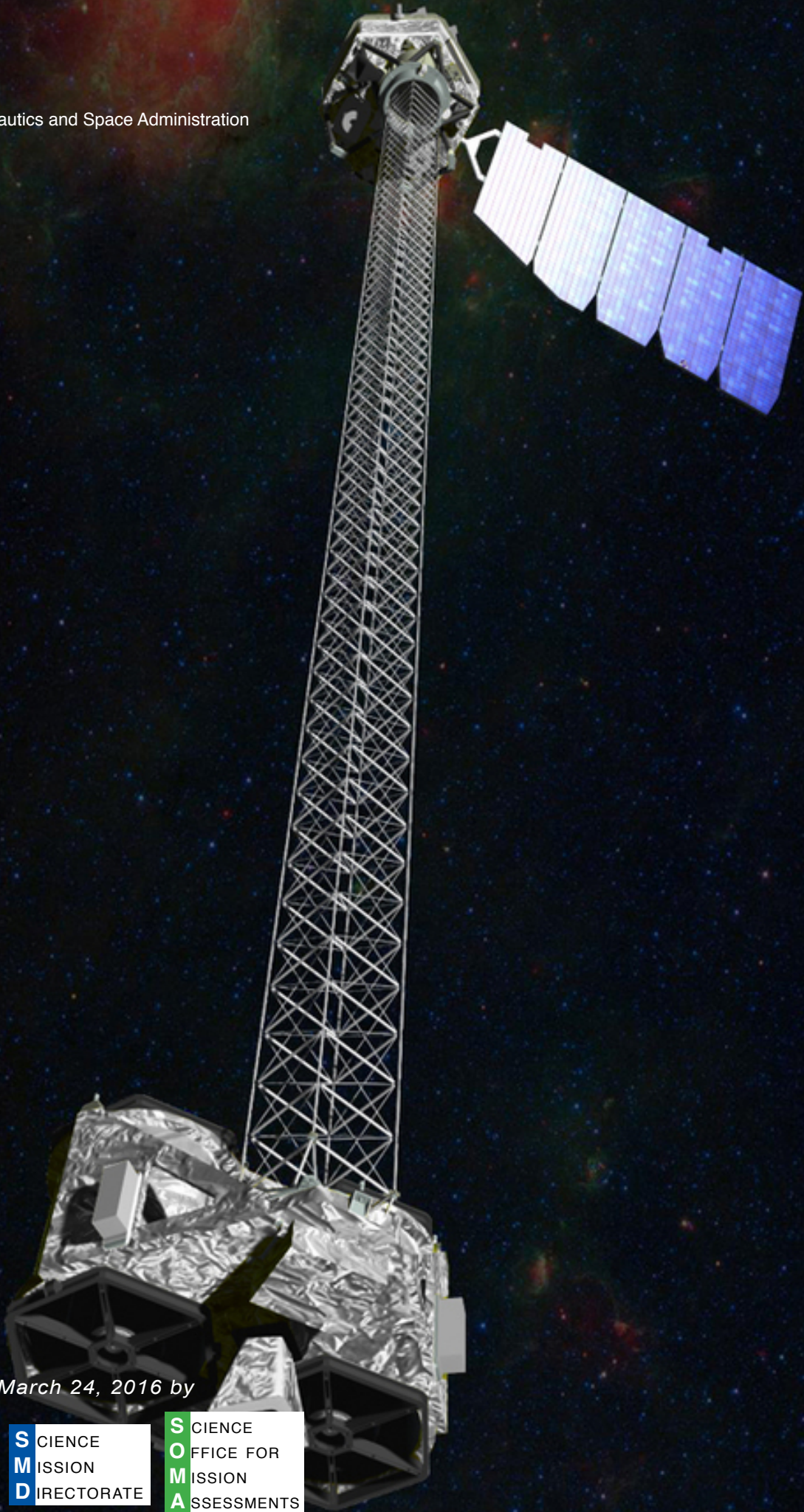


National Aeronautics and Space Administration



# PI-Team Masters Forum 6

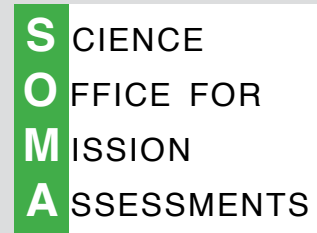
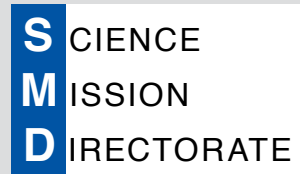
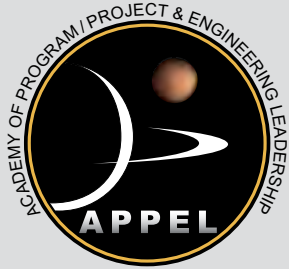
Presented March 24, 2016 by



**S** SCIENCE  
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**A** SSESSMENTS

*The NASA Academy of Program/Project and Engineering Leadership's Knowledge Sharing initiative,  
in partnership with NASA's Science Mission Directorate and NASA's Science Office for Mission Assessments, presents*



# PI-Team Masters Forum 6

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*March 24, 2016*

Academy Center for Excellence OSB II | Room 5109  
Kennedy Space Center, Florida 32899  
Phone: 321-861-1572

**W**elcome to the **Principal Investigator (PI)–Team Masters Forum 6**, a collaboration between NASA’s Science Mission Directorate (SMD), Science Office of Mission Assessments (SOMA), and Academy of Program/Project and Engineering Leadership (APPEL). This is the fifth of our PI Team knowledge-sharing events, which are held following major science mission announcement of opportunity (AO) Phase A selections as established by SMD Policy Directive 13B (SPD-13B). The purpose of this Forum is to enable you to engage, share with, and learn from colleagues in relevant science missions through their stories, shared experiences, and lessons learned as a means to enhance the probability of executing a mission successfully.

Your participation in this Forum is in recognition of your selection in the Explorer 2014 Announcement of Opportunity process, and we wish to congratulate your team on these outstanding accomplishments. The Forum reflects the importance that NASA places on providing a context for knowledge that can contribute to a successful mission. We are delighted to have you participate

Among the many benefits of your participation, this Forum is meant to help you gain an understanding of program/project management, systems engineering, and science mission design best practices and lessons learned; to cultivate reflective practitioners within your team; and to help solidify cross-organizational relationships in support of your project.

In addition to thought-provoking presentations and dynamic group discussions, the Forum offers you the chance to build relationships with peers and meet face to face with key leaders in this community. Former Forum participants have stated that the opportunity to network with colleagues from across NASA, other government agencies, universities, and private industry is one of the Forum’s most valuable features.

We hope that this Forum will provide you with an enhanced perspective and be useful in helping you conduct your studies, investigations, and missions.

Sincerely,

Greg Robinson, SMD Deputy Associate Administrator for Programs

Cindy Daniels, SOMA Director

Roger Forsgren, APPEL Director

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# Agenda

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**PI Masters Forum #6 – Agenda**  
**March 24, 2016**  
**Academy Center of Excellence, KSC**

	Session Title	Time	Speaker / Panelists
A S T R O - E X P L O R E R	<b>Formal Welcome &amp; Opening Remarks</b> <ul style="list-style-type: none"> <li>- Charge to Participants, Agenda Review</li> <li>- Attendee Introductions, PIs introduce teams</li> </ul>	9:00-9:20	<i>Ed Weiler, Moderator</i>
	<b>SMD Introduction/Overview</b> <ul style="list-style-type: none"> <li>- How Astro EX Program fits within SMD mission set</li> </ul>	9:20-9:35	<i>Geoff Yoder, SMD DAA</i>
	<b>SMD Management of PI-Led Missions: Guidance and Expectations (PANEL)</b> <ul style="list-style-type: none"> <li>- Introduction of Panelists (5 min)</li> <li>- Working within NASA Policy and Directives (15 min)</li> <li>- Guidance and Expectations of the Astrophysics Div. (15 min)</li> <li>- NASA HQ SMD Role (15 min)</li> <li>- Discussion / Q&amp;A (20 min)</li> </ul>	9:35-10:45	<i>Panel Host: Ed Weiler Greg Robinson / DAA Programs Paul Hertz / Astrophysics Div.Dir. Wilt Sanders / PS Jeanne Davis/ PE</i>
	Break	10:45-11:00	
	<b>Lessons from Previous Explorer Missions – PI PANEL</b> <ul style="list-style-type: none"> <li>- Introduction of Panelists (5 min)</li> <li>- GALEX (15 min)</li> <li>- ICON (15 min)</li> <li>- NICER (15 min)</li> <li>- WISE (15 min)</li> <li>- Discussion / Q&amp;A (25 min)</li> </ul>	11:00-12:30	<i>Panel Host: Ed Weiler Chris Martin / PI Thomas Immel / PI Keith Gendreau / PI Ned Wright / PI</i>
	Lunch	12:30-1:30	
	<b>Lessons from Previous Missions – PM/PSE PANEL</b> <ul style="list-style-type: none"> <li>- Introduction of Panelists (5 min)</li> <li>- TESS (15 min)</li> <li>- ASTRO-H (15 min)</li> <li>- IBEX (15 min)</li> <li>- GOLD (15 min)</li> <li>- Discussion / Q&amp;A (25 min)</li> </ul>	1:30-3:00	<i>Panel Host: Ed Weiler Jeff Volosin / PM Cynthia Simmons / PM John Scherrer / PM Susan Batiste / PSE</i>
	<b>Essential Elements for Successful Missions</b> <ul style="list-style-type: none"> <li>- Program Office Role - Assistance vs. Oversight</li> <li>- Creating a Realistic, Resource Managed Schedule</li> <li>- Managing Mission Development Risk</li> <li>- Managing Resources within the Mission Cost Cap</li> <li>- Q&amp;A (15 min)</li> </ul>	3:00-4:00	<i>Nick Chrissotimos / Explorer PM Greg Frazier / Explorer DPM Jeanne Davis/HQ PE Christine Hinkle / Explorer Bus Mgr.</i>
	Break	4:00-4:15	
	<b>Dealing with Resource Challenges on Explorer Missions</b> <ul style="list-style-type: none"> <li>- Managing Partners, Managing Contingency, De-scope Philosophy</li> <li>- Q&amp;A (15 min)</li> </ul>	4:15-5:00	<i>Jim Russell / AIM PI Richard Eastes / GOLD PI</i>
	<b>SOMA Analysis of Previous PI Missions Performance</b>	5:00-5:30	<i>Cindy Daniels or Washito Sasamoto / SOMA</i>
	<b>Capturing Knowledge/ Closing Remarks</b> <ul style="list-style-type: none"> <li>- Evaluation of Forum</li> </ul>	5:30-6:00	<i>Ed Weiler, Moderator</i>

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# **Presentations**

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## About the Presenters

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### **Moderator: Dr. Edward J. Weiler**

Dr. Weiler retired from NASA, effective Sept. 30, 2011. Dr. Weiler and his spouse, Dr. Barbara Thorne, now reside in Vero Beach, Fl. Although retired from NASA, he continues active in Space Science through several advisory and consulting positions including Adjunct Senior Scientist, University of Colorado, member of the LASP (U. of COLO.) Advisory Board, Executive Science Advisor to SGT, Inc., member of the board of directors of USRA, member of the board of advisors to JPL (CalTech) and some science and technical consulting for Lockheed and Boeing.

Dr. Edward J. Weiler was named Associate Administrator of the Science Mission Directorate at NASA Headquarters in Washington, D.C. in May 2008. He was previously Center Director of NASA's Goddard Space Flight Center in Greenbelt, Md., a position he held since August 2004. Prior to that, he served as the Associate Administrator for NASA's Space Science Enterprise since 1998. Under his leadership, the Enterprise had numerous successes, including the Chandra Observatory, NEAR, MAP, FUSE, Spitzer, Mars Odyssey, and Mars Exploration Rover missions. He was responsible for a new Mars Exploration Program architecture in 1999 that has subsequently led to 7 successes in a row over the past 14 years including the incredibly prolific rovers, Spirit, Opportunity and Curiosity, the nuclear-powered Mars Rover (Curiosity) which landed in August 2012. The successes realized under Dr. Weiler's leadership have earned consistent support from the Administration and Congress and have secured an unprecedented level of funding to continue such important space science missions. Dr. Weiler received his Ph.D. in astrophysics from Northwestern University in 1976. He has published numerous papers in scientific journals. In his role as the Hubble Space Telescope Chief Scientist, he acted as the prime scientific spokesperson for the program and has appeared on a number of National TV programs including NIGHTLINE, TODAY, GOOD MORNING AMERICA, 60 MINUTES, etc. He also is routinely requested as a keynote speaker for a variety of professional and public events.

### **Science Mission Directorate (SMD) Deputy Associate Administrator: Mr. Geoffery L. Yoder**

Geoffery L. Yoder, served as the Deputy Associate Administrator for Programs for NASA's Science Mission Directorate from May 2013 to December 2014. Prior to this assignment, he assumed leadership responsibilities for the James Webb Space Telescope, as program director at the agency's headquarters in Washington, on June 30, 2012. Yoder has also served as the director of the Office of Evaluation at NASA Headquarters, responsible for assessing NASA programs, projects and institutions for cost effectiveness, quality, and performance in achieving strategic objectives, including ensuring alignment with national goals and the agency's vision and mission. In May 2010, Mr. Yoder served as Deputy Director for the Astrophysics Division in the Science Mission Directorate at NASA HQ.

Mr. Yoder joined NASA in 2000 formulating the Flight Hardware Development Branch within the Engineering Directorate at the Johnson Space Center, Houston Texas. In 2005, Mr. Yoder joined the Exploration Systems Mission Directorate at NASA Headquarters serving in various roles including Director for the Directorate Integration Office where he was responsible for a broad range of ESMD integration activities including architecture trades and analysis, information technology architecture and IT management, risk and knowledge management, technology protection, and Constellation Program Level 1 requirements. Mr. Yoder served as the Director of the Constellation Systems Division within the Exploration Missions Directorate NASA Headquarters where he was responsible for Division management of the Constellation Systems Program and Commercial Crew and Cargo Program.

From 1986 to 2000, working for Litton Systems Inc., Mr. Yoder was responsible for reliability assurance of various avionics suites directing reliability and qualification test and verification activities. He served as scientist for the Reliability Assurance Department participating in the various product improvement initiatives such as the Navy Production Technology Improvement Program (PTIP). He also served as Engineering Project Manager for various commercial, military, and space projects.



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## SMD Management of PI-Led Missions: Guidance and Expectations Panel

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**Panel Host:** Ed Weiler

**SMD DAA Programs:** Greg Robinson

**Astrophysics Division Director:** Paul Hertz

**Astrophysics Explorers Program Executive:** Jeanne Davis

**Astrophysics Explorers Program Lead Scientist:** Wilt Sanders

### Working within NASA Policy and Directives

**Greg Robinson** - Mr. Gregory L. Robinson is Deputy Associate Administrator for Programs, NASA Science Mission Directorate (SMD). He is responsible for assessing NASA programs, projects and institutions for technical and cost effectiveness, quality, and performance. He also coordinates program and project content with the other NASA Mission Directorates, and federal agencies in which SMD has partnerships. SMD has a portfolio of 97 missions in formulation, development, and operations.

Mr. Robinson served as Deputy Center Director at NASA's John H. Glenn Research Center (GRC), Cleveland Ohio. Mr. Robinson was responsible for planning, organizing, and controlling the effective accomplishment of all missions assigned to the Center. GRC is engaged in a diverse program of research, technology advancement, and project management related to aeronautical propulsion, space power propulsion, cryogenic fluids, microgravity science, expendable launch vehicles, space communications, materials, structures, instrumentation and controls, computational fluid dynamics, and electronics.

Mr. Robinson served as NASA Deputy Chief Engineer (2005-2013); He had primary responsibility and authority for oversight of Agency engineering work, including the design, manufacture, testing, operation, training, and maintenance practices and products. Additionally, he provided policy for and oversight of the readiness and execution of all NASA programs to ensure development efforts and mission operations were planned and conducted with sound engineering and proper programmatic controls.

Mr. Robinson served as the National Oceanic and Atmospheric Administration (NOAA), Acting National Environmental Satellite, Data, and Information Service (NESDIS) Deputy Assistant Administrator, Systems (2011-2012). He led the acquisition, and management of all NOAA satellite flight and ground acquisitions.

### Guidance and Expectations of the Division

**Dr. Paul Hertz** - Paul Hertz was named Director of the Astrophysics Division in the Science Mission Directorate at NASA in March 2012. He is responsible for the Agency's research programs and missions necessary to discover how the universe works, explore how the universe began and developed into its present form, and search for Earth-like planets. He previously served as the Chief Scientist of NASA's Science Mission Directorate, managing the Directorate's science solicitation activities and ensuring the scientific integrity of the Directorate's programs. During that period, he oversaw the acquisition of more than \$3B of space flight missions and instruments for projects across the breadth of NASA's space and Earth science programs. Dr. Hertz joined the NASA Office of Space Science as a Senior Scientist in 2000 and managed projects and programs in astrophysics and planetary science.

Dr. Hertz received SB degrees in both Physics and Mathematics from MIT, followed by a PhD from Harvard University in Astronomy in 1983. He then joined the staff of the Naval Research Laboratory in Washington DC as an astrophysicist, a position he held until joining NASA in 2000. Dr. Hertz's research concentrated on X-ray emission from galactic neutron stars, black holes, and globular clusters. He authored or co-authored over 100 papers, including observational papers in every band of the electromagnetic spectrum from radio to gamma ray as well as theory and computation papers. From 1993-2001 he was Associate Professor of Computational Sciences and Space Sciences at George Mason University. Dr. Hertz is a recipient of the Meritorious Presidential Rank Award, the Robert J. Trumpler Award of the Astronomical Society of the Pacific, the Alan Berman Research Publication Award of the Naval Research Laboratory (twice), and multiple NASA Group Achievement Awards.

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## **SMD Management of PI-Led Missions: Guidance and Expectations Panel, cont.**

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### **NASA HQ SMD Role**

**Jeanne Davis** – Jeanne Davis current position in the NASA HQ Planetary Sciences Division is the Program Executive for the Astrophysics Explorers (APEX), ASTRO-H and NICER missions. Prior NASA HQ responsibilities included Lead Program Executive (PE) for the Cosmic Origins (COR) Program; Lead PE for the Physics of the Cosmos (PCOS) Program. During 21 years at the NASA Kennedy Space Center, she served in various technical integration positions on the Space Shuttle and Space Station Programs, and also supported systems engineering and integration roles. Jeanne has a Master of Science in Industrial Engineering from University of Central Florida.

**Dr. Wilton Sanders** – Dr. Sanders has spent the past 12 years as a federal bureaucrat at NASA Headquarters. Over the years, he has served in the Astrophysics Division as the R&A Lead, the ATP lead, the APRA lead, the PCOS SAT lead, the High Energy Astrophysics discipline scientist, the Program Scientist (PS) for several missions, including Chandra, XMM, NuSTAR, ASTRO-H, Con-X, IXO, and LISA, and the PS for the Physics of the Cosmos (PCOS) Program and the Explorers Program. He is currently the Astrophysics Explorers PS as well as Deputy PS for the PCOS Program and several missions.

Before coming to NASA Headquarters in 2004, Dr. Sanders was an astrophysicist who spent his professional career as an academic staff scientist at the University of Wisconsin–Madison in both the Department of Physics and the Space Science and Engineering Center. He was involved in the university's X-ray astronomy program since 1971, both with the sounding rocket program in Cosmic X-ray Physics, and the Orbiting Solar Observatory-8 soft X-ray experiment. He was the PI of the Diffuse X-ray Spectrometer experiment, as well as a guest observer using the Einstein satellite, the Chandra X-ray Observatory and others. He was elected a fellow of the American Physical Society in 1993. Dr. Sanders received BA degree in Physics from the Johns Hopkins University in 1969, and a Ph.D. from University of Wisconsin-Madison in Physics in 1976.

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## Lessons from Previous Missions – PI Panel

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**Panel Host:** Ed Weiler

**GALEX PI:** Chris Martin

**ICON DPI:** Tom Immel

**NICER PI:** Keith Gendreau

**WISE PI:** Ned Wright

### **GALEX**

The Galaxy Evolution Explorer (GALEX) is an orbiting space telescope that observes galaxies in ultraviolet light. Since its launch in 2003, the mission has surveyed tens of thousands of galaxies in ultraviolet light across nine billion years of time. The mission's science goals include mapping the history of star formation in the universe and performing ultraviolet all-sky imaging and ultraviolet wide-area spectroscopic surveys. The GALEX mission is a partnership between NASA's Jet Propulsion Laboratory and the California Institute of Technology (Caltech) and includes other universities, science institutes, laboratories, and commercial technology providers from around the world. Caltech in Pasadena, California, hosts the GALEX science center and has overall responsibility for the project. JPL in Pasadena, California, constructed the GALEX science instrument, performed calibration, and is responsible for project management.

### **ICON**

The Ionospheric Connection Explorer (ICON) will explore the boundary between Earth and space, to understand the physical connection between our world and the immediate space environment around us. The anticipated launch date is June 2017. This boundary region is where ionized plasma (the ionosphere) and neutral gas (our atmosphere) collide and react, causing dramatic variability that affects space-based technological systems like GPS. The ionosphere has long been known to respond to "space weather" drivers from the sun, but NASA missions, such as TIMED and IMAGE, have surprised us in showing this variability often occurs in concert with weather on our planet. ICON will compare the impacts of these two drivers as they exert change on the space environment that surrounds us. ICON's science objectives are to understand: the sources of strong ionospheric variability; the transfer of energy and momentum from our atmosphere into space; and how solar wind and magnetospheric effects modify the internally-driven atmosphere-space system.

### **NICER**

The Neutron star Interior Composition ExploreR (NICER) is an approved NASA Explorer Mission of Opportunity dedicated to the study of the extraordinary gravitational, electromagnetic, and nuclear-physics environments embodied by neutron stars. NICER will explore the exotic states of matter inside these stars, where density and pressure are higher than in atomic nuclei, confronting theory with unique observational constraints. NICER will enable rotation-resolved spectroscopy of the thermal and non-thermal emissions of neutron stars in the soft (0.2-12 keV) X-ray band with unprecedented sensitivity, probing interior structure, the origins of dynamic phenomena, and the mechanisms that underlie the most powerful cosmic particle accelerators known. NICER achieves these goals by deploying, following launch in August 2016, an X-ray timing and spectroscopy instrument as an attached payload aboard the International Space Station (ISS). Grazing-incidence optics coupled with silicon drift detectors, actively pointed for a full hemisphere of sky coverage, will provide photon-counting spectroscopy and timing registered to GPS time and position, with high throughput and relatively low background.

### **WISE**

WISE is an unmanned satellite carrying an infrared-sensitive telescope. WISE launched into the morning skies above Vandenberg Air Force Base in central California on Dec. 14, 2009. By early 2011, it had finished scanning the entire sky twice in infrared light, snapping pictures of three-quarters of a billion objects, including remote galaxies, stars and asteroids. Today, astronomers continue to mine a cosmic quarry of data provided by WISE.

Upon completing its surveys in 2011, WISE was put to sleep. But in Sept. 2013, NASA reactivated the mission with the primary goal of scanning for near-Earth objects, or NEOs. Though the WISE mission had been doing asteroid searches before it entered hibernation, through a project called NEOWISE, that had not been its main purpose until now. For its new chapter in life, the mission is officially renamed NEOWISE.

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## About the Presenters

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### **Dr. Christopher Martin, GALEX PI**

Christopher Martin is a Professor of Physics at the California Institute of Technology. He has 38 years of experience in Space Astrophysics. As a Ph.D. student at Berkeley, he worked on the Extreme Ultraviolet Explorer Spectrometer, EUVP, the FAUST experiment, the Extreme UV background spectrometer, the Aries Far UV Imager experiment, and the UVX Space Shuttle experiment. The latter two projects, which formed his Ph.D. thesis, made detailed measurements of the UV sky background in order to understand its nature and to constrain the star formation history of the universe. Martin won the Uhl Prize for Outstanding Ph.D. Thesis for this work. Martin moved to New York City in 1987 to begin as an Assistant Professor in Physics at Columbia University. While there he led the development of a sounding rocket UV spectrometer designed to search for hot gas emission in the Milky Way Halo. Martin's group designed, constructed and successfully flew a NASA sounding rocket experiment called NUVIEWS to map the UV sky in four narrow bands and probe the hot and molecular interstellar medium (1996 and 1999). The GALEX (Galaxy Evolution Explorer) was selected by NASA in 1997. After six years of technical problems (surmounted) and delays, GALEX was launched on April 28, 2003. Since its launch, GALEX has surveyed most of the sky, detected more than 100 million galaxies, led to hundreds of new publications, and several major new discoveries, including the spectacular UV tail of Mira. One of the most interesting and unexpected insights provided by GALEX are the study of galaxies in transition from star-forming to passively evolving. Martin was awarded the NASA Exceptional Scientific Achievement Medal (2014) for *the new understanding of galaxy evolution, the identification of new environments for star formation, and an invaluable data archive of UV images of most of the sky*. Since 2003, Martin and his group have been developing a new suite of instruments and space missions designed to detect for the first time and map emission from the tenuous cosmic web of intergalactic gas that connects the galaxies in the universe. The experiments include a new instrument for the Hale 200-inch telescope (The Palomar Cosmic Web Imager, funded by NSF [2005-2007] and Caltech), the Keck Observatory (Keck Cosmic Web Imager [funded by NSF/TSIP and NSF/MRI 2009-2018]), a high altitude balloon (FIREBALL [funded by NASA 2003-2017 and flown successfully in 2009] using many of the technologies developed for GALEX. The Palomar Cosmic Web Imager has been operating since 2009, and resulted in two recent Caltech Press releases announcing the discovery of filamentary emission around a QSO, around a protogalactic system (2014), and feeding a giant protogalactic disk (2015). Martin received a B.A. from Oberlin College in 1978 (Highest Honors in Physics) and a Ph.D. from the University of California, Berkeley in 1986.

### **Dr. Tom Immel, ICON PI**

Dr. Immel is a physicist and Senior Fellow at the Space Sciences Laboratory at UC Berkeley. There he is the Principal Investigator of the Ionospheric Connection Explorer, or ICON, NASA's next Explorer mission. He was a steering committee member on the National Academy of Science 2013 Decadal Survey for Solar and Space Physics, and currently serves on that discipline committee. His scientific work has reached to understanding Earth's auroral and magnetospheric processes and coupling of atmospheric energy to the ionosphere and space. He earned a BA in Physics from Knox College in 1990 and a PhD in Physics from the University of Alaska in 1998. He and his wife Laura have two boys, living in the East San Francisco Bay.

### **Dr. Keith Gendreau, NICER PI**

Dr. Keith Gendreau is the principal investigator of the the Station Explorer for X-ray Timing and Navigation Technology (SEXTANT) and the Neutron Star Interior Composition ExploreR (NICER) mission. He has been at Goddard Space Flight Center since 1995 and was the calibration lead on the X-ray spectrometer instrument on the ASTRO-E mission. Dr. Gendreau was the NASA scientist on the joint NASA--DARPA X-ray pulsar source--based navigation and timing study. Keith Gendreau received his PhD in astrophysics at the Massachusetts Institute of Technology in 1995, working on X-ray charge-coupled devices and the cosmic X-ray background with the Advanced Satellite for Cosmology and Astrophysics (ASCA) mission.

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## About the Presenters

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### **Dr. Edward (Ned) Wright, WISE PI**

Edward L. Wright is a Professor of Physics and Astronomy at UCLA, where he holds a David Saxon Presidential Chair. He is the PI on the WISE [Wide-field Infrared Survey Explorer] project, which is a MidEx. Prior to the WISE project, Wright worked on the Cosmic Background Explorer [COBE], and on the Wilkinson Microwave Anisotropy Probe [WMAP] which selected in the first MidEx competition. Before coming to UCLA, he taught in the MIT Physics Department, where he first became involved with COBE and with the Spitzer Space Telescope, then known as the Shuttle InfraRed Telescope Facility [SIRTF].

For COBE, Wright was the data team leader. He led the team that chose the COBE pixelization scheme, and he developed techniques for evaluating systematic errors in the differential microwave radiometer data, such as magnetic susceptibility, and removing them from the final maps. In addition, he developed a technique that used star sightings in the scanning infrared radiometer to determine the COBE aspect to arc-minute accuracy.

Wright was an Interdisciplinary scientist on the Spitzer science working group. He led a committee that greatly simplified the instrument complement that led to a much less complicated mission.

For WMAP, Wright invented a technique for solving for the three million pixels in the map without ever inverting, or indeed even constructing, the 9 trillion element correlation matrix.

Wright received a bachelor's degree (ABscI) in Physics from Harvard, and then spent a year working on underwater sound for the Naval Research Laboratory before returning to Harvard to get a PhD in Astronomy.

Wright is a member of the National Academy of Sciences. He is a fellow of the American Academy of Arts and Sciences, and a fellow of the American Association for the Advancement of Science. He has received the NASA Exceptional Scientific Achievement Medal and the NASA Exceptional Public Service Medal.

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## Lessons from Previous Missions – PM/PSE Panel

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**Panel Host:** Ed Weiler

**TESS PM:** Jeff Volosin

**ASTRO-H PM:** Cynthia Simmons

**IBEX PM:** John Scherrer

**GOLD PSE:** Susan Westfall (formerly Batiste)

### **TESS**

The Transiting Exoplanet Survey Satellite (TESS) scheduled to launch August 2017 will use an array of telescopes to perform an all-sky survey to discover transiting exoplanets ranging from Earth-sized to gas giants, in orbit around the nearest and brightest stars in the sky. Its goal is to identify terrestrial planets in the habitable zones of nearby stars. Its principal investigator is George Ricker of the Massachusetts Institute of Technology in Cambridge.

### **ASTRO-H**

Astro-H is a powerful orbiting observatory being developed by the Japan Aerospace Exploration Agency (JAXA) for studying extremely energetic processes in the universe and is expected to launch in February 2016. NASA and the JAXA/Institute of Space and Astronautical Science have teamed up to develop a high resolution “Soft X-Ray Spectrometer” (SXS) for Astro-H. SXS, with its unprecedented sensitivity for high-resolution x-ray spectroscopy, will perform a wide variety of breakthrough science investigations directly aligned with NASA goals. SXS will test theories of structure formation by measuring the velocity field of x-ray-emitting gas in clusters of galaxies and the energy output from the jets and winds of active galaxies. SXS will accurately measure metal abundances in the oldest galaxies, providing unique information about the origin of the elements. SXS will observe matter in extreme gravitational fields obtaining time-resolved spectra from material approaching the event horizon of a black hole. SXS will determine the chemical abundances and velocity structure in Galactic Type Ia supernova remnants to provide insight into the explosion mechanism. The NASA contribution to Astro-H is being built at the NASA/Goddard Spaceflight Center in collaboration with the University of Wisconsin. The Principal Investigator is Richard Kelley from the NASA Goddard Space Flight Center in Greenbelt, Maryland.

### **IBEX**

Interstellar Boundary Explorer (IBEX) is the first mission designed to map the entire region of the boundary of our Solar System which launched Oct 19, 2008. As charged particles from the Sun, called the “solar wind,” flow outward well beyond the orbits of the planets, they collide with the material between the stars, called the “interstellar medium” (ISM). These interactions create energetic neutral atoms (ENAs), particles with no charge that move very quickly. This region emits no light that can be collected by conventional telescopes so, instead, IBEX, measures the particles that happen to be traveling inward from the boundary. IBEX contains two detectors designed to collect and measure ENAs, providing data about the mass, location, direction of origin, and energy of these particles. From this data, maps of the boundary are created. IBEX has mapped the boundaries of the tail of the heliosphere, something that has never before been possible. Scientists describe this tail, called the heliotail, in detail in a paper published on July 10, 2013, in *The Astrophysical Journal*. By combining observations from the first three years of IBEX imagery, the team mapped out a tail that shows a combination of fast and slow moving particles. There are two lobes of slower particles on the sides, faster particles above and below, with the entire structure twisted, as it experiences the pushing and pulling of magnetic fields outside the solar system. The Principal Investigator is David McComas from Southwest Research Institute in San Antonio, Texas.

### **GOLD**

The Global-scale Observations of the Limb and Disk (GOLD) mission of opportunity, scheduled to launch in February 2017, will perform unprecedented imaging of the Earth's thermosphere and ionosphere from geostationary orbit. GOLD's imager will fly as a hosted payload on a commercial communications satellite provided by ESE Government Solutions, one of the world's leading comsat companies. This hosted payload approach is a pathfinder for cost-effective NASA science missions. GOLD will answer fundamental scientific questions about how the thermosphere-ionosphere (T-I) system responds to geomagnetic storms, solar radiation, and upward propagating tides. GOLD will conduct simultaneous measurements of temperature and composition in the T-I system on a global scale, in the same way that weather satellites provide comprehensive measurements of the troposphere. GOLD's synoptic images of temperature and composition at a half-hour cadence will enable unambiguous separation of temporal and spatial variability. GOLD's far-ultraviolet imaging spectrograph will perform breakthrough measurements needed to address compelling questions about the global response of the T-I system to external and internal influences and their ties to space weather, comparative planetary atmospheres, and Earth sciences. GOLD is led by the Principal Investigator, Dr. Richard Eastes of University of Central Florida (UCF). GOLD is a collaboration between UCF, University of Colorado/LASP, SES-GS, NCAR, University of California/Berkeley, NOAA, and others.

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## About the Presenters

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### **Jeff Volosin, TESS PM**

Jeff has supported NASA and NOAA satellite development and operations for the past 30 years as a systems engineer, project/program manager and senior executive in the government and in industry. Jeff currently works at Goddard Space Flight Center as the NASA Project Manager for the Transiting Exoplanet Survey Satellite (TESS) mission. He has also spent the past 12 years as an adjunct professor at Capitol College in Maryland, where he teaches undergraduate and graduate classes in Systems Engineering and Spacecraft Design. He is a contributing author on a number of text books, including: "Space Mission Engineering: The New SMAD", and "Reducing the Cost of Spacecraft Ground Systems and Operations". He also recently had the opportunity to serve as the instructor for an on-line Systems Engineering class co-sponsored by NASA and the Saylor Academy which had over 8,000 students from around the world. Jeff spent half of his career in industry where he supported observatory I&T and flight operations for missions such as ACE, TRMM and NOAA-15 as a project manager. He also served as the Program Manager for NOAA's GOES/POES Engineering Operations support contract and for the GSFC Mission Operations and Mission Support (MOMS) contract which included I&T, ground system development and flight operations activities. The remainder of his career includes 10+ years as a civil servant at NASA HQ supporting study efforts in the 1980's and early 2000's related to human Moon/Mars exploration. During this period, Jeff led: the Global Exploration Strategy group, comprised of space agency representatives from 14 countries interested in coordinating human exploration efforts, the Lunar Exploration Strategy effort which was tasked with defining the science and technology initiatives that could be supported by human lunar exploration, and NASA's Humans to Mars planning effort (awarded the NASA Exceptional Service Medal for this work). More recently, he rejoined NASA at GSFC where he served as the Deputy Division Manager for Communication Networks (Space and Near Earth Networks as well as Laser Communications demonstrations and TDRSS development efforts) prior to becoming the TESS Project Manager at the start of Phase-B. Jeff has BS in Space Sciences from the Florida Institute of Technology.

### **Cynthia Simmons, ASTRO-H PM**

Cynthia Simmons is an Associate Division Chief for the Instrument Systems & Technology Division in the Applied Engineering & Technology Directorate at Goddard Space Flight Center. She began her aerospace engineering career in 1982 as a 2nd Lieutenant in the U.S. Air Force analyzing advanced payload technologies for classified satellite programs in the Office of Special Projects. By the rank of Captain, she was distinguished with the Air Force Meritorious Service Medal and formal recognition by the Under Secretary of the Air Force for an innovative operational concept that enhanced satellite hardware capabilities, and enabled faster and more efficient threat assessment for a National Defense intelligence agency. After receiving an Honorable Discharge in 1987, she continued work on classified payload designs as a Project Systems Requirements Analyst and Manager of the Systems Engineering Group for Unisys Corp. In 1996, Ms. Simmons worked as the power, propulsion, and thermal Systems Engineer for the Iridium Program, and supported 15 Iridium launches that placed 76 satellites into orbit within one year of the first launch. She received recognition from Corporate Headquarters with monetary award for the design and implementation of a new technique for on-orbit assessment of subsystem performance in a LEO, multi-satellite, cross-linked constellation with 24/7 continuous real-time downlinked data. In March 2000, she accepted a position as the Thermal Lead Engineer on the NASA Mission Operations Support Team for launch and post-launch support of the GOES L and M satellites. From 2000 to 2009, Ms. Simmons provided thermal design and systems engineering support as a contractor for several instrument and spacecraft projects at Goddard (ST-5, SAM, LRO, GOES O & P, GPM, Messenger, EO-1, SECCHI, TDRSS, Shuttle Hitchhiker and EVA Return-to-Flight), as well as for NTSpace (Japan), classified DoD and DARPA spacecraft programs. In March 2010, she was recruited by Goddard into civil service as Instrument Manager on the DESDynI Decadal Survey mission to lead the instrument team in the development of the LiDAR instrument concept. After successful completion of the Mission Concept Review, Ms. Simmons was reassigned to the Astro-H mission where she led the NASA SXS instrument project in programmatic recovery of the NASA effort. In March 2013, she was by-name requested to support the ICESat-2 mission as Instrument Project Manager, and tasked to lead the ATLAS instrument team to programmatic recovery using the approach she had employed on the Astro-H/SXS instrument project. During her career, Ms. Simmons has supported 21 launches for NASA, DoD, and commercial missions. She has been distinguished with several prestigious awards and honors for her contributions to spaceflight missions including the NASA Exceptional Achievement Award for the successful programmatic recovery of the NASA Astro-H/SXS Instrument Project, Special Act Award for leadership as ATLAS Instrument Project Manager, and Robert H. Goddard Leadership Honor Award for her leadership of instrument projects. Ms. Simmons has a Bachelor of Science from the U.S. Air Force Academy and a Master of Engineering from the University of Maryland, College Park.

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## About the Presenters

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### **John Scherrer, IBEX Industry PM**

John Scherrer is Program Director at Southwest Research Institute (SwRI) with over 32 years' experience in the design, development, management and delivery of complex instruments for scientific missions, spacecraft and payload management, and mission management. Mr. Scherrer's career at SwRI has encompassed the roles of research engineer, instrument developer and project manager. Mr. Scherrer served as the Deputy Project Manager/Spacecraft Manager for NASA's first MIDEX mission, IMAGE, where he oversaw the development of the SwRI-subcontracted IMAGE spacecraft and directed the IMAGE payload integration onto the spacecraft and launch vehicle. IMAGE launched ahead of schedule and below program cost with no science descopes. He has been IBEX's Project Manager from its Step 1 proposal inception. Under his leadership, IBEX was selected, confirmed and then delivered on time and under budget and launched in 2008. In January 2011, IBEX fully completed its baseline mission and is now in its second extended mission. Following IBEX, Mr. Scherrer served as Project Manager of the HPCA instrument for the MMS mission. Mr. Scherrer now serves as mission Project Manager of the NASA ESSP's first Earth Ventures mission, CYGNSS, where SwRI is responsible for the development, launch and operation of eight microsatellites. CYGNSS just completed Pre-Environmental Review and is scheduled for launch in October 2016. Mr. Scherrer received a B.S. in Mechanical Engineering from Texas A&M University in 1982 and a M.B.A. from the University of Texas at San Antonio in 1986

### **Dr. Susan Westfall, GOLD PSE**

Dr. Susan Westfall (formerly Susan Batiste) is a Systems Engineer with the Laboratory for Atmospheric and Space Physics at the University of Colorado Boulder where she began as a graduate student in 1995 and continued on as a professional in 2001. She is currently the Mission Systems Engineer on Global-Scale Observations of the Limb and Disk (GOLD) an Explorers' Mission of Opportunity. She has been Systems Engineer for the Imaging Ultraviolet Spectrometer (IUVS) for the Mars Atmosphere and Volatile Evolution (MAVEN) mission, Relativistic Electron-Proton Telescope (REPT) for the Radiation Belt Storm Probes (RBSP), Electric Fields of Waves (EFW) for RBSP, Cloud Imaging and Particle Size (CIPS) instrument for the Aeronomy of Ice in the Mesosphere (AIM) mission, the Cosmic Dust Experiment (CDE) for AIM, and the Student Dust Counter (SDC) for New Horizons. She participated as both a science investigator and a technical manager for the Mechanics of Granular Materials (MGM) Space Shuttle experiment (3 missions in 1996, 1998, 2003). She has also been active as a geotechnical engineer assisting in NASA's development and testing of new lunar regolith simulants. She has a Bachelor's degree in Civil Engineering, and a Masters and Ph.D. in Geotechnical Engineering from the University of Colorado Boulder.

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## Essential Elements for Successful Missions

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**Host:** Ed Weiler

**NASA Explorers Program Manager:** Nick Chrissotimos

**NASA Explorers Deputy Program Manager:** Greg Frazier

**NASA Astrophysics Explorers Program Executive:** Jeanne Davis

**NASA Explorers Business Manager:** Christine Hinkle

### Program Office Role – Assistance vs. Oversight

#### Nick Chrissotimos, Explorers PM

Mr. Chrissotimos has over 30 years of project/program management experience at the Goddard Space Flight Center (GSFC). He is currently the Associate Director of Flight Projects for Explorers and Heliophysics Projects Division (EHPD) where he is the Program Manager for Explorers, Living With a Star and Solar Terrestrial Probes. He is responsible for directing the implementation of the Solar Orbiter, Solar Probe Plus, Astro-H, ICON, TESS, GOLD and NICER missions. He has been in this position since 2008 and has successfully launched SDO, RBSP, MMS, IBEX, WISE, NuSTAR and IRIS. In addition, under his responsibility EHPD successfully developed and delivered the MSL SAM instrument and the LADEE payloads.

He is currently serving as an SRB Chair for the GRACE FO mission and is serving or has served on a number of NASA SRB's as a review board member.

Mr. Chrissotimos also served as the Associate Director of Flight Projects for the Exploration and Space Communications Projects Division. There he was responsible for the Lunar Reconnaissance Orbiter (LRO) Project, TDRS Project, Space Network and Ground Network Projects and GSFC Constellation Program support. He has also served as the STEREO Project Manager where he led the project to a successful launch in October 2006.

In addition, he has held various program/project management positions on the Earth Explorers Program, ESSP, EOS Aura, and the TDRS projects.

Mr. Chrissotimos earned his bachelor's degree in EE from Pratt Institute, Brooklyn New York, in 1974, and his master's degree in EE from the University of Maryland, College Park MD, in 1981. He has received numerous individual and group achievement awards throughout his career, and he has been awarded the NASA Medal for Outstanding Leadership, and the Presidential Meritorious Rank Award.

#### Creating a Realistic, Resource Managed Schedule

#### Gregory Frazier, Explorers Program DPM

Gregory Frazier has worked at the NASA for over 30 years. He has worked on numerous flight projects currently performing Earth and Space Science Observations and a mission to Mars.

Mr. Frazier started as a cooperative education student while attending the University of Maryland at College Park. He completed his Bachelor of Sciences in Aerospace Engineering in 1985 and became a member of the Mechanical Engineering Branch. Mr. Frazier designed numerous mechanical systems on flight projects such as the Cosmic Background Explorer, the X-ray Timing Explorer and Gamma-Ray Observatory. He also helped manage missions for the Earth Science Systems Pathfinder Project. He went on to manage the main instrument on the Swift Project, the Burst Alert Telescope.

Following the successful launch of Swift in 2004, Mr. Frazier became a member of the Flight Projects Directorate where he served as the Interstellar Boundary Explorer Mission Manager, which was successfully launched in 2008. Following that, he became the Project Manager for the Sample Analysis at Mars instrument suite on the Mars Sample Laboratory rover Curiosity, which is currently operating on the red planet.

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## **Essential Elements for Successful Missions, cont.**

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### **Managing Mission Development Risk**

#### **Jeanne Davis, Astrophysics Explorers Program Executive**

Jeanne Davis current position in the NASA HQ Planetary Sciences Division is the Program Executive for the Astrophysics Explorers (APEX), ASTRO-H and NICER missions. Prior NASA HQ responsibilities included Lead Program Executive (PE) for the Cosmic Origins (COR) Program; Lead PE for the Physics of the Cosmos (PCOS) Program. During 21 years at the NASA Kennedy Space Center, she served in various technical integration positions on the Space Shuttle and Space Station Programs, and also supported systems engineering and integration roles. Jeanne has a Master of Science in Industrial Engineering from University of Central Florida.

### **Managing Resources within the Mission Cost Cap**

#### **Christine Hinkle, Explorers Program Business Manager**

Ms. Christine Hinkle is the Explorers Program Business Manager in the Explorers and Heliophysics Projects Division (EHPD). Christine joined the EHPD in December of 2009, as the Deputy Program Business Manager for Explorers, supporting the IRIS, NuSTAR, SAM, and GEMS missions. In March of 2011, she moved to the position of Program Business Manager, currently supporting the Astro-H, NICER, ICON, TESS, and GOLD missions.

Before joining the EHPD, Christine supported the Exploration and Space Communications Division, for over 20 years in various business leadership roles in several projects and offices, including the Near Earth Network Project, Space Network Project, Technology and Standards, the Guam Remote Ground Terminal Project, and the Second TDRSS Ground Terminal Project.

Christine has a Bachelor of Science degree from University of Maryland, University College.



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## Dealing with Resource Challenges on Explorer Missions

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### AIM

Aeronomy of Ice in the Mesosphere (AIM) satellite mission is exploring Polar Mesospheric Clouds (PMCs), also called noctilucent clouds, to find out why they form and why they are changing.

The AIM mission was launched in 2007 and has been extended by NASA through the end of FY15. During this time the instruments monitor noctilucent clouds to better understand their variability and possible connection to climate change. Individual instrument data collection status, as well as spacecraft and instrument health, will be monitored throughout the life of the mission and reported periodically on this website.

The primary goal of the AIM mission is to help scientists understand whether the clouds' ephemeral nature, and their variation over time, is related to Earth's changing climate - and to investigate why they form in the first place. By measuring the thermal, chemical and other properties of the environment in which the mysterious clouds form, the AIM mission will provide researchers with a foundation for the study of long-term variations in the mesosphere and its relationship to global climate change. In addition to measuring environmental conditions, the AIM mission will collect data on cloud abundance, how the clouds are distributed, and the size of particles within them.

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## About the Presenters

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### **Dr. James Russell III, AIM PI**

James M. Russell III's research has focused on atmospheric science, remote sensing, and satellite data analysis to study properties and processes in Earth's atmosphere. He began his career in electrical engineering at the NASA Langley Research Center, developing instrumentation and performing ground and rocket reentry tests of heat shield material used on the Gemini and Apollo capsules. He also worked on instrumentation for characterizing the Martian atmosphere during entry.

Dr. Russell served as Co-PI on the Nimbus-7 LIMS experiment to study odd nitrogen effects on Earth's ozone layer and PI for the HALOE experiment on the UARS satellite to study odd chlorine and odd nitrogen effects on ozone. He currently serves as PI for the SABER experiment on the TIMED satellite to study the chemistry, dynamics, and energetics of the thermosphere and mesosphere and PI on the AIM mission to study noctilucent clouds. He also served as co-investigator on the JPL ATMOS experiment launched on the Space Shuttle and the Oxford University ISAMS experiment launched on the UARS satellite, to study the chemistry and dynamics of the stratospheric ozone layer.

Dr. Russell served as head of the Chemistry and Dynamics Branch and the Theoretical Studies Branch in the Langley Atmospheric Sciences Division and currently is an endowed professor of atmospheric and planetary sciences and co-director of the Center for Atmospheric Sciences at Hampton University in Virginia. He received a BSEE degree from Virginia Tech, an MSEE degree from the University of Virginia, and a PhD in aeronomy from the University of Michigan. He is author or co-author of more than 400 papers in the scientific literature, including first authorship of the most cited paper in all of geosciences during the period 1991–2001. He is a Fellow of the American Geophysical Union and has received the NASA Exceptional Scientific Achievement Medal; the NASA Outstanding Leadership Medal; the Virginia 2008 Outstanding Scientist Award; and the University of Michigan, College of Engineering, Alumni Merit Award.

### **Dr. Richard Eastes, GOLD PI**

Dr. Eastes is a research scientist at the Florida Space Institute and the PI for the Global-scale Observations of the Limb and Disk (GOLD) mission, which NASA selected for flight development in April 2013. The GOLD mission of opportunity will fly an ultraviolet (UV) imager on a commercial communications satellite in geostationary orbit. This imager will make the first simultaneous images of the temperature and composition (O/N<sub>2</sub> ratio) of the Earth's thermosphere (the neutral atmosphere in the Earth's space environment). The GOLD team has been responsible for arranging the commercial host for the imager, which is on schedule for a late 2017 launch. That launch would make it the first NASA mission of opportunity hosted on a commercial satellite.

Dr. Eastes received his Ph.D. in Physics for work with instrumentation for and data from ultraviolet spectrometers on sounding rockets. Following his graduate studies, he worked at The University of Michigan's Space Physics Research Laboratory, on data from rockets and satellites, before going to the Air Force Research Laboratory (AFRL). At AFRL he worked in various roles, including as PI for space-based ultraviolet experiments, on satellite missions. Since arriving at the Florida Space Institute (FSI) in 2001, Dr. Eastes has led FSI's efforts in remote sensing of the Earth's space environment.

Education:     Ph. D., 1985, Physics, The Johns Hopkins University, Baltimore, Maryland  
                  M.A.,    1981, Physics, The Johns Hopkins University, Baltimore, Maryland  
                  B.S.,    1978, Tennessee Technological University, Cookeville, Tennessee

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## **SOMA Analysis of Previous PI Missions Performance**

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To encourage the submission of the highest-quality mission proposals and concept-study reports, the Science Office for Mission Assessments maintains an ongoing effort to identify and analyze common areas of major weaknesses resulting from the technical, management, and cost-review process. The results of this effort will be described, including appropriate lessons learned that can provide valuable guidance to future mission proposal and concept-study teams.

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## **About the Presenter**

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### **Washito Sasamoto, Acquisition Manager, SOMA, NASA Langley Research Center**

Washito Sasamoto is currently the Discovery 2014 Acquisition Manager, preparing for the Technical, Management, and Cost evaluation of the upcoming Step 2 Concept Study Reports (CSRs) – a continuation of his role on the Step 1 Proposal Evaluation. Mr. Sasamoto has been a member of SOMA since 2010 – having worked with the office since its inception in 1996 – leading the Heliophysics Explorer 2011 Step 2 CSR Evaluation and the Explorer 2011 Step 1 Proposal Evaluation. He was responsible for the Astrophysics Explorer 2011 Step 2 CSR Evaluation until its Site Visit phase, the development of the Mars 2020 Announcement of Opportunity (AO), and the implementation of the 2014 Standard AO Template update. He has also served as a Subpanel or Alternate Acquisition Manager on Mars 2020, Discovery 2010, and ExoMars Trace Gas Orbiter. Prior to joining SOMA, Mr. Sasamoto's entire post-college career was with the Space Mission Analysis Branch, where he was responsible for stochastic, dynamic, and conceptual tool development; conceptual and mission design for robotic and human space flight missions; and analysis of the International Space Station Thermal Control System.