Develop the project closeout report;**
- d. Support project reviews by assisting the HIAD PM in the development/review of the presentation packages.**

### **3.0 Special Requirements**

Access to Sensitive or ITAR Data : Yes: ITAR and SBU

### **4.0 Schedule/Milestones/Period of Performance**

The Period of Performance February 1, 2013 through January 31, 2014

**Mod 2: The new period of performance is February 1, 2013 through September 30, 2014.**

### **5.0 Deliverables/Reporting Requirements**

The Contractor shall provide the following deliverables:

1. Provide a monthly status report by the 10th of the month, for prior month, detailing work progress, problems, and items requiring HEART attention.
2. Provide inputs to HEART documentation:
  - a. Updated HEART project implementation plan (compliant with 7120.5E)
  - b. Recommendations for tailoring 7120.5E requirements
  - c. Interagency Agreement between NASA and Aberdeen
  - d. Revised Operational Concept Plan
  - e. Review of project schedule with recommendations for EVM implementation

**Mod 2: The following deliverables are added to Section 5.0 above:**

- 1. Provide a monthly status report by the 10th of the month, for prior month, detailing work progress, problems, and items requiring HIAD attention (in microsoft office format).**
- 2. Provide inputs to HIAD documentation:**
  - a. Updated HIAD project implementation plan as per GCDP template;**
  - b. Changes/improvements to Education and Public Outreach (EPO) content to reflect current project investments;**
  - c. Draft of the project closeout report by June 30, 2014.**

**6.0 Other Information Needed for Performance of Task**

none

**7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_ Data proposed for

fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-061\_Mod3 CY3

**Task Order Title:** CERES Simulation Software

**1.0 Technical POC (TPOC):**

Name: paul.brewster  
Organization: D207:Flight Software Systems Branch  
Email Address: paul.f.brewster@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**Phase I -Requirements Phase**

Flight Software Systems Branch is required to provide a Graphical User Interface (GUI) for the CERES simulator. This task describes contractor support needed to achieve this requirement.

- 1) The contractor shall support development of a preliminary SW Concept of Operations (CONOPS) and supporting Software (SW) requirements in preparation for System Requirements Review (SRR).
- 2) The contractor shall support development of an optimized SW architecture that can be used to implement the defined SW requirements consistent with the CONOPS.

**Phase II - Preliminary Design Phase**

- 1) The Contractor shall support maintenance of the SW CONOPS, SW requirements, and SW architecture.
- 2) The contractor shall support development of the preliminary GUI design in preparation for PDR.
- 3) The contractor shall support development of the initial GUI based on the preliminary GUI design.

**Mod 1: The purpose of this modification is to add embedded software for the CERES simulator as a requirement.**

**4) The contractor shall support developed of the preliminary embedded software design in preparation for PDR.**

**5) The contractor shall support development of the initial embedded software based on the preliminary design.**

**Mod 2: The purpose of this modification is to add integration, testing, verification, and validation for the CERES simulator as a requirement.**

**6) The contractor shall support integration, testing, verification, and validation of the GUI, embedded software, flight software, and FPGA code at the end of each build cycle.**

**Mod 3: The purpose of this mod is to extend the period of performance for the entire task through January 31, 2015, to provide continuing software development, testing, and support required for the CERES FM6 Simulator project as required in Section 2.0 above.**

### **3.0 Special Requirements**

Education Requirement is BS degree or higher in Engineering or Computer Science.

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: February 1, 2013 - January 31, 2014.

**Mod 3: The new period of performance is February 1, 2013 through January 31, 2015.**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall provide a monthly written status report in a Microsoft Word document to the NASA TM and an oral report at the Flight Software Systems Branch Monthly Project Reviews (MPRs).

The contractor shall deliver documents in support of the preliminary FSW design in preparation for SRR and PDR to the NASA TM in an agreed upon format and schedule between the NASA TM and the contractor.

### **6.0 Other Information Needed for Performance of Task**

All software artifacts developed and maintained in a CMMI environment.

The contractor shall be able to work independently and within an engineering team.

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):



**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-062\_Mod2 CY3

**Task Order Title:** Solid State Laser Development for Remote Sensing Applications

**1.0 Technical POC (TPOC):**

Name: brian.walsh  
Organization: D208:Laser Remote Sensing Branch  
Email Address: brian.m.walsh@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

The objective of this task is to perform research and development in the areas of spectroscopic measurements, modeling and data analysis, and laser design for ground-based, airborne and space-borne laser/lidar remote sensing and related technologies.

2.1 The contractor shall perform research and development on mid-infrared laser materials and lasers, as set forth below:

- a) The contractor shall obtain spectroscopic measurements of absorption and emission spectra needed for mid-infrared laser design and perform data analysis;
- b) The contractor shall develop a theoretical model to simulate laser performance of a mid-infrared laser;
- c) The contractor shall set up a diode pumped, mid-infrared laser and perform laboratory experiments in the areas of solid state lasers, non-linear devices, optics alignment, and optimization;
- d) The contractor shall compare the modeling with the experimental results and perform data analysis;
- e) The contractor shall design the optics for a mid-infrared laser using the spectroscopic measurements.

2.2 The success criteria is dependent upon the research and development results obtained during the execution of this task. The success criteria is successful

measurements of absorption and emission spectra of a NASA supplied laser crystal and data analysis. If the particular laser material provides gain in the mid-infrared region, success criteria shall include demonstration of laser threshold and data analysis.

**Mod 1: The purpose of this modification is to extend the period of performance in order to provide additional data processing, and research and development support required for the Mid-Infrared lasers.**

**Mod 2: The purpose of this modification is to extend the period of performance through January 31, 2015, in order to provide additional research and development support required for the investigation of Mid-Infrared lasers.**

### **3.0 Special Requirements**

n/a

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance: June 30, 2013 – October 31, 2013

**Mod 1: The new period of performance is: June 30, 2013 - April 28, 2014**

4.1 The contractor shall meet the following milestones by the due dates below:

- a) Absorption and emission spectra July 31, 2013
- b) Time resolved data August 30, 2013
- c) Laser performance data September 31, 2013

**Mod 1: The contractor shall meet the following additional milestones (in Section 4.1) by the due dates below:**

- d) Spectroscopy data analysis Nov 31, 2013
- e) Laser performance analysis Jan 30, 2014

f) Laser resonator design      April 28, 2014

**Mod 2: The new period of performance is: June 30, 2013 - January 31, 2015**

**Mod 2: The contractor shall meet the following additional milestones (in Section 4.1) by the due dates below:**

- g) Apply resonator design to Pr laser material    July 31, 2014
- h) Demonstrate Mid Infrared Pr laser at  $\sim 5\mu\text{m}$     October 31, 2014
- i) Demonstrate Mid Infrared Pr laser at  $\sim 7.5\mu\text{m}$     January 31, 2015

## **5.0 Deliverables/Reporting Requirements**

- a) The following reports shall be delivered electronically to the TM within one month of completion:
  - (1)The spectroscopic data used to determine energy levels;
  - (2)Time resolved data used to determine the lifetime of particular energy levels;
  - (3)Documentation and evaluation data on laser performance.
- b) The final report shall be in a Word or Power Point document and delivered to the TM by 10/31/20
- c) Monthly technical progress reports with the current status, any issues or concerns, and accomplishments for the task shall be provided electronically to the TM by the 5<sup>th</sup> of each month via email.

**Mod 1: The following additional deliverables for Mod 1 are set forth below:**

- d) The following reports shall be delivered electronically (Microsoft Office format) to the TM within one month of completion:

**(1)The spectroscopic data used to determine laser performance;**

**(2)Documentation and evaluation data on laser performance and resonator design.**

**e) The final report shall be in a Word or Power Point document and delivered electronically to the TM by 4/28/2014.**

### **6.0 Other Information Needed for Performance of Task**

- a) Spectroscopic and laser laboratories suitable for this project are located in the Engineering Directorate at Langley Research Center. NASA LaRC will provide the following at task award: spectroscopic samples; mid infrared laser material; spectroscopic laboratory and equipment for experimental tasks; lasers with sufficient power for optical pumping; laser optics for mid infrared laser.
- b) Travel: Travel is required to accomplish the objectives of this Task. One trip per month (5 total trips) to NASA LaRC for 2-3 days per trip.

**Mod 1: The following additional travel requirements for Mod 1 are set forth below:**

**c) Additional Travel: Travel is required to accomplish the objectives of Mod 1 in this task.**

**3 total trips--one in December, January, and February, to NASA LaRC for 5 days per trip.**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_ None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**

**NNL11AA00B**

**Task Order Statement of Work**

**Task Order Number:** C-064\_Mod4 CY3

**Task Order Title:** TEMPO (Tropospheric Emissions: Monitoring of Pollution) Requirements

**1.0 Technical POC (TPOC):**

Name: Alan.Little

Organization: B103:Science & Flight Projects Contract Branch

Email Address: a.little@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

2.1 Background Information: This Statement of Work (SOW) details the work required for updating the Tropospheric Emissions: Monitoring of Pollution (TEMPO) Interface Requirements Document (IRD), TEMPO Environmental Requirements Document (ERD), and TEMPO Mission Requirements Document (MRD). The TEMPO mission will measure pollution over North America, from Mexico City to the Canadian tar/oil sands, and from the Atlantic to the Pacific, hourly and at high spatial resolution.

The TEMPO Instrument Project consists of the TEMPO instrument; the ground systems associated with Instrument Operations Center (IOC) and Science Data Processing Center (SDPC); instrument operations; science data processing; and education and public outreach. Smithsonian Astrophysical Observatory is responsible for the project as the Principal Investigator (PI) for the TEMPO Instrument

Project, and will provide the Science Team, Ground Systems, Instrument Operations, Science Data Processing System, and Education and Public Outreach. Ball Aerospace and Technology Corporation (BATC) will build the TEMPO Instrument under a contract with NASA. NASA Langley Research Center, with the advice and guidance of the PI, will manage the day-to-day implementation of the project to include: administration of the BATC contract; Systems Engineering oversight and coordination; Safety & Mission Assurance responsibilities; overall schedule, configuration, financial, and risk management responsibilities.

The TEMPO mission share a ride on a commercial Geostationary Earth Orbit (GEO) host spacecraft to provide a modest cost mission. NASA is responsible for the Host Accommodation. Host Accommodation includes activities necessary to obtain the spacecraft/satellite, instrument integration, launch vehicle, data downlink, and the ground system to transfer the data to the TEMPO Instrument Operations Center.

2.2 The Contractor shall perform the systems engineering services required for successive updating of the TEMPO Interface Requirements Document (IRD), TEMPO Environmental Requirements Document (ERD), and TEMPO Mission Requirements Document (MRD). The Government will furnish the existing preliminary versions of these documents as Government Furnished Information (GFI).

- a) The first update of the IRD, ERD and MRD shall be based on the TEMPO instrument's design maturity as well as information contained in the proprietary Common Instrument Interface (CII) responses and the public CII interface document relative to GEO constraints.
- b) The second update to the IRD, ERD and MRD shall be based on the results of Host Spacecraft Studies to be conducted in the Spring of 2014 and the TEMPO instrument's design maturity.
- c) The third update of the IRD, ERD and MRD shall be based on the selected Host Spacecraft and the TEMPO instrument's design maturity. The Contractor shall ensure the requirements are consistent across the IRD, ERD and MRD.

**Mod 1: The purpose of this Mod is to add an additional document to be updated and delivered in Section 2.0, as set forth below:**

**2.3 The Contractor shall perform the systems engineering services required for successive updating of the TEMPO System Requirements Document (SRD) and**

**perform a series of document revisions as the mission matures. The Government will furnish the existing preliminary version of this document as Government Furnished Information (GFI).**

**Mod 2: The purpose of this Mod is to add additional documents to be updated and delivered in Section 2.0, as set forth below:**

**2.4 The Contractor shall perform the systems engineering services required for populating and maintaining the TEMPO Mission requirements database with the currently identified Level 1, Level 2, and Level 3 mission requirements. Successive updating of the TEMPO Mission requirements database as requirements are developed and matured.**

**2.5 The contractor shall perform the project management tasks required to develop input documents for the TEMPO project plan and review TEMPO provided documents. The document requirements are defined in NASA NPR 7120.5E.**

**Mod 4: The purpose of this modification is to extend the period of performance for the entire task through January 31, 2016, to provide continuing support for TEMPO.**



### **3.0 Special Requirements**

Under this task, the Contractor will require access to both ITAR and proprietary information. The Contractor shall support the Government in securing appropriate Non-Disclosure Agreements (NDAs) for gaining access to the required proprietary information. This is likely to entail the execution company specific NDAs.

### **4.0 Schedule/Milestones/Period of Performance**

The STARSS Contract Year 3 POP is June 25, 2013 - September 30, 2015

**Mod 4: The new period of performance is June 25, 2013 through January 31, 2016**

### **5.0 Deliverables/Reporting Requirements**

The contractor shall electronically deliver the following to the TM:

- a) First update to the IRD, ERD and MRD, July 31, 2013
- b) Second update to the IRD, ERD and MRD, September 15, 2014
- c) Third update to the IRD, ERD and MRD, September 15, 2015

**Mod 1: The contractor shall electronically deliver the following to the TM:**

- a) The first update to the is SRD is due August 31, 2013.
  
- b) The second update to the SRD is due September 15, 2014.
  
- c) The third update to the SRD is due September 15, 2015.

**Mod 2: The contractor shall electronically deliver the following to the TM in Microsoft Office format:**

- a) Requirement numbering structure to be used for the database is due August 30, 2013**
- b) Requirements database output required for TEMPO Mission SRR is due October 21, 2013.**
- c) Capture requirements database updates by semiannually (April and October) publishing updated mission requirements documents.**
- d) Draft Information Technology Plan – Due 9 September 2013**
- e) Environmental Management Plan – Due 9 September 2013**
- f) Draft Integrated logistics support plan – Due 9 September 2013**
- g) Draft Security Plan – Due 9 September 2013**
- h) Draft Communications plan – Due 9 September 2013**
- i) Draft Technology transfer control plan – Due 9 September 2013**
- j) Provide comments on NASA written Project Plan – Due 23 September 2013**
- k) Provide comments on NASA Schedule and Cost control plans – Due 23 September 2013**
- l) Provide comments on NASA Acquisition Plan – Due 23 September 2013**
- m) Provide comments on NASA Instrument Formulation Agreement – Due 23 September 2013**
- n) Provide comments on NASA Mission Formulation Agreement – Due 23 September 2013**

## **6.0 Other Information Needed for Performance of Task**

The Government will furnish the following information as GFI:

- a) Preliminary versions of IRD, ERD, and MRD – to be provided at task order award;
- b) Access to the proprietary Common Instrument Interface (CII) responses - to be provided no later than 30 Days after task order award;
- c) Results from the Host Spacecraft Studies for the TEMPO Instrument, to be provided no later than June 2014.
- d) Identification of the selected Host Spacecraft, June 30, 2015
- e) TEMPO instrument design documentation (as updates become available)

**Mod 1: The Government will furnish the following information as GFI:**

- f) Preliminary version of the SRD to be provided at task mod award.**

**Mod 2: The Government will furnish the following information as GFI:**

- g) Access to the requirements database software at task mod award**
- h) Project Plan – 9 September 2013**
- i) Schedule and cost control plans – 9 September 2013**
- j) Acquisition plan– 9 September 2013**
- k) Instrument formulation Agreement at task mod award**
- l) Mission formulation agreement at task mod award**

**Mod 3: The purpose of this modification is to add the following travel requirements on this task:**

- 1. 1 person to travel to Boulder, CO for 4 days (December 2013)**

- 2. 1 person to travel to Palo Alto, CA for 5 days (June 2014)**
- 3. 1 person to travel to Boulder, CO for 4 days (July 2014)**
- 4. 1 person to travel to Washington DC for 1 days (July 2014)**

## **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-066\_Mod2 CY3

**Task Order Title:** JPSS Instrument Scientist Support

**1.0 Technical POC (TPOC):**

Name: David.Johnson  
Organization: D204:Remote Sensing Flight Systems Branch  
Email Address: david.g.johnson@nasa.gov

**2.0 Description of Work to be Performed and Performance Standards**

**2.1 Background:**

a) This task is to provide technical assistance during the Cross-Track Infrared Sounder (CrIS) environmental testing and Calibration/Validation (Cal/Val) activities in support of Joint Polar Satellite System (JPSS) Program. There are currently three CrIS sensors that are operating, being assembled and tested, and/or planned: CrIS Flight Model 1 (F1) is currently operating on board the Suomi National Polar Orbiting Environmental Satellite System (NPOESS) Preparatory Project (NPP) satellite and is starting intensive cal/val; CrIS Flight Model 2 (F2) will fly on the JPSS-1 satellite in 2017 and will start environmental testing in September 2013; and CrIS Flight Model 3 is in the planning stages.

b) The primary objectives of this task are to evaluate the on-orbit radiometric and spectral performance of CrIS F1; evaluate the accuracy of the algorithms used in flight and ground software; and evaluate the radiometric and spectral performance of CrIS F2.

**2.2 The contractor shall:**

- a) Develop a theoretical model to simulate the ringing seen in calibrated F1 spectra;
- b) Serve as on-site science observer at the ITT-Exelis facility in Fort Wayne, Indiana, during an 80 hour portion of F2 Thermal Vacuum Chamber (TVAC) testing. The contractor shall monitor the test activities that occur while on-site and document any test anomalies or deviations from test procedures in Test Data Logs. Documentation shall include time, test configuration, and a description of the anomaly. Flight Model 2 TVAC testing is currently scheduled for February 7, 2014 through June 20, 2014. The 80 hour period need not consist of consecutive 8-hour days.
- c) Evaluate the performance of the digital Finite Impulse Response (FIR) filters on F2 during bench and TVAC testing.

### 2.3 Performance Standards:

- a) Theoretical model reproduces ringing seen in F1 spectra;
- b) TVAC Test Data Logs are complete for the 80 hour monitoring period;
- c) FIR filter response evaluation is completed within 1 month of test data acquisition.

**Mod 1: The purpose of this modification is to replace the following sections above (Section 2.2.b, 2.2.c, 2.3.b, 2.3.c) - with the revised sections set forth below, and add new requirements (Section 2.2.d, 2.3.d) due to the realignment of priorities within the project directly relating to research and testing in this task:**

### **Section 2.2:**

- b) Develop CrIS Science Data Record (SDR) algorithm calibration enhancement recommendations. Work consists of: analyzing and determining the source of unwanted spectral ringing in the correction matrix operator (CMO); proposing an algorithm with reduced spectral ringing in the CMO**

formulation; and developing an optimized end-to-end SDR algorithm processing flow.

c) Optimize the performance of the CrIS and SDR algorithm digital filtering to improve calibration accuracy.

d) Review the CrIS J1 gas cell test procedures for bench and thermal vacuum chamber testing, and make science recommendations.

### **Section 2.3:**

b) SDR algorithm recommendations delivered by July 19, 2014.

c) FIR filter recommendations delivered by July 19, 2014.

d) Gas cell test recommendations delivered by March 14, 2014.

**Mod 2: The purpose of this modification is to add new requirements that will reduce the calibration uncertainty**

**and also improve the quality control of the SDR from the CrIS NPOESS NPP J1 and J2 instruments:**

**Section 2.2:**

**e) Participate with the CAL/VAL team in trade studies aimed at reducing calibration uncertainty of unapodized CrIS SDRs. Perform trades, develop selection criteria, perform data analysis and make recommendation for various SDR algorithm segments that may include as needed any of the following: self apodization correction, spectral resampling, Fast Fourier Transform (FFT) and convolution methods, quality control measures, SDR algorithm digital filters, engineering packet content, complex radiometric calibration, and optimum sequencing of these algorithm segments.**

**f) CrIS SDR Algorithm Theoretical Basis Document (ATBD) editing and review:**

**i. Conduct an end-to-end document review and edit of the latest version of Exelis' SDR ATBD and provide feedback to Exelis for next document revision.**

**ii. Conduct an end-to-end document review and edit of latest version of NOAA's SDR algorithm ATBD document and provide feedback to NOAA for next revision update.**

**iii. Identify any discrepancies between NOAA and Exelis version of ATBD that need to be resolved. Work with CAL/VAL team and Exelis to resolve any important discrepancies.**



### **g) CrIS End-to-end Signal Processing Support:**

**i. Provide system level recommendations, trade studies and anomaly resolution for planned signal processing flight hardware/software improvements on J1 and J2. This area of support includes the FPGA FIR filter, bit trim, impulse noise mask, system noise, data rate options, data rate reduction methods, system level signal processing architecture and changes to the CrIS sensor that support wider spectral coverage.**

**ii. Assess CrIS on-board signal processing changes (currently underway and/or planned by NASA) for SDR algorithm compatibility and their impact on SDR calibration uncertainty. Provide recommendations for optimizing the CrIS end-to-end signal processing for the purpose of enhancing CrIS SDR quality and utility (i.e. FIR filter coefficient optimization).**

### **3.0 Special Requirements**

None

### **4.0 Schedule/Milestones/Period of Performance**

Period of Performance is 7/20/2013 through 07/19/2014

**Mod 2: The new period of performance is 7/20/2013 through 7/19/2015**

### **5.0 Deliverables/Reporting Requirements**

1. Monthly status reports in Microsoft Word shall be sent electronically to the NASA TM on the first business day of each month. The reports shall include a brief (one paragraph) summary of work completed

during the previous month, summary of work planned for the next month, and concerns.

2. Test Data Logs and all other data artifacts resulting from this task shall be delivered electronically to the TM within the schedule agreed upon between the NASA TM and the contractor. Microsoft Office products shall be used when appropriate.

**Mod 1: The purpose of this modification is to replace the following deliverable above (2) with the revised deliverable (2) set forth below:**

**2. SDR algorithm enhancement presentation, FIR filter recommendation presentation, gas cell test recommendation report, and all other data artifacts resulting from this task shall be delivered electronically to the TM within the schedule agreed upon between the NASA TM and the contractor. Microsoft Office products shall be used when appropriate.**

**Mod 2: The following deliverables are added – the formats shall be in Microsoft Office software and electronically delivered to the Technical POC by 7/19/2015:**

**3. CAL/VAL Team presentation(s).**

**4. ATBD redlined documents.**

**5. FIR filter coefficient table and summary report.**

#### **6.0 Other Information Needed for Performance of Task**

No travel is anticipated for this task.

**Mod 2: The following is required for this task:**

- 1. Travel: 3 trips for 1 person, 5 days each (including 2 travel days): travel from Fort Wayne, Indiana to the NOAA College Park facility for technical interchange meetings with engineering personnel.**
- 2. The contractor shall participate in CrIS CAL/VAL team biweekly telecons and the NASA/Exelis weekly technical telecons.**

### **7.0 Data Rights**

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

### **8.0 Safety**

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

### **9.0 Risk**

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

### **10.0 Proposed Award Fee**

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):

**Science Systems and Applications, Inc.**  
**NNL11AA00B**  
**Task Order Statement of Work**

**Task Order Number:** C-067\_Mod0 CY4

**Task Order Title:** BRDF Facility Development

## **1.0 Technical POC (TPOC):**

Name: arthur.bradley  
Organization: D203:Electronic Systems Branch  
Email Address: Arthur.T.Bradley@nasa.gov

## **2.0 Description of Work to be Performed and Performance Standards**

### **2.1 Background:**

a) This task is for the development of a Far-Infra-red (IR) Bidirectional Reflectance Distribution Function (BRDF) Measurement facility for NASA Langley Research Center's (LaRC) Engineering Directorate. This facility will enable mid- and Far-IR (FIR) BRDF measurements on coatings for blackbodies that will be used in the mid- and FIR radiance calibrations of instruments for climate and weather monitoring. The facility will yield BRDF data at specific laser wavelengths of 5, 10.6 and 14  $\mu\text{m}$ , and the goal is to implement spectral measurements from 5 to 50  $\mu\text{m}$  using an existing Fourier Transform Spectrometer (FTS).

These FIR BRDF data are needed to determine the uncertainty in the calibration blackbody radiance. This requires cavity modeling with BRDF inputs to determine the blackbody emissivity using the Virial's STEEP 323 and INCA 333 computational software products. This facility will give NASA a more detailed set of data to use both in designing and in verifying performance for very high emissivity blackbodies for application in climate sensing instruments. This will improve LaRC's ability to compare various blackbody coatings for selection and screening, and will improve the turnaround times for exploratory investigations and measurement repeatability.

b) The primary objective of this task is to develop a BRDF Measurement facility which will reside in the Remote Sensing Flight Systems Branch (RSFSB) Metrology Lab in NASA LaRC Building 1202.

## 2.2 The contractor shall:

- a) Review the BRDF Government-Furnished test equipment procured in 2013 by NASA which will be made available to the contractor as soon as the task is awarded by NASA;
- b) Specify the remaining equipment to be procured by NASA to complete the BRDF facility;
- c) Design and fabricate the Dark-Enclosure;
- d) Integrate and assemble BRDF lab equipment;
- e) Perform the following tests and document test results:
  - i. Test for proper operation of source module by verifying that all sources deliver IR radiation onto the proper location of the unit under test (UUT).
  - ii. Test for proper operation of goniometer module by verifying that rotary stages can be driven to the proper positions.
  - iii. Test for proper operation of detectors module by verifying that IR radiation reflected from the illuminated portion of the UUT is collected by the detector optics and delivered onto the active portion of the IR detectors. Also verify absence of signal contamination by stray light.
  - iv. Test signal processing and control module by verifying that
    - 1. Software for rotary stages correctly orients UUT for desired measurement angles
    - 2. detector signals are received and logged into data files
    - 3. data handling and processing software works properly
  - v. Run a complete BRDF measurement on a sample UUT to verify acceptable control routines, signal levels, and data collection processes.
  - vi. Record results in MS Office files.

## 3.0 Special Requirements

None

## 4.0 Schedule/Milestones/Period of Performance

The period of performance is Task award date through 1/31/2015.

## 5.0 Deliverables/Reporting Requirements

The contractor shall provide the following deliverables to the NASA TM:

1. Integrated BRDF Measurement facility by 1/31/2015.
2. BRDF design documents and test results, electronically, in Microsoft Office format, by 1/31/2015.
3. Written report on the operation and use of the BRDF Measurement system, electronically, in Microsoft Office format by 1/31/2015.
4. List of remaining equipment needed to complete the BDRF facility, electronically, in Microsoft Office format, by 9/30/2014.

## 6.0 Other Information Needed for Performance of Task

not applicable

## 7.0 Data Rights

In accordance with FAR Provision 52.227-15 REPRESENTATION OF LIMITED RIGHTS DATA AND RESTRICTED COMPUTER SOFTWARE, paragraph (c), The offeror has reviewed the requirements for the delivery of data or software and states \_\_\_\_\_. None of the data proposed for fulfilling such requirements qualifies as limited rights data or restricted computer software. \_\_\_\_\_ Data proposed for fulfilling such requirements qualify as limited rights data or restricted computer software and are identified as follows:

## 8.0 Safety

Staff on this task shall comply with federal, state, local, and center safety regulations. This shall be accomplished through management emphasis, technical training, and personal responsibility. Staff shall participate in safety orientation and training in accordance with the contract Safety and Health Plan, and work within the requirements of that plan.

## 9.0 Risk

Contractor shall provide ongoing risk assessment and mitigation in performance of the Task Order. Priorities shall be re-evaluated as appropriate with the TM. Cost and schedule performance shall be assessed on a regular basis (no less frequently than monthly) and significant variations discussed and acted on in consultation with the TM and COTR.

## 10.0 Proposed Award Fee

In accordance with Paragraph B.5, of the contract, propose the Award Fee amount and proposed Award Fee Period(s): Proposed amount for Award fee: Proposed Award fee period(s):