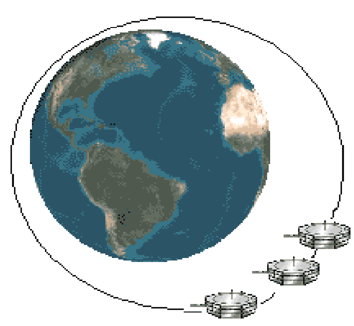
Space Technology 5
News Media Kit



February 22, 2006

Erica Hupp
Headquarters, Washington
(Phone: 202/358-1237)
(cell- 240-671-6565)

Lynn Chandler
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/286-2806)
(cell: 301/787-9044)

February 22, 2006

RELEASE: 06-

NEW NASA SATELLITES PAVING THE WAY FOR FUTURE MICRO-SATELLITES

Have you ever noticed how things keep getting smaller and smaller? NASA's new micro-satellite mission is out to prove that big science and engineering results can come in a smaller package too.

NASA's Space Technology 5 (ST5) mission, scheduled to launch from Vandenberg Air Force Base, Calif, aboard a Pegasus XL rocket on March 11 is a technology development and validation mission.

"The ST5 team has worked hard and long hours to get the three spacecraft to these final stages of launch site processing and we are all looking forward to a successful launch." said Art Azarbarzin, ST5 Project Manager.

Miniaturized components and technologies are being integrated into each of the ST5 micro-satellites. Each micro-satellite weighs, about the size of a 13 inch television, are approximately 25 kilograms (55 pounds) when fully fueled and are 53 centimeters (20.7 inches) wide and 48 centimeters (18.7 inches) high. The three ST5 satellites will be launched using a Pegasus XL rocket and spun into a near-Earth polar elliptical orbit that will take them anywhere from 300 kilometers (190 miles) to 4,500 kilometers (2,800 miles) from Earth.

"The future of space science is dependent upon the continual development of new and ever more powerful space-borne technologies," said Jim Slavin, ST5 Project Scientist. "The lessons learned from the development and flight of ST5's three full-service micro-spacecraft constitute a major step toward the use of 'constellations' or 'swarms' of small spacecraft to accomplish science that cannot be done with a single spacecraft, no matter how capable," he said.

Although small in size compared to their counterparts, each of the spacecraft is considered "full service," meaning they contain power, propulsion, communications, guidance, navigation and control functions found in spacecraft that are much larger.

Another unique feature as a result of the miniaturized size and reduced weight is the ability to launch multiple micro-satellites from a low-cost Pegasus XL rocket. The ST5 Project designed, fabricated and tested a new innovative Pegasus launch rack that supports the three micro-satellites in a “stacked” configuration. By utilizing this type of design, each micro-satellite will be individually deployed in a spinning (Frisbee-like) motion.

Once in orbit, the micro-satellites will be placed in a “string of pearls” about 40-140 km (about 25-90 miles) apart from each other to perform coordinated multi-point measurements of the Earth's magnetic field using a highly sensitive miniaturized magnetometer built by University of California, Los Angeles. This type of measurement is useful for future missions that will study the effect of solar activity on the Earth’s magnetosphere, the magnetic “bubble” that surrounds our planet and helps protect it from harmful space radiation.

“We will also be demonstrating automated operations techniques that will be useful to larger constellations of spacecraft in the future,” said Candace Carlisle, ST5 Deputy Project Manager.

The Cold Gas Micro-Thruster (CGMT), built by Marotta Scientific Controls of Montville, N.J., will provide propulsion for orbit maintenance. The X-Band Transponder Communication System, built by Aero Astro of Chantilly, Va., will support two-way communications between the ST5 micro-satellites and the ground stations. Johns Hopkins University, Applied Physics Laboratory of Laurel, Md., along with Sensortex, Kennett Square, Pa., and SANDIA National Labs, Albuquerque, NM., built the Variable Emittance Coatings for Thermal Control, which will test the ability to configure the thermal characteristics of a radiator surface on the micro sat. The University of Idaho, Center for Advanced Microelectronics and Bimolecular Research in Post Falls, Idaho, provided the Complementary Metal Oxide Semiconductor (CMOS) Ultra-Low Power Radiation Tolerant (CULPRiT) Logic, which provides a low-power (operating at 0.5 V) digital-logic test circuit that will help reduce power requirements for future satellites.

The ST5 Project is an instrumental part of the New Millennium Program. The New Millennium Program was created by NASA to develop and test critical and revolutionary technologies needed to enable future endeavors in space. Each flight acts as a “test track” for its suite of technologies, mission objectives, operations concepts, and scientific goals. New Millennium is managed for NASA by the Jet Propulsion Laboratory in Pasadena, Calif.

For more information on ST5:

http://www.nasa.gov/st5

-end-

Media Services Information

NASA Television Transmission

NASA TV is carried on the Web and on an MPEG-2 digital signal accessed via satellite AMC-6, at 72 degrees west longitude, transponder 17C, 4040 MHz, vertical polarization. It's available in Alaska and Hawaii on AMC-7, at 137 degrees west longitude, transponder 18C, at 4060 MHz, horizontal polarization. A Digital Video Broadcast compliant Integrated Receiver Decoder is required for reception. For NASA TV information and schedules on the Web, visit: **www.nasa.gov/ntv**

Audio

Audio only will be available on the V circuits that may be reached by dialing 321-867-1220, -1240, -1260, -7135, -4003, or -4920.

Webcasting

A live web cast of this mission will be available at http://www.ksc.nasa.gov

Briefings

A L-14 media telecon will be held on Thursday, February 16 at 1 p.m. EST. Participants for this briefing will be:

--Candace Carlisle, ST5 Deputy Project Manager, Goddard Space Flight Center, Greenbelt, Md.
--Dr. Jim Slavin, ST5 Project Scientist, Goddard Space Flight Center, Greenbelt, Md.
--Dr. Chris Stevens, New Millennium Program Manager, Jet Propulsion Laboratory, Pasadena, Calif.

Additional information on this briefing will be sent out in a separate Media Advisory.

The prelaunch news conference will be held in the main conference room of the NASA Vandenberg Resident Office, Building 840, Vandenberg Air Force Base, Calif. Additional information will be sent in a Media Advisory.

Launch Media Credentials

U.S. news media desiring accreditation for the launch of should fax their request on news organization letterhead to:

NASA Vandenberg Resident Office
Vandenberg Air Force Base, CA
Attention: Bruce Buckingham
FAX: (805) 605-3380

Foreign news media desiring accreditation should fax their **request at least 10 days prior** to launch to:

30th Space Wing Public Affairs Office
Vandenberg Air Force Base, CA
Attention: Staff Sgt.
FAX: (805) 606-8303

For further information on launch accreditation call the Kennedy Space Center News Center at (321) 867-2468. Beginning March 9, media may call the NASA News Center at Vandenberg Air Force Base 805/605-3051.

News Center/Status Reports
The News Center at the NASA Vandenberg Resident Office will open (L-2) and may be reached at (805) 605-3051. Recorded status reports will be available beginning L-2 at (805) 734-2693.

Internet Information
More information on the mission, including an electronic copy of this press kit, press releases, fact sheets, status reports and images, can be found at:

http://www.nasa.gov/st5

Quick Facts

Pegasus/L-1011 Take-off Date/Time-March 11, 2006/5:02 a.m. PST

Mass:
25 kg (55 lbs)

Spacecraft Dimensions:
53 centimeters (20.7 inches) wide x 48 centimeters (18.7 inches) high

Power:
~20-25W at 9-10V, ~7~9 Ah Battery

Orbit:
Lowest orbital altitude 300 km (190 miles)
Highest orbital altitude 4500 km (2,800 miles)

Complete Orbit:
136 minutes

Mission Lifetime:
90 days

Technology Demonstrations:
Cold Gas Micro-Thruster (CGMT)
X-Band Transponder
Variable Emittance Coatings for Thermal Control
Complementary Metal Oxide Semiconductor (CMOS) Ultra-Low Power Radiation Tolerant (CULPRiT) Logic
Software tools for autonomous ground operations

Major Contractors/Contributors:
Goddard Space Flight Center, Greenbelt, Md.
Jet Propulsion Laboratory, Pasadena, Calif.
Ames Research Center, Moffett Field, Calif.
University of California at Los Angeles
Kennedy Space Center, Fla.
University of New Mexico, N.M.
Marotta Scientific Controls, Montville, N.J.
Aero Astro, Chantilly, Va.
Johns Hopkins University, Applied Physics Laboratory, Laurel, Md.
University of Idaho, Post Falls, Idaho

Launch Site:
Vandenberg Air Force Base, Calif.

Launch Vehicle:
Orbital Sciences Corporation Pegasus XL, Chantilly, Va.

Launch Date and Time: March 11, 2006

5:02 a.m. PST – take off of L-1011
Drop of Pegasus from L1011 – 5:57 a.m. PST (1st opportunity of 82-minute launch window)
Third stage burn out is 6 min. 11 sec after drop of Pegasus
Deployment of
Forward spacecraft – 3 min 20 second after third stage burn
Mid spacecraft – 3 minutes 10 sec after forward
Aft spacecraft – 3 minutes 10 seconds after mid

Cost:
~$130 Million including launch vehicle and operations

Spacecraft Builder/Integrator:
Goddard Space Flight Center, Greenbelt, Ma.

Launch Vehicle/Operations:
NASA's Kennedy Space Center, Fla.

Mission Management:
Goddard Space Flight Center, Greenbelt, Ma.

Mission Overview

NASA's new micro-satellite mission is out to prove that big science and engineering results can come in smaller packages.

Space Technology 5 (ST5) is a technology development and validation mission at Goddard Space Flight Center (GSFC) in Greenbelt, Md. Three micro-satellites will launch from Vandenberg Air Force Base, Calif. aboard a Pegasus XL rocket. Each satellite will test and validate new technologies for future science missions with the hope of paving the way for flying anywhere from ten to hundreds of micro-satellites in the future.

Although small in size compared to other satellites, each of the spacecraft are considered “full service,” meaning they contain power, propulsion, communications, guidance, navigation, and control functions found in spacecraft that are typically much larger in size. Miniaturized components and technologies have been integrated into each of the micro-satellites in order to achieve a low-weight of approximately 25 kilograms (55 pounds) when fully fueled. Each of the micro-satellites resembles a large octagon measuring approximately 50 centimeters (20.7 inches) across and 48 centimeters (18.7 inches) high. To maintain constant power, there are solar panels on each face. Thanks to their size and weight, all three spacecraft can be launched on a single small launch vehicle. The micro-satellites will launch one at a time, in a Frisbee-like spinning motion, from a specially designed launch rack. Once in orbit, the micro-satellites will be placed in a row about 40-140 km (about 25-90 miles) apart from each other to perform coordinated multi-point measurements of the Earth's magnetic field using a highly sensitive miniaturized magnetometer. Their elliptical orbit takes them anywhere from 300 kilometers (190 miles) to 4,500 kilometers (2,800 miles) from Earth.

Technology Mission Objectives

The mission is slated to last 90 days and will validate the following mission objectives:

Technology Development: Operating a constellation of micro-satellites within the Earth's magnetosphere.

Technology Validation: Test each micro-satellite and demonstrates its ability to support high-quality measurements of Earth’s magnetic field.

Technology Infusion: Pave the way for future micro-satellite missions.

Science Applications

ST5’s primary focus is to flight test its miniaturized satellites and innovative technologies in the harsh environment of Earth's magnetosphere, and to demonstrate the ability of these miniaturized satellites to perform research-quality science. The satellites are able to map the intensity and direction of magnetic fields within the inner magnetosphere. If these measurements are collected, it will allow scientist to directly infer the presence of electrical currents carried by energetic charged particles. Studying this region may help us understand the space weather that disrupts our communication, navigation and power systems. For, while the magnetosphere acts as Earth's "suit of armor," deflecting most of the charged particles blasting out from the Sun, some do get through. These particles cause geomagnetic storms that can cause widespread power blackouts and damage satellites, sometimes permanently. They are also potentially harmful to any astronauts on duty in orbit.

Currently scientists do not know enough about solar activity to accurately forecast space weather and thereby minimize its harmful effects on space and ground based systems. We know that solar flares (explosions on the sun's surface) and coronal mass ejections (ejected gas bubbles) project the sun's plasma outward. We know that the solar wind carries this plasma through interplanetary space, where it eventually reaches Earth's "protective shield," the inner magnetosphere. We know that this "shield" deflects much of the solar wind plasma and solar energetic particles emanating from the sun.

However, "radiation belts" still surround the Earth at altitudes of ~ 3,000 to 30,000 kilometers (1,864 to 18,641 miles) and present a hazard to satellites, like ST5's, orbiting at these distances. And, some of the mass and energy carried by solar wind *does* get through.

The advanced technologies being flight validated on ST5 will enable the success of future micro-satellite or nanosat missions, such as the proposed **Magnetospheric Constellation**. Such missions will provide global coverage of the magnetosphere as it reacts to major events on the Sun and during geomagnetic storms and substorms. The result will be a better understanding of the Earth's magnetosphere and a great improvement in our operational response to these events.

New Millennium Program (NMP)

The ST5 Project is an instrumental part of New Millennium Program (NMP). NMP was created to develop and test critical and revolutionary technologies needed to enable future endeavors in space. Each flight acts as a “test track” for its suite of technologies, mission objectives, operations concepts, and scientific goals. NMP is managed for NASA by the Jet Propulsion Laboratory (JPL) of the California Institute of Technology, Pasadena, Calif.

While an emerging technology may seem promising and likely to provide the technical capabilities NASA requires, it may also present an unacceptable risk to any exploration mission using it for the first time in space. The goal of NMP is to reduce the risks to, as well as the costs of future NASA space science missions.

To meet its goals, the NMP identifies and selects leading-edge technologies that will increase the capability of future Science Mission Directorate missions. Once selected, these untried technologies are demonstrated on NMP in-space validation missions.

Ion propulsion, for instance, is a technology that was in the development stage for several decades. It was considered too risky to use, but promised a revolution in space propulsion if it did work. So, in 1998 NMP conducted its first technology validation mission -- Deep Space 1 (DS1), with a xenon ion drive engine and several other advanced, high-risk technologies:

* solar electric propulsion
* autonomous optical navigation
* beacon monitor operations
* solar concentrator array
* telecommunications devices
* microelectronics and spacecraft structure
* autonomous operations systems
* miniature camera and imaging spectrometer
* miniature ion and electron spectrometer

Following its launch, three of DS1's technologies had to work within a few minutes of when the spacecraft separated from the rocket that took it into space. Unlike most interplanetary missions, which have many months of coasting with minimal activity before reaching their destinations, DS1 immediately began a very intensive period of demanding experiments to characterize the 12 technologies on board.

While the primary focus of NMP's projects is to test advanced instruments, spacecraft systems and subsystems, and mission concepts in spaceflight, they may also return science data as a byproduct of their testing. DS1 is a good example. After the testing period, a bonus mission was conducted during which the revolutionary xenon ion engine propelled the DS1 spacecraft through space to a successful encounter with Comet Borrelly -- returning the best images and other science data ever from a comet!

Through NMP, advanced technologies are developed at a lower cost and in less time than has been done in the past. The program's space-flight validation advances the readiness levels of these emerging technologies, so that they may be applied to operational science missions sooner. In this way, scientific information through space exploration is gained sooner.

Mission Themes & Objectives

The focus of ST5 is to build, test and operate three small 25-kilogram technology demonstration spacecraft. Using ST5, NASA will validate new technologies for future science missions, and demonstrate the benefits of a group or "constellation" of small low-cost spacecraft taking scientific measurements at the same time at different locations.

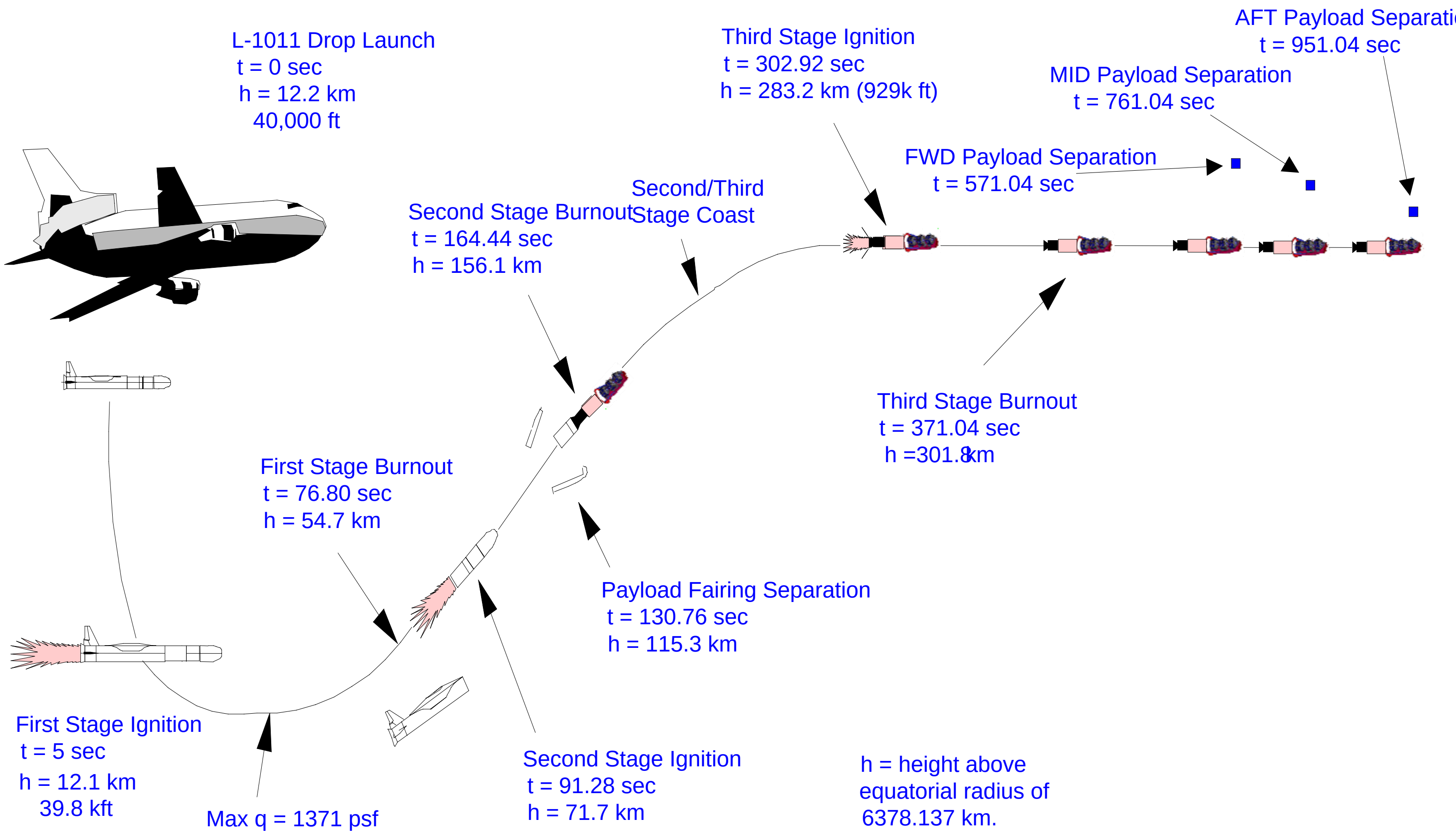
The mission is slated to last 90 days and will validate the following mission objectives:

Technology Development: Operating a constellation of micro-satellites within the Earth's magnetosphere.

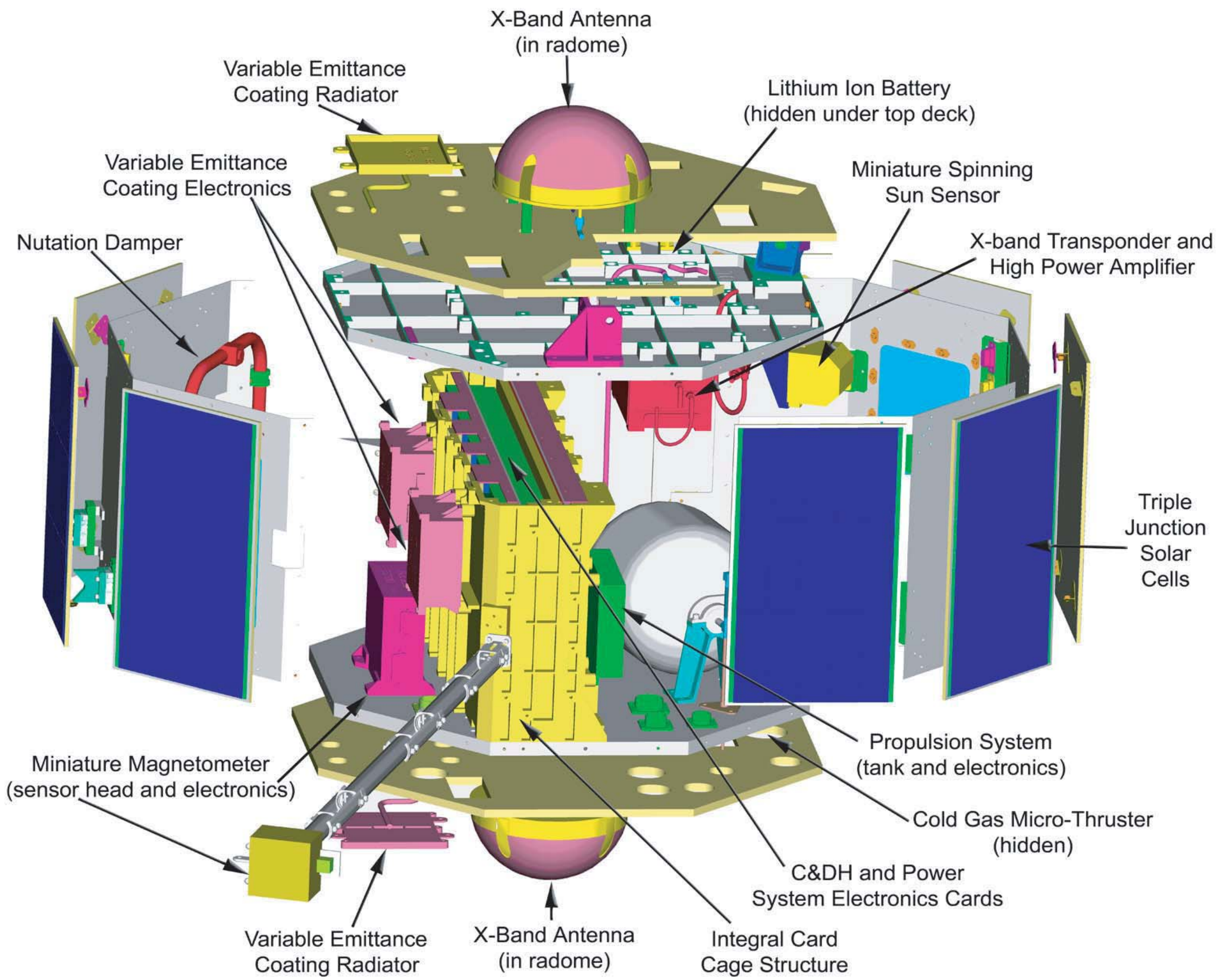
Technology Validation: Test each micro-satellite and demonstrate its ability to support high-quality measurements of Earth’s magnetic field.

Technology Infusion: Pave the way for future micro-satellite missions.

ST-5 Flight Profile



Spacecraft Configuration



BIOGRAPHIES

Art Azarbarzin
Space Technology 5, Project Manager

Prior to Mr. Azarbarzin's reassignment to the Project Management position, he was the Associate Chief for the Electrical Engineering Division, at GSFC from 2000 â€“ 2005. He managed over 280 employees in eight different Branches and directed several in-house projects. Mr. Azarbarzin held the position of the Deputy Program Manager for Polar Operational Environmental Satellites (POES) program at GSFC from 1998-2000, leading to the successful launch campaign of the NOAA-K weather satellite from VAFB. Mr. Azarbarzin held the Observatory Manager position for the Landsat 7 Project (GSFC) from 1995-1998, launched aboard Delta II from VAFB. He was also the Observatory Manager for the TOMS-EP (Total Ozone Mapping Spectrometer), GSFC, 1991-1995, leading NASA’s first launch campaign for the Pegasus XL at VAFB. Mr. Azarbarzin held the positions of Electrical Systems and I&T Managers for the TOPEX/Poseidon Mission at Fairchild Space Co.(now OSC) 1988-1991. He was the Design Lead/Project Lead, for the A6 Aircraft Engine Retrofit Start system at Sundstrand Aviation, 1986-1988. Mr. Azarbarzin also held positions of Systems Engineer for C-130 Aircraft High Technology Test Bed Program (Electro-mechanical Flaps, Aileron, & Rudder actuation retrofit program) Sundstrand Aviation (now Hamilton Standard), 1984-1986 and the Designer/Project Engineer, Cessna Jet Electro-mechanical Flap Actuation System, Sundstrand Aviation (now Hamilton Standard), 1980-1984.

Education
B.S., Electrical Engineering, University of Illinois, Champaign, Ill, 1978
M.S., Aeronautical & Astronautical Engineering, University of Illinois, Champaign, Ill, 1981

Candace Carlisle
Space Technology 5, Deputy Project Manager

Candace Carlisle is the Deputy Project Manager at NASA's Goddard Space Flight Center. Prior to , she worked in System Engineering roles on the Earth Observing Data and Information System and the Network Control Center for the Tracking and Data Relay Satellite System. She has a BS in Computer Science and Physics from the College of William and Mary, and MS degrees in Computer Science and Technical Management from the Johns Hopkins University.

Dr. James Slavin
Space Technology 5, Project Scientist

Dr. James Slavin has worked at the Caltech Jet Propulsion Laboratory (1982-6), NASA Headquarters (1986-7) and NASA GSFC (1987 â€“ present). He is the author or co-author of over 250 scientific articles on Sun-Solar System Connection Physics. He has served as P.I., Co-I, Participating Scientist, GI or Team Member for 19 magnetic field investigations including the on-going Cluster, WIND and MESSENGER and the recently selected Magnetospheric MultiScale and BepiColombo missions. Dr. Slavin has also been Project Scientist, Acting Project Scientist, Deputy Project Scientist, or Study Scientist for 5 NASA missions including Space Technology 5 micro-satellite pathfinder mission that is scheduled to launch February 28, 2006. He is presently also the Senior Project Scientist for the Solar Terrestrial Probes Program. Dr. Slavin has served in a number of supervisory positions including Chief of the Laboratory for Solar and Space Physics (present), Acting Associate Chief of the Laboratory for Extraterrestrial Physics (2004), and Head of the Electrodynamics Branch (1990-2004). Dr. Slavin is a recipient of the NASA Medal for Exceptional Achievement and he was recently named a University of California Regents Lecturer for 2005-2006.

Dr. Chris Stevens
New Millennium Program Manager

Dr. Christopher M. Stevens is currently the Manager for the NASA New Millennium Program (NMP) at the Jet Propulsion Laboratory (JPL). The objective of NMP is to accelerate the infusion of revolutionary technologies into NASA science missions by validating them in space in order provide new and lower cost capabilities for Earth and space science missions and reduce the risks to the first users. Prior to this assignment, he was Manager of the Space Instruments Implementation Section at JPL. For the last 20 years, he has been involved in technology development and the development of remote sensing instruments for planetary exploration, astrophysics and Earth science missions. Dr. Stevens received his Ph.D. from the University of Southern California.

ST5 Mission Participants/Key Personnel

ST5 Program Executive, Ray Taylor, NASA HQs
Raynor.L.Taylor@nasa.gov
(202) 358-0766

NMP Program Manager, Chris Stevens, JPL
Christopher.M.Stevens@jpl.nasa.gov
(818) 354-5545

ST5 Project Manager, Art Azarbarzin, Goddard Space Flight Center
Art.Azarbarzin@nasa.gov
(301) 286-1501

ST5 Project Scientist, Jim Slavin, Goddard Space Flight Center
James.A.Slavin@nasa.gov
(301) 286-5839

ST5 Deputy Project Manager, Candace Carlisle, Goddard Space Flight Center
Candace.Carlisle@nasa.gov
(301) 286-3427

ST5 Public Affairs Contacts:
Erica Hupp, NASA HQs
erica.hupp-1@nasa.gov
(202) 358-1237

Lynn Chandler, NASA Goddard
Lynn.chandler-1@nasa.gov
(301) 286-2806

Rachel Weintraub, NASA Goddard
Rachel.A.Weintraub@nasa.gov
(301) 286-0918

Natalie Godwin, NASA JPL
Natalie.Godwin@jpl.nasa.gov
(818) 354-0850

George Diller, NASA KSC
george.h.diller@nasa.gov
(321) 867-7643