THE NATIONAL SPACE GRANT COLLEGE & FELLOWSHIP PROGRAM

FISCAL YEAR 2020
ANNUAL PERFORMANCE REPORT (APR)

FUNDING SOURCE:
OFFICE OF STEM ENGAGEMENT
SPACE GRANT

MANAGING ORGANIZATION:
NASA HEADQUARTERS OFFICE OF STEM ENGAGEMENT

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COOPERATIVE AGREEMENT/GRANT NUMBER:
80NSSC20M0047

ACTIVITY/PROGRAM DESCRIPTION:

Kentucky Space Grant Consortium (KYSGC), a diverse group of 29 affiliate members, including 19 Kentucky universities, colleges and community colleges, 6 industry partners and 4 science centers, uses a portfolio-of-programs approach and best practices to set students and faculty on Pathways of Opportunities towards aerospace-related career goals, contributing to a skilled, high-performing and diverse workforce to meet emerging needs of both NASA and Kentucky. KYSGC programs engage competitively-selected participants in STEM education and training primarily at the post-secondary level, including developmental pipeline pre-college programs. Diversity of students, faculty, disciplines and institutional types is essential and integral to this approach. NASA Mission Directorate and OSTEM alignment is required for all programs. Three current strategic themes chosen by KYSGC are Data + Science, Earth + Space, and Aerospace + Innovation. These themes enable multiple programs to be unified in a portfolio approach that can be balanced to serve state and national aerospace needs. A fundamental premise of KYSGC programs is that STEM education should reach out to inspire and recruit talent from all student populations to engage and enable innovative contributions to NASA and the National Space Grant College and Fellowship Program. Special focus areas to increase program and participant diversity in Kentucky include participation from minority-serving institutions, community and technical colleges, students from rural and urban historically underserved backgrounds, students with disabilities, and minority and female students and faculty.

ACTIVITY/PROGRAM GOALS:

Kentucky Space Grant Consortium goals are to develop expertise and capacity for aeronautics, space and science research and education in Kentucky. In fulfilling its mission, the KYSGC program serves several constituencies – NASA, the U.S., and Kentucky, including Kentucky's university/college faculty, students, teachers, and the general public. The KYSGC mix of program elements and emphases offers student and faculty participants a "Pathways of Opportunities" serving the educational and economic needs of Kentucky and its constituents, aligned with NASA's mission.

Kentucky has developed SMART Objectives for each of three program areas: 1) NASA Internships and Fellowships (NIFs); 2) Higher Education and Pre-College Programs (Non-NIFS); and 3) Consortium Activities and Affiliate Collaboration. NASA Kentucky has also established SMART Objectives for student, faculty and institutional diversity. SMART objectives for Year 1 of the 2020-2024 KYSGC Space Grant Award include quantitative targets in each program area as described below. KYSGC has completed the first 10 months of the four-year 2020-2024 Space Grant award which began February 4, 2020.

KY Space Grant Consortium -- Year 1 (Base + Year 1 Augmentation) Goals and Objectives

NASA Internships and Fellowships (NIFs) Programs:

Program: Graduate Fellowships (GF)

- Goal: Advance students toward degree and career goals; contribute to NASA missions and work and support KY industry
- Objectives: Competitively select high-quality R&D projects aligned with NASA mission directorates conducted by diverse students
- Metrics: # student awards; % diversity of awards;

- Target: 5 awards for Yr 1; 25% ±2% female; 13% ±2% URM

Program: Research Experience for Undergraduates (REU)
- Goal: Advance students toward degree and career goals; contribute to NASA missions and work and support KY industry
- Objectives: Competitively select high-quality R&D projects aligned with NASA mission directorates conducted by diverse students
- Metrics: # student awards; % diversity of awards;
- Target: 7 awards for Yr 1; 25% ±2% female; 13% ±2% URM

Program: NASA Center interns (NCI)
- Goal: Advance students toward degree and career goals; contribute to NASA missions and work
- Objectives: Competitively select diverse students for NASA Center Internships
- Metrics: # student awards; % diversity of awards;
- Target: 5 awards for Yr 1; 25% ±2% female; 13% ±2% URM

Program: Kentucky Industry Interns (KII)
- Goal: Advance students toward degree and career goals; contribute to KY industry aligned with NASA missions and work
- Objectives: Competitively select diverse students for high-quality industry projects aligned with NASA
- Metrics: # student awards; % diversity of awards;
- Target: 4 awards for Yr 1; 25% ±2% female; 13% ±2% URM

Higher Education & Pre-College Programs (Non-NIFs):

Program: Team Projects (TP)
- Goal: Advance students toward degree and career goals via hands-on design experience; support NASA missions and KY industry
- Objectives: Competitively select high-quality design/competition projects aligned with NASA mission directorates conducted by diverse students
- Metrics: # awards; # institutional participation (reach)
- Target: 4 awards for Yr 1; 2 different affiliates

Program: Research Initiation Awards (RIA)
- Goal: Provide crucial entry point for promising younger faculty to Pathways of Opportunity to hone student mentor skills, increase NASA mentor contacts and lead to larger research awards
- Objectives: Competitively select high-quality R&D projects aligned with NASA mission directorates conducted by diverse faculty and students
- Metrics: # awards; % diversity of PIs
- Target: 1 award for Yr 1; 25% ±2% female; 13% ±2% URM

Program: Enhanced Mini-Grant (EMG-HE)
- Goal: Provide unique opportunities to attract and retain students, enhance higher education effectiveness in aerospace-related disciplines
- Objectives: Competitively select high-quality projects aligned with NASA mission directorates
- Metrics: # awards; # institutional participation (reach)

- Target: 2 awards for Yr 1; 2 different affiliates

Program: Enhanced Mini-Grant (EMG-PC)
- Goal: Provide unique opportunities to attract and retain students, develop teacher knowledge and inform the general public in NASA-related STEM disciplines
- Objectives: Competitively select high-quality projects aligned with NASA mission directorates
- Metrics: # awards; # institutional participation (reach)
- Target: 1 award for Yr 1

Program: Mini-Grants (MG)
- Goal: Provide educational opportunities to attract and retain students, develop teacher knowledge, and inform the general public in NASA-related STEM
- Objectives: Competitively select high-quality projects aligned with NASA mission directorates
- Metrics: # awards; # institutional participation (reach)
- Target: 1 award for Yr 1

Consortium Activities & Affiliate Collaboration:

Program: Annual Consortium Meeting
- Goal: Integrate interdisciplinary aerospace-related training, research and service
- Objectives: Feature high-quality projects aligned with NASA mission directorates
- Metrics: # affiliates participating; diversity of institutions
- Target: 1 annual meeting; 70% institutions participating

ACTIVITY/PROGRAM CONTRIBUTIONS TO PERFORMANCE GOALS (PG) AND SUCCESS CRITERIA

PG 3.3.3: Provide opportunities for students to engage with NASA's aeronautics, space, and science people, content, and facilities in support of a diverse future NASA and aerospace industry workforce.

> **PG 3.3.3 Success Criteria:** Meet or exceed the national average in two of the four categories of student diversity for NASA STEM enrollees in internships, fellowships, or other student engagement opportunities. Diversity Categories: (1) students across all institutional categories and levels (as defined by the U.S. Department of Education), (2) racially or ethnically underrepresented students (Hispanics and Latinos, African Americans, American Indians, Alaska Native, Native Hawaiians and Pacific Islanders), (3) women, and (4) persons with disabilities at percentages that meet or exceed national averages for science and engineering enrollees, as determined by the most recent, publicly available data from the U.S. Department of Education's National Center for Education Statistics.

Response to PG 3.3.3 and PG 3.3.3 Success Criteria:

KYSGC uses a portfolio-of-programs approach and best practices to set students and faculty on Pathways of Opportunities towards aerospace-related career goals, with a goal of contributing to a skilled, high-performing and diverse workforce that meets the emerging needs of NASA and Kentucky. KYSGC competitive programs are designed to support training of the future NASA and aerospace workforce. KYSGC contributed to Success Criteria PG 3.3.3 in Year 1 of the 2020-2024 Space Grant award in the following categories: 1) Supporting student engagement opportunities with 38 sub-projects at the levels of pre-college, community and technical college, undergraduate higher education, and graduate higher education (Master's and PhD); 2) Exceeding KYSGC NIFs targets for participant diversity in direct awards to underrepresented minority students (target 13.0%/result 13.6%); and 3) Exceeding KYSGC NIFs targets for participant diversity in direct awards to female students (target 25.0%/result 31.8%).

PG 3.3.4: Enhance the effectiveness of education investments using performance assessment and evaluation-driven processes.

PG 3.3.4 Success Criteria: Achieve milestone(s) in the implementation of performance assessment and evaluation of STEM engagement investments. Milestone: Award one competitive agreement to conduct a multi-year, third-party, project-level evaluation of the National Space Grant College and Fellowship Project.

Response to PG 3.3.4 and PG 3.3.4 Success Criteria:

KYSGC program reporting and evaluation data is drawn from two primary sources: 1) KYSGC Student Information Forms (SIFs), which gather self-reported student data such as contact information and demographics from project participants, and 2) sub-recipient project reporting required from all PIs funded by KYSGC, which collects faculty, collaborator, and student information and identifies numbers of participants, presentations, publications, follow-on funding, patent applications, as well as narrative project reports. Formative and summative program evaluation are accomplished with project SMART metrics including diversity and number of awards, respectively. For NASA alignment and programmatic evaluation, logic models were developed for each program to determine the most relevant metrics. Starting with goals and objectives, inputs, outputs, outcomes, and impacts were defined from which meaningful, measureable and moveable metrics are derived to inform the SMART matrix. KYSGC contributed to Success Criteria PG 3.3.4 in Year 1 of the 2020-2024 Space Grant award by submitting a multi-year, third-party, project-level evaluation proposal to the Space Grant Program-Level Independent Evaluation Opportunity solicitation. The proposal was not selected.

PG 3.3.5: Provide opportunities for students to contribute to NASA's aeronautics, space, and science missions and work in exploration and discovery.

PG 3.3.5 Success Criteria: Number of paper presentations and peer-reviewed research publications (and beginning in FY2021 to include student proposed solutions and products) resulting from STEM engagement investments. (Target number is 1,300)

Response to PG 3.3.5 and PG 3.3.5 Success Criteria:

Kentucky Space Grant programmatic funding is allocated via a competitive process in which proposals to Kentucky Space Grant programs are selected through an annual Request for Proposals (RFP). Guidance for NASA mission, research, and educational objectives are provided to proposers, who must demonstrate NASA alignment in order to be selected for funding. Policies for alignment vary based on the specific KYSGC funding programs, ranging from collaboration with NASA personnel on research objectives (as indicated in a NASA letter of support) to utilization of NASA resources and engaging NASA STEM Engagement and Research objectives. For PG 3.3.5 Success Criteria, no paper presentations or peer-reviewed research publications have yet occurred under this new award as sub-project research activities are in early stages and are working towards initial results.

ACTIVITY/PROGRAM ACCOMPLISHMENTS:

The following accomplishments refer to program goals and descriptions in the previous Activity / Program Goals section.

NASA Internships and Fellowships (NIFs) Programs:

KYSGC awarded support for 13 Graduate Fellowships (GF) from 4 Kentucky institutions working with 8 NASA Centers. Year 1 awards also included 8 Research Experience for Undergraduate (REU) projects selected from 3 Kentucky institutions using NASA resources and collaboration. These competitive projects were selected from proposals that affiliate institutions submitted to the annual KYSGC Request for Proposals (RFP). KYSGC also partnered with NASA to support 1 Fall term NASA Center Internship (NCI). KYSGC exceeded its quantitative metric target for number of NIFs direct student awards in GF (target 8 student awards/result 13) and REU (target 7/result 8) and met and exceeded targets for participant diversity in direct awards to female students (target 25.0%/result 31.8%) and in awards to underrepresented minority students (target 13.0%/result 13.6%). KYSGC did not meet its Year 1 target for NCI and KII awards. Due to fewer internship opportunities than expected (related to the COVID pandemic) and interruption in availability of state matching funds until July 2020, NCI and KII awards during the summer of 2020 were supported instead by the 2015-2020 Space Grant project award.

Higher Education and Pre-College Programs (Non-NIFs):

KYSGC awarded support for 6 Team Projects (TP), 4 Research Initiation Awards (RIA), 2 Higher Education Enhanced Mini-Grants (EMG-HE), 2 Pre-College Enhanced Mini-Grants (EMG-PC), and 3 Pre-College Mini-Grants (MG), led by 9 different Kentucky affiliate institutions. These competitive projects were selected from proposals that affiliate institutions submitted to the annual KYSGC RFP. KYSGC met or exceeded its quantitative metric targets for number of Higher Education and Pre-College awards in TP (target 4 awards/result 6), RIA (target 1/result 4), EMG-HE (target 2/result 2), EMG-PC (target 1/result 2), and MG (target 1/result 3) projects. KYSGC met or exceeded its Year 1 institutional diversity targets in TP (target 2 affiliate institutions/result 4) and EMG-HE (target 2/result 2). KYSGC did not meet its target for participant diversity in RIA awards to female faculty (target 25%/result 0%) or underrepresented minority faculty (target 13%/result 0%). Additional effort will be applied to encouraging female and URM faculty to submit RIA proposals to future RFPs.

Consortium Activities & Affiliate Collaboration:

KYSGC Consortium activities in Year 1 included frequent communication with individual affiliate representatives and project leaders, primarily focusing on the annual RFP, sub-project activities, and planning, to meet a goal of integrating interdisciplinary aerospace-related training, research and service objectives among Kentucky's affiliate institutions. The quantitative metric target for this program area of holding 1 annual Consortium meeting has not been met in Year 1, encountering impediments related to the COVID pandemic including the need to meet virtually and having less scheduling availability for affiliate faculty experiencing additional teaching load to deliver both online and in-person class instruction. Alternatively, KYSGC Directors participated (virtually) in the Fall meeting of Kentucky's Statewide EPSCoR Committee in which Consortium objectives of featuring high-quality projects aligned with NASA mission directorates were met with a presentation to VPRs, Deans and Faculty at KYSGC Affiliate Institutions. KYSGC also met its objective of featuring high-quality projects by facilitating a presentation during the Fall 2020 Space Grant Directors Meeting from affiliate project leaders of a KY statewide astronomy research group (KARL) showcasing research opportunities available with the new NSF-funded Vera Rubin / LSST observatory.

ACTIVITY/PROGRAM IMPROVEMENTS MADE IN THE PAST YEAR:

KYSGC contracted with the National Space Grant Foundation (NSGF) to provide internship stipend payments for KY interns. This service will streamline the process of delivering stipend funds to Kentucky's NASA Center Interns (NCI) and Kentucky Industry Interns (KII). Previously, the KYSGC intern stipend payment process required multiple administrative steps within the university financial system to authorize individual payments to each intern, sometimes resulting in the intern experiencing a short payment delay. The new service will reduce administrative effort for KYSGC and will also allow interns to receive their payments via direct deposit instead of by check.

ACTIVITY/PROGRAM PARTNERS AND ROLE OF PARTNERS IN ACTIVITY EXECUTION:

Kentucky Space Grant programmatic funding is allocated via a competitive process in which proposals to Kentucky Space Grant programs are selected through an annual Request for Proposals (RFP) made available to all Consortium affiliate institutions. Proposers must demonstrate NASA Mission Directorate alignment in order to be selected for funding. Policies for alignment vary based on the specific funding programs, with research-focused programs requiring active collaboration with NASA researchers.

Graduate Fellowships (GF) and Research Initiation Awards (RIA) must collaborate with NASA personnel on research objectives, to be detailed in the project's research plan and in a letter of support from a committed NASA collaborator. Research Experience for Undergraduates (REU) awards require proposers to utilize NASA resources, which may include NASA collaborators, facilities or others resources such as datasets, modeling and source code. Collaboration with NASA-funded research institutes and missions are also acceptable. Team Projects (TP), Enhanced Mini-Grants (EMG) and Mini-Grants (MG) all require proposers to describe alignment with specific NASA Mission Directorate objectives in order to be eligible for selection. Upon project completion, each project is required to provide a final report that identifies how the project met programmatic and alignment objectives.

The following tables describe partnerships resulting from KYSGC's Year 1 competitive project awards:

Table 1. NASA Mission Directorate Alignment and Partners for Year 1 KYSGC Competitive Projects

KYSGC Project ID	KYSGC Affiliate	Location	NASA Center Partner or Program	Other Partner or Program	KYSGC Project Title
Aeronautics Research Mission Directorate					
GF-20-055	UK	Lexington, KY	GRC		Electric Aircraft Propulsion Concepts with Axial Flux PM Machines, Integrated Condition Sensing, and HIL Enabled WBG Power Electronic Drives
REU-20-054	UK	Lexington, KY	GRC		Markov Theory based Optimization of Reliable and Highly Efficient All-electric Aircrafts
MG-20-002	AMK	Lexington, KY			Aerospace Motivates Kids: A Context for STEM
TP-20-001	UK-Paducah	Paducah, KY		AIAA Design/Build/Fly	2021 Design/Build/Fly
Aeronautics Research Mission Directorate and Human Exploration Mission Directorate					
RIA-20-038	UK	Lexington, KY	LaRC		Autonomous Multi-UAV System for COVID-19 Body Temperature Monitoring of Crowds
Aeronautics Research Mission Directorate and Space Technology Mission Directorate					
GF-20-056	UofL	Louisville, KY	GRC, LaRC		NASICON-type Composite Solid Electrolytes in Solid-State Li Batteries for Cold Environments
REU-20-037	UK-Paducah	Paducah, KY	ARC		Simulation of Ionic Liquids Confined Between Electrodes Using Coarse-Graining Approach
Human Exploration Mission Directorate					
TP-20-016	UK-Paducah	Paducah, KY	NASA Human Exploration Rover Challenge		Design of Big Blue Rover for NASA Human Exploration Challenge
TP-20-033	UK	Lexington, KY	RMC: Lunabotics		Kentucky Organization of Robotics and Automation (KORA)
TP-20-047	OCTC	Owensboro, KY	NASA Human Exploration Rover Challenge		OCTC NASA Human Exploration Rover Teams
MG-20-036	WKCTC	Paducah, KY		Challenger Center for Space Science Education	NASA and STEM: Virtual Reality
Human Exploration Mission Directorate and Space Technology Mission Directorate					
RIA-20-003	UofL	Louisville, KY	GRC		Multi-Scale Optimization of Damping Composite Structures for Additive Manufacturing
Science Mission Directorate					
GF-20-006	UK	Lexington, KY	JPL		Predicting the Structure and Stability of Thermoelectric Composite Interfaces in Deep-Space using In Situ Microscopy
GF-20-010	UK	Lexington, KY	GSFC		Research Leading to Forecasting of Sinkholes using Satellite Data

GF-20-022	UofL	Louisville, KY	ARC		Seasonal Dependence of Froude and Mach numbers in the OpenMARS Reanalysis
GF-20-042	UK	Lexington, KY	GSFC/WFF		Performance of Real-Time Kinematic Global Navigation Satellite System Receivers on Unmanned Aircraft Systems for Precision Meteorology
GF-20-053	MuST	Murray, KY	GSFC		AMERICAN CHESTNUT RESTORATION ON PUBLIC LANDS: A REMOTE SENSING APPROACH
RIA-20-049	UofL	Louisville, KY	JPL	EKU, MuST, UK, WKU	High-Resolution Laser Spectroscopy of Trace Gases in the Lower Atmosphere of Venus in Support of NASA's Exploration Missions
REU-20-040	UofL	Louisville, KY			Machine Learning Search for the Earliest Galaxies
REU-20-043	UofL	Louisville, KY			How to teach a machine to find cosmic smileys
REU-20-044	UofL	Louisville, KY			The Full Size of the Milky Way using the Smallest Stars
EMG-20-018	UofL	Louisville, KY			Galaxy Populations Identified by Machine Learning
EMG-20-026	LASC	Lexington, KY			Advancing STEAM Engagement
EMG-20-035	MuST	Murray, KY			Mapping invasive plant species in Kentucky using LiDAR, UAS and satellite imagery, and GIS
EMG-20-057	KSC	Louisville, KY		Challenger Center for Space Science Education	Kentucky Science Center Challenger Learning Center Immersion Program
MG-20-027	LASC	Lexington, KY			Mission Discovery: Expanding Learning Opportunities in Earth and Space Sciences
Science Mission Directorate and Space Technology Mission Directorate					
GF-20-028	UK	Lexington, KY	JSC		Formation of Single Metal Atoms Coordinated with Four Nitrogen Atoms in Carbon Nano-Onions for Efficient and Selective CO2 Conversion into Fuels
Space Technology Mission Directorate					
GF-20-009	UK	Lexington, KY	ARC, LaRC		Spallation Particle Characterization for Ablative Thermal Protection Systems
GF-20-012	UK	Lexington, KY	JSC		Development of an artificial neural network to transfer microstructural information of thermal protection systems (TPS) into vehicle-scale simulations
GF-20-013	UK	Lexington, KY	ARC		Development of a Novel Computational Framework to Investigate Thermochemistry of Melt Flow in Aerothermal Entry Physics
GF-20-032	UK-Paducah	Paducah, KY	LaRC		Isolating Modal Contributions to Thermal Conductivity in Porous Insulation Materials

GF-20-051	UK	Lexington, KY	ARC		Connecting stochastically computed effective properties to experimentally measured mechanical behavior of fibrous TPS materials
REU-20-025	UofL	Louisville, KY	NASA REDDI, NASA Flight Opportunities	Zero-G	Evaluation of a Dual Chamber Bag System for Rehydration of Dried Blood under Reduced Gravity
REU-20-031	UK-Paducah	Paducah, KY	LaRC		Control System Development for Space Environment Simulation Chamber
REU-20-045	UK	Lexington, KY	ARC		Contact overlap effects on thermal and mechanical properties of fibrous TPS materials
RIA-20-048	UofL	Louisville, KY	JPL		Barocaloric Materials for Solid-State Cooling at Cryogenic Temperatures
TP-20-041	UK	Lexington, KY	NASA EPSCoR, NASA Flight Opportunities		Kentucky Re-entry Universal Payload System: Enhancing instrumentation Suite
TP-20-029	MuST	Murray, KY		IEEE Southeast Con	Autonomous Pac-Man Robot

Table 2. KYSGC Year 1 Projects with NASA Center Partners or NASA Programs

KYSGC Project ID	KYSGC Affiliate	KYSGC Project Title
Ames Research Center		
GF-20-013	UK	Development of a Novel Computational Framework to Investigate Thermochemistry of Melt Flow in Aerothermal Entry Physics
GF-20-022	UofL	Seasonal Dependence of Froude and Mach numbers in the OpenMARS Reanalysis
GF-20-051	UK	Connecting stochastically computed effective properties to experimentally measured mechanical behavior of fibrous TPS materials
REU-20-037	UK-Paducah	Simulation of Ionic Liquids Confined Between Electrodes Using Coarse-Graining Approach
REU-20-045	UK	Contact overlap effects on thermal and mechanical properties of fibrous TPS materials
Ames Research Center and Langley Research Center		
GF-20-009	UK	Spallation Particle Characterization for Ablative Thermal Protection Systems
Glenn Research Center		
GF-20-055	UK	Electric Aircraft Propulsion Concepts with Axial Flux PM Machines, Integrated Condition Sensing, and HIL Enabled WBG Power Electronic Drives
REU-20-054	UK	Markov Theory based Optimization of Reliable and Highly Efficient All-electric Aircrafts
RIA-20-003	UofL	Multi-Scale Optimization of Damping Composite Structures for Additive Manufacturing
Glenn Research Center and Langley Research Center		
GF-20-056	UofL	NASICON-type Composite Solid Electrolytes in Solid-State Li Batteries for Cold Environments
Goddard Space Flight Center		
GF-20-010	UK	Research Leading to Forecasting of Sinkholes using Satellite Data
GF-20-053	MuST	AMERICAN CHESTNUT RESTORATION ON PUBLIC LANDS: A REMOTE SENSING APPROACH
GF-20-042	UK	Performance of Real-Time Kinematic Global Navigation Satellite System Receivers on Unmanned Aircraft Systems for Precision Meteorology

Jet Propulsion Laboratory		
GF-20-006	UK	Predicting the Structure and Stability of Thermoelectric Composite Interfaces in Deep-Space using In Situ Microscopy
RIA-20-048	UofL	Barocaloric Materials for Solid-State Cooling at Cryogenic Temperatures
RIA-20-049	UofL	High-Resolution Laser Spectroscopy of Trace Gases in the Lower Atmosphere of Venus in Support of NASA's Exploration Missions
Johnson Space Center		
GF-20-012	UK	Development of an artificial neural network to transfer microstructural information of thermal protection systems (TPS) into vehicle-scale simulations
GF-20-028	UK	Formation of Single Metal Atoms Coordinated with Four Nitrogen Atoms in Carbon Nano-Onions for Efficient and Selective CO2 Conversion into Fuels
Langley Research Center		
GF-20-032	UK-Paducah	Isolating Modal Contributions to Thermal Conductivity in Porous Insulation Materials
REU-20-031	UK-Paducah	Control System Development for Space Environment Simulation Chamber
RIA-20-038	UK	Autonomous Multi-UAV System for COVID-19 Body Temperature Monitoring of Crowds
NASA EPSCoR and NASA Flight Opportunities		
TP-20-041	UK	Kentucky Re-entry Universal Payload System: Enhancing instrumentation Suite
NASA REDDI and NASA Flight Opportunities		
REU-20-025	UofL	Evaluation of a Dual Chamber Bag System for Rehydration of Dried Blood under Reduced Gravity
NASA Human Exploration Rover Challenge		
TP-20-016	UK-Paducah	Design of Big Blue Rover for NASA Human Exploration Challenge
TP-20-047	OCTC	OCTC NASA Human Exploration Rover Teams
NASA RMC: Lunabotics		
TP-20-033	UK	Kentucky Organization of Robotics and Automation (KORA)

Key:

KYSGC Affiliate Institutions Partnering on Year 1 Projects:

AMK	Aviation Museum of Kentucky	Lexington, KY
EKU	Eastern Kentucky University	Richmond, KY
KSC	Kentucky Science Center	Louisville, KY
LASC	Living Arts and Science Center	Lexington, KY
MuST	Murray State University	Murray, KY
OCTC	Owensboro Community and Technical College	Owensboro, KY
UK	University of Kentucky	Lexington, KY
UK-Paducah	University of Kentucky, Paducah Engineering Campus	Paducah, KY
UofL	University of Louisville	Louisville, KY
WKCTC	West Kentucky Community and Technical College	Paducah, KY
WKU	Western Kentucky University	Bowling Green, KY

KYSGC Year 1 Programs:

GF	Graduate Fellowship
REU	Research Experience for Undergraduates
RIA	Research Initiation Award
TP	Team Project
EMG	Enhanced Mini-Grant
MG	Mini-Grant

CURRENT AND PROJECTED CHALLENGES:

Impact of the 2020 COVID Pandemic on Project Activities:

Various COVID-related impacts have affected project activities during Year 1 of the 2020-2024 Space Grant award: 1) Significant among these are additional administrative requirements associated with COVID restrictions, such as safety measures, response tracking, and remote/virtual work and communications. Milestones related to the 2020 Year 1 competitive projects RFP process and subawards were delayed by 1-3 months and travel funds were not utilized from March – September 2020; 2) Fewer Summer 2020 internship opportunities were available for KYSGC students than expected, both with NASA Centers and in-state, due to the difficulty of logistics conducting internships during the COVID pandemic; 3) Some sub-project PIs have had to delay substantial project activities until January 2021 for various reasons, including a shortage of teaching assistants in their departments, which caused research assistants assigned to KYSGC projects to be re-assigned as department teaching assistants. Projects that are based on outreach and science center activities are shifting work from in-person educational activities to develop virtual programming and online content delivery. This in turn will cause a delay in outcomes for these projects as project personnel must focus more time on preparing their content for virtual delivery.

Sub-Project Expenditures:

KYSGC manages dozens of competitive projects ("sub-projects") under the 2020-2024 Space Grant award (currently 38) and all Year 1 project funds have been allocated and committed, each with a 1-year period of performance. Affiliates may invoice KYSGC monthly and expend these funds anytime within their 1-year award, based on cost reimbursement of any documented project activities that have taken place. A delay factor thus results for KYSGC to draw-down funds from NASA. KYSGC has developed processes to mitigate draw-down delay of NASA funds by: 1) Limiting sub-projects to an initial 1-year period of performance; 2) Expediting payment processing of sub-project invoices; 3) Communicating with projects on when they will use their funding; and 4) Monitoring the prime draw-down and comparing the draw-down amount with allocated and committed amounts.