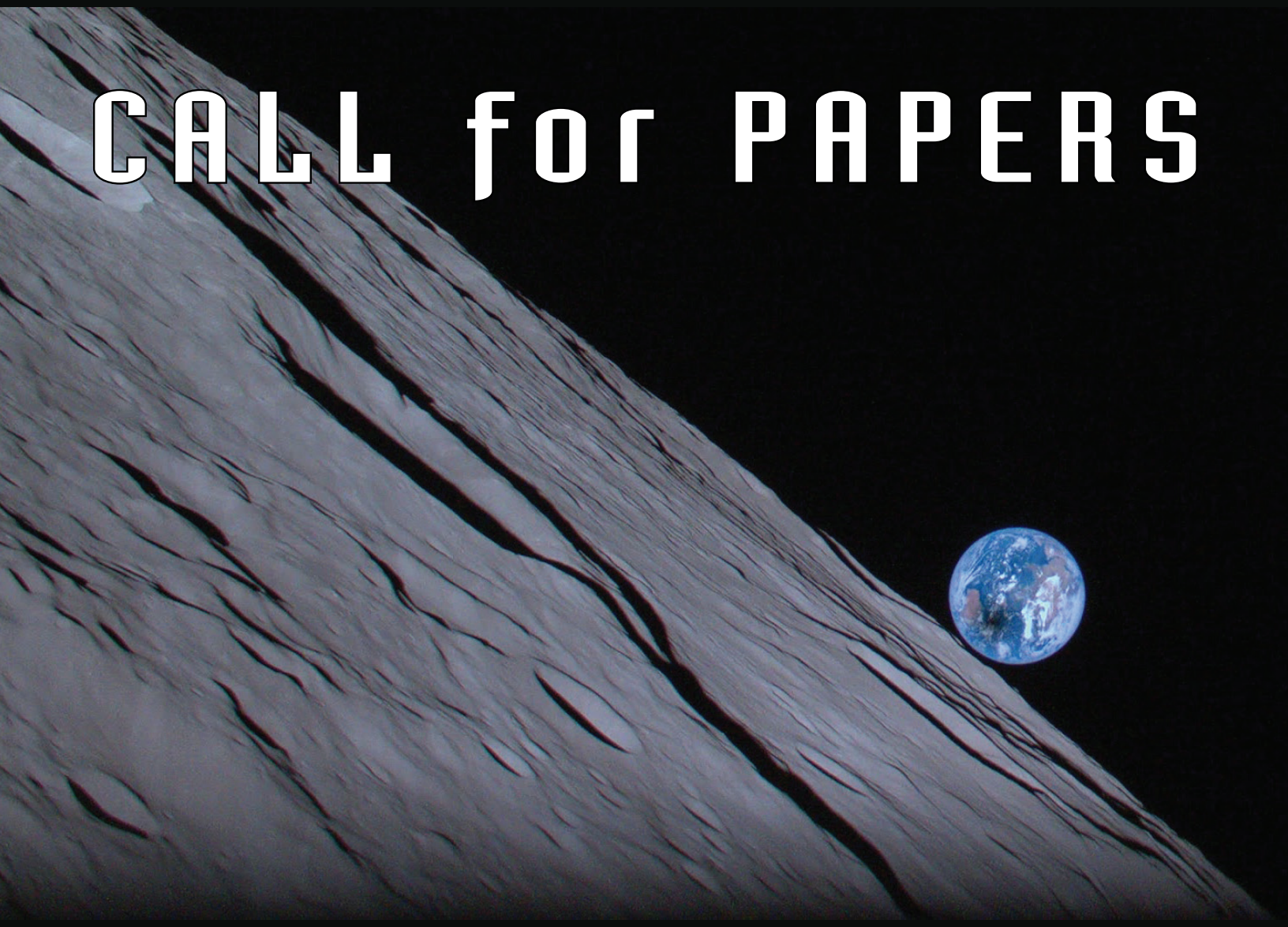
2025 IEEE Aerospace Conference

Technical Cosponsors

AIAA SHAPING THE FUTURE OF AEROSPACE

phmsociety



CALL for PAPERS

Yellowstone Conference Center, Big Sky, Montana, March 1-8, 2025

The Conference

The international IEEE Aerospace Conference, with AIAA and PHM Society as technical cosponsors, is organized to promote interdisciplinary understanding of aerospace systems, their underlying science and technology, and their application to government and commercial endeavors. The annual, week-long conference, set in a stimulating and thought-provoking environment, is designed for aerospace experts, academics, military personnel, and industry leaders. The 2025 conference is the 46th in the conference series.

Who Should Attend

This is a conference for **Participants.** Consider attending if you have a professional interest in aerospace engineering or science and wish to:

- Present results and insights from your own work
- Interact with colleagues who present papers in your field
- Engage with people and ideas across a broad spectrum of aerospace technologies
- Understand how your organization might participate in next year's conference

What Sets This Conference Apart

High-Quality Papers and Presentations. Each year, a large number of presentations are given by professionals distinguished in their fields and by high-ranking members of the government.

Science and Aerospace Frontiers. The plenary sessions feature internationally prominent researchers working on frontiers of science and engineering that may significantly impact the world. Registrants are briefed on cutting-edge technologies emerging from and intersecting with their disciplines.

Multidisciplinary Focus. This is the single general IEEE conference designed to facilitate cross-fertilization of aerospace disciplines and dialogue among members of government, industry, and the academic community.

Exceptional Networking Opportunities. The conference provides extraordinary opportunities for discussions and collaborative dialogue with aerospace pacesetters. Professional exchanges benefit the participants, their organizational sponsors, industry, and the engineering and scientific professions.

Author Development. The conference provides thorough and supportive paper reviews, relying on expert guidance from senior engineers and scientists and an opportunity for instructive interaction between author and reviewers.

Conference Proceedings. Electronic download of Conference Proceedings (comprised of 450+ papers) is included in the registration package.

International Participation. Representatives of 23 countries participated in the 2024 conference.

Sequestered Venue. The Yellowstone Conference Center and lodging are nestled closely together in the small village of Big Sky, fostering communications and ensuring easy access to all events.

Exhibitors and Patrons

This unique venue is perfect for exhibiting products and materials in a central area of the conference and to sponsor both conventional and unconventional social events, getting your brand and products out in front of your customers.

What Attendees Say: Simply the Best!

- Highly acclaimed IEEE Conference Proceedings with peer review.
- A fantastic conference that fosters collaboration at the same time it encourages participants to strengthen their personal and family relations. Amazing achievement!
- I've made invaluable connections every year.
- I really enjoyed the collaborative and supportive atmosphere. The exchange of ideas that resulted was something that I have not seen in any other conference that I have attended.
- It is the most technical aerospace conference and incredibly useful for networking. The plenary talks were wonderful, and the diversity of subjects was fantastic.
- No conference packs so much into one week.
- Never have I encountered such a concentrated and collaborative environment at a conference.
- The technical stature of this conference makes it one of the best places to present your ideas and receive competent comments.
- Allows me to interact with people in ways that are simply not possible otherwise. The benefit to my work has been tremendous.
- For my company, the networking and high profile of the conference are second to none!
- Beautiful facility, amazing staff, conference well organized. Junior conference amazingly well done.

Technical Program

This Call invites papers reporting original work or state-of-the-art reviews that will enhance knowledge of:

- Aerospace systems, science and technology
- Applications of aerospace systems and technology to military, civilian or commercial endeavors
- Systems engineering and management science in the aerospace industry
- Government policy that directs or drives aerospace programs, systems and technologies

Specific topics planned for the 2025 Conference are listed in the **Tracks, Sessions and Organizers** section, pages 6–30.

Networking Program

The Networking Program provides opportunities for engaging with other conference professionals beyond the technical sessions. Networking events include:

- Saturday arrival icebreaker reception
- Buffet dinners at four evening meetings
- Pre-dinner receptions
- Midweek mountainside lunch
- Networking "Java Jams" prior to afternoon sessions
- Post-session fireside ice cream socials
- Friday evening farewell dinner

The costs for these are covered in the registration and guest registration fees.

Front Cover – *Lunar Earthrise seen by the ispace Hakuto-R mission during the solar eclipse of April 20, 2023 captured by the lander-mounted camera at an altitude of about 100 km from the lunar surface. The Hakuto-R Mission 1 was a failed private Japanese uncrewed lunar landing mission built and operated by ispace, which was launched in December 2022 for an attempted lunar landing on April 26, 2023. In an effort to conserve fuel, the mission used a slower path to approach the Moon, entering lunar orbit in March 2023.* ***Photo Credit: ispace.***

Abstract Submission

An abstract of 500 words or less is due by **July 1, 2024** at the conference website www.aeroconf.org.

Abstracts will be accepted ONLY through the conference website. Accept/reject notices will be emailed promptly. Author instructions are on the website.

Note: The IEEE Aerospace Conference is designed as a venue for engineers and scientists to present and discuss their work. **Please submit only if you expect to attend the conference yourself to personally present your paper. (See IEEE Policies on Presentation and Reuse below.)**

Paper Submission

Properly formatted papers of 6-20 pages must be submitted for review no later than **Friday, October 4, 2024**, a **firm** deadline! Each paper must be in final publishable format and submitted via the conference website as a PDF file. Use our format template to type your paper and see useful links: http://www.aeroconf.org/paper-submission. **Revised** papers responsive to reviewer comments must be submitted to the website by **Friday, January 10, 2025**. This is a **firm** deadline!

Questions regarding the review process may be directed to:

Lisa May, Paper Review Chair
PaperReviewChair@aeroconf.org

IEEE Copyright forms (see link on your "My Submissions" page) must be signed and submitted by **Friday, January 10, 2025.**

Submitted papers are considered for track and conference **Best Paper Awards**, which are selected prior to the conference on the basis of technical innovation and quality of the written paper.

(See www.aeroconf.org for criteria.)

IEEE Policies on Presentation and Reuse

Publication of Conference Papers in the *IEEE Xplore* Digital Library

IEEE policy on publication of papers accepted for IEEE conferences states that "IEEE reserves the right to exclude a paper from distribution after the conference (e.g., removal from *IEEE Xplore*), if the paper is not presented at the conference."

IEEE Xplore is the association's digital library of over 4.5 million full-text documents. IEEE journals and conference proceedings are among the world's most highly cited technical publications.

Reuse of Conference Papers in Journal Publications

IEEE policy recognizes and encourages the evolutionary publication process from conference presentation to scholarly publication. Guidelines for author reuse of their presented papers and other intellectual property rights can be found at:

https://www.ieee.org/publications/rights/author-originality.html

A list of IEEE journals can be found at:

https://www.ieee.org/membership-catalog/index.html?srchProdType=Subscription&searchType=prodType

Registration

The conference registration fee includes:

- Access to all technical sessions
- Electronic copy of Conference Proceedings
- Electronic copy of Conference Digest and Schedule
- Networking/Social Program
- Recreation activities discount

REGISTRATION FEES (US$) Including Activities & Meals	Received by Nov 30, 2024	Received after Nov 30, 2024	Received after Jan 24, 2025
IEEE & AIAA Members	$975	$1,175	$1,425
Non-Members	$1,240	$1,525	$1,755
Guests* and Jr. Engineers (Activities & Meals only)	$315	$330	$370

*Spouse/partner/child of primary registrant

Travel and Lodging

Special rates for lodging near the Yellowstone Conference Center will be available through the conference website. Check www.aeroconf.org after October 1, 2024. Book early for best choice.

For More Information

Visit Our Web Site: www.aeroconf.org for additional information on abstract and paper submission, and any further notices on the 2025 Conference.

CONFERENCE-RELATED QUESTIONS

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Karen Profet — Karen.Profet@aeroconf.org
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JUNIOR CONFERENCE HELP

Please visit: https://aeroconf.org/junior-engineering

GENERAL HELP

IEEE Aerospace Conference — Info@aeroconf.org

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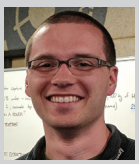

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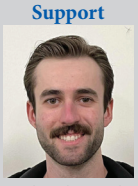

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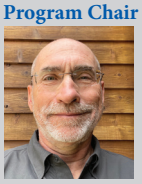

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Maddalena Jackson

Website Support

Jessica Millenbach

Website Administration
Roark Sandberg

Conference Historian

Monica Panno

SCHEDULE OVERVIEW

6 Days of Presentations, over 175 Hours of Technical Sessions and 20 Hours of Conference-Sponsored Technical Networking Events

Registration and Icebreaker Wine & Cheese Reception
Saturday March 1, 6:30–9:00 PM

Sunday March 2	Monday March 3	Tuesday March 4	Wednesday March 5	Thursday March 6	Friday March 7
Continued Registration 8:45–11:30 AM	Technical Sessions 8:30 AM–Noon	Technical Sessions 8:30 AM–Noon	Technical Sessions 8:30 AM–Noon	Technical Sessions 8:30 AM–Noon	Technical Sessions 8:30 AM–Noon
Continued Registration 3:30–6:45 PM	Lunch Break 12:15–1:25 PM	Catered Lunch Noon–1:30 PM	Lunch Break 12:15–1:25 PM	Lunch Break 12:15–1:25 PM	Lunch Break 12:15–1:25 PM
	Panels 1:25–4:00 PM	Jr Engineering & Science Conference 1:30–4:00 PM	Panels 1:25–4:00 PM	Panels 1:25–4:00 PM	Ad Hoc Individual Track Planning Meetings
	Jr Eng & Sci Conf 1:30–4:00 PM				
Java Jam 4:00–4:30 PM	Java Jam 4:00–4:30 PM	Ad Hoc Session Workshops (see announcement board for time and location)	Java Jam 4:00–4:30 PM	Java Jam 4:00–4:30 PM	Track/Session Organizers Planning Session for 2026 Conference 4:00–5:30 PM
Technical Sessions 4:30–5:45 PM	Technical Sessions 4:30–5:45 PM		Technical Sessions 4:30–5:45 PM	Technical Sessions 4:30–5:45 PM	
Plenary Session 5:50–6:35 PM	Plenary Session 5:50–6:35 PM		Plenary Session 5:50–6:35 PM	Plenary Session 5:50–6:35 PM	
Hosted Reception 6:35–7:05 PM	Hosted Reception 6:35–7:05 PM	Free Evening in Big Sky Village	Hosted Reception 6:35–7:05 PM	Hosted Reception 6:35–7:05 PM	Farewell Networking Catered Reception & Dinner 7:00–11:00 PM (Buffet open 7:00 –9:00 PM)
Catered Dinner 7:05–8:05 PM	Catered Dinner 7:05–8:05 PM		Catered Dinner 7:05–8:05 PM	Catered Dinner 7:05–8:05 PM	
Plenary Session 8:05–8.50 PM	Plenary Session 8:05–8.50 PM		Plenary Session 8:05–8.50 PM	Plenary Session 8:05–8.50 PM	
Technical Sessions 9:00–10:15 PM	Technical Sessions 9:00–10:15 PM		Technical Sessions 9:00–10:15 PM	Technical Sessions 9.00–10:15 PM	
Après Session Fireside Cheer and Chat 10:15–11:00 PM	Après Session Fireside Cheer and Chat 10:15–11:00 PM		Après Session Fireside Cheer and Chat 10:15–11:00 PM	Après Session Fireside Cheer and Chat 10:15–11:00 PM	

All dinners and networking activities are intended to promote, enhance and facilitate technical discussions and long-term professional and personal relationships.

Tracks, Sessions & Organizers

Track 1 Science and Aerospace Frontiers (Plenary Sessions)

David Woerner
david.f.woerner@jpl.nasa.gov

JPL Lead for RPS Systems Engineering and Integration activities for NASA's Radioisotope Power Systems Program. Editor, The Technology of Discovery: Radioisotope Thermoelectric Generators and Thermoelectric Technologies for Space Exploration. Chair, Board of Directors of IEEE Aerospace Conferences. Numerous NASA awards, including the Exceptional Service and Exceptional Achievement Awards.

Kendra Cook
kendra.l.cook@gmail.com

Senior Systems Engineer, NASA Jet Propulsion Laboratory, and Owner/Principal of C2 International. Served 7 years as an Officer in the U.S. Air Force, specializing in UAVs and air-launched weapons systems. B.S. in Aerospace Engineering, Boston University; M.S., Astronautical Engineering and Computer Engineering, Air Force Institute of Technology.

Track 2 Space Missions, Systems and Architectures

Steven Arnold
steven.arnold@jhuapl.edu

Deputy Executive, Civil Space, APL. Oversees all Civil Space programs at APL, including NASA missions. Responsible for strategic activities such as core technology development, internal research and development, external partnering programs, program formulation and program execution. BSEE, Virginia Tech; MSEE, Purdue University.

Keyur Patel
keyur@jpl.nasa.gov

Director for Astronomy and Physics, NASA Jet Propulsion Laboratory and represents the Directorate as a member of JPL's Executive Council. Formerly Deputy Director for Planetary Science, Director for the Interplanetary Directorate and Deputy Director for Office of Safety and Mission Success.

Session 01 Current Space and Earth Science Missions

Addresses status and results of missions in development, implementation, and operation. Session objective is to provide a full mission prospective and discuss the system level trade offs, challenges and lessons learned. From operational missions, results are discussed along with the in-flight challenges. Session addresses all types of missions from Earth orbiting to planetary to heliophysics to astrophysics missions.

James Graf — **james.e.graf@jpl.nasa.gov**
Director, Earth Science and Technology Directorate, NASA Jet Propulsion Laboratory

Nick Chrissotimos — **nicholas.g.chrissotimos@nasa.gov**
Associate Director of Flight Projects Code 430, NASA Goddard Space Flight Center

Keyur Patel — **keyur@jpl.nasa.gov**
Associate Director for Flight Projects and Mission Success, NASA Jet Propulsion Laboratory

Session 02 Future Space and Earth Science Missions

Future space or Earth science programs or missions in formulation or concept development.

Alex Austin — **alexander.austin@jpl.nasa.gov**
Systems Engineer, NASA Jet Propulsion Laboratory

Michael Gross — **magross@jpl.nasa.gov**
Project Manager, GRACE-C Project, NASA Jet Propulsion Laboratory

Session 03 System and Technologies for Landing on Planets, the Moon, Earth and Small Bodies

This session includes landing spacecraft, including precision and safe landing, atmospheric entry, descent, and landing/rendezvousing with small bodies.

Ian Clark — **ian.g.clark@jpl.nasa.gov**
Systems Engineer, NASA Jet Propulsion Laboratory

Clara O'Farrell — **ofarrell@jpl.nasa.gov**
Guidance and Control Engineer, NASA Jet Propulsion Laboratory

Session 04 Robotic Mobility and Sample Acquisition Systems

Use of robotic systems for in situ space exploration involving robotic mobility, manipulation, and sampling. All aspects of these robotic systems - including design, development, implementation, validation and operation - are valued topics of presentation. Research prototypes as well as fielded or flown systems are of interest.

Richard Volpe volpe@jpl.nasa.gov

Directorate Technologist, NASA Jet Propulsion Laboratory

Paul Backes backes@jpl.nasa.gov

Group Supervisor, NASA Jet Propulsion Laboratory

Joseph Bowkett bowkett@jpl.nasa.gov

Robotics Technologist, NASA Jet Propulsion Laboratory

Session 05 Future Missions & Enabling Technologies for In Situ Exploration, Sample Returns

Future mission concepts, planetary protection technologies, sample handling techniques, novel technologies for in situ exploration, technologies not covered under robotic mobility and sample acquisition, human precursor mission concepts, and technologies that enable precursor missions.

Elena Adams elena.adams@jhuapl.edu

Systems Engineer, Johns Hopkins University/Applied Physics Laboratory

Christopher Green christopher.m.green-1@nasa.gov

Assistant Chief for Technology, NASA Goddard Space Flight Center

Session 06 In Situ Instruments for Landed Surface Exploration, Orbiters, and Flybys

This session solicits papers that describe advanced instrument concepts and/or innovative analytical protocols that enable the characterization of surface and subsurface chemistry and geology (elemental, isotopic, molecular, mineralogical composition), astrobiological potential, geophysical processes (tectonics, internal structure, heat flow, geochronology), atmospheric chemistry and dynamics, dust and particles, charged particles/plasmas, and magnetic fields.

Xiang Li xiang.li@nasa.gov

Research Scientist, NASA Goddard Space Flight Center

Jacob Graham jacob.graham@nasa.gov

Research Space Scientist, NASA Goddard Space Flight Center

Terry Hurford terry.a.hurford@nasa.gov

Scientist, NASA Goddard Space Flight Center

Session 07 Mission Design, Formation Flying and Constellations

This session covers all aspects of mission design for spacecraft flying to or about Earth, other celestial bodies and deep space. A specific interest is devoted to missions involving distributed systems, as formation flying and constellations. Papers dealing with preliminary and advanced design, actual mission implementation and operational issues are welcome.

Giovanni Palmerini giovanni.palmerini@uniroma1.it

Professor, Guidance and Navigation, Sapienza Universita' di Roma

Leonard Felicetti leonard.felicetti@cranfield.ac.uk

Senior Lecturer in Space Robotics and GNC, Cranfield University

Ryan Woolley woolley@jpl.nasa.gov

Mission Design Engineer, NASA Jet Propulsion Laboratory

Session 08 Space Radiation and its Interaction with Shielding, Electronics and Humans

The mitigation of adverse effects from radiation on humans and electronics in space is a critical step in mission success. This session focuses on research in understanding the nature of the radiation field in space and how that field is changed as it passes through shielding materials, electronics, and the human body. Topics include radiation measurements made in space, projectile and target fragmentation measurements and materials studies conducted at accelerator facilities on ground, radiation transport modeling, improvements of nuclear reaction models and radiation transport codes, shielding of electronics and humans, and benchmarking of measurements performed both in space and on ground for the verification and validation of the transport codes.

Lembit Sihver lembit.sihver@tuwien.ac.at

Professor, TU Wien and Nuclear Physics Institute of the Czech Academy of Sciences

Ondrej Ploc ploc@ujf.cas.cz

Senior researcher, Nuclear Physics Institute of the Czech Academy of Sciences

Session 09 Space Debris and Micrometeoroids: The Environment, Risks, and Mitigation Concepts and Practices

Operational satellites are at risk from collisions with the more than 20,000 trackable debris objects that remain in orbit today, as well as hundreds of thousands of objects, including micrometeoroids, that are too small to be cataloged. Beyond the realm of Earth-oriented orbits, unique and immensely valuable science-gathering spacecraft can also be exposed to similar hypervelocity collisional risks, but from cometary and asteroidal micro-milliscale particles (dust). Papers are invited that address the space debris population and growth projections; debris and dust characteristics; impact modeling and materials testing; modeling and simulation and/or test results that can lead to quantification of the risks to spacecraft in various orbits and exploration missions; and mitigation strategies including debris removal or repositioning, spacecraft shielding, orbit selection, and spacecraft operations. Papers documenting past mission anomalies traced to space debris, and mitigation strategies employed today, are also of interest.

James Kinnison **jim.kinnison@jhuapl.edu**

Mission System Engineer, Johns Hopkins University/Applied Physics Laboratory

Yasin Abul-Huda **yasin.abul-huda@jhuapl.edu**

Space Environmental Effects Modeling and Analysis, Johns Hopkins University/Applied Physics Laboratory

Session 10 Asteroid Detection, Characterization, Sample-Return, and Deflection

This Session invites papers on flight and ground system concepts, mission concepts, and technologies that address the need to detect, characterize and deflect asteroids that could pose an impact hazard to Earth. Papers on instrument technologies and technologies for proximity operations near, and landing on, asteroids are also sought.

Jeffery Webster **jeff.webster@aeroconf.org**

Senior Systems Engineer, retired, NASA Jet Propulsion Laboratory

Paul Chodas **paul.chodas@jpl.nasa.gov**

Director, Center for Near-Earth Object Studies, NASA Jet Propulsion Laboratory

Michael Werth **mikewerth1@gmail.com**

Senior Scientist, The Boeing Company

Session 11 In-Space Robotics: In-Space Servicing, Assembly, Manufacturing, and Active Debris Removal

On-going and future missions involving in-space robotic systems and operations, to include in-space Inspection, Servicing, Active Debris Removal, Assembly, and Astronaut Assistance. All designs and methods to accomplish robotic tasks in orbit, such as mobility, manipulation, assembly or maintenance, are of interest. Specific aspects may be addressed, such as hardware design, open-loop or closed-loop control, rendezvous trajectory generation, computer vision, autonomy, tele-operation, experimental facilities on the ground, or others of relevance. Mission concept papers are to include technical development toward ground testing or flight operation.

David Sternberg **david.c.sternberg@jpl.nasa.gov**

Guidance and Control Engineer, NASA Jet Propulsion Laboratory

Kenneth Cheung **kenny@nasa.gov**

research scientist, NASA Ames Research Center

Track 3 Antennas, RF/Microwave Systems and Radio Science

Glenn Hopkins
glenn.hopkins@gtri.gatech.edu

GTRI Fellow and Chief Engineer of the Antenna Systems Division of the GTRI Sensors and Electromagnetic Applications Laboratory, specializing in array antenna technologies. Interests include phased arrays, wide bandwidth antennas, digital beam forming and RF subsystems.

James Hoffman
jimhoffman@ieee.org

Vice President of Engineering at Kinemetrics, Inc. Over 10 years experience in microwave instrument design for remote sensing applications. Formerly the RF System Lead for the NISAR radar mission (NASA-ISRO) and the InSight Landing Radar.

Session 01 Phased Array Antenna Systems and Beamforming Technologies

Included are active power combining, thermal management, phasing networks, integration, power, test and evaluation and beamsteering, algorithm development and associated hardware implementations, and modeling and simulation for all levels of phased array development and beamsteering.

Glenn Hopkins **glenn.hopkins@gtri.gatech.edu**

Principal Research Engineer, Georgia Tech Research Institute

Session 02 Ground and Space Antenna Technologies and Systems

Topics on all aspects of antenna systems associated with space-based sensors or communications. Systems include ground based terminals, ground-to-space and space-to-space data links, and radar sensors. Antenna technologies include reflectors, lenses, feeds, arrays, and the transmit/receive subsystems associated with the antenna(s).

James Hoffman **jimhoffman@ieee.org**

Vice President of Engineering, Kinemetrics

David Mooradd **mooradd@ll.mit.edu**

Technical Staff, MIT Lincoln Laboratory

Session 03 RF/Microwave Systems

Papers about RF and microwave systems or components, passive and active, including radar systems.

James Hoffman **jimhoffman@ieee.org**

Vice President of Engineering, Kinemetrics

Orin Council **orin.council@gtri.gatech.edu**

Research Engineer, Georgia Tech Research Institute

Session 04 Radio Astronomy and Radio Science

Papers on the techniques, hardware, systems, and results in the fields of Radio Astronomy and Radio Science.

Mark Bentum **m.j.bentum@tue.nl**

Professor, Eindhoven University of Technology

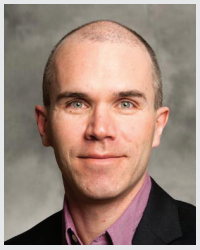
Melissa Soriano **webguru@aeroconf.org**

Payload Systems Engineer, NASA Jet Propulsion Laboratory

Track 4 Communication & Navigation Systems & Technologies

Kar Ming Cheung
kar-ming.cheung@jpl.nasa.gov

Principal Engineer and Technical Group Supervisor in the Communication Architectures and Research Section at the NASA Jet Propulsion Laboratory. Received NASA's Exceptional Service Medal for work on Galileo's onboard image compression scheme. BSEE, University of Michigan, Ann Arbor; M.S. and Ph.D., California Institute of Technology.



John Enright
jenright@torontomu.ca

Professor in Department of Aerospace Engineering at Toronto Metropolitan University (formerly Ryerson University). His primary research interests concern the development of attitude sensors for spacecraft, optical navigation, and mobile robotics.

Session 01 Evolving Space Communication Architectures

A forum in which to trace, examine and predict trends in the architectures of space communications and navigation, including ground infrastructure and support and interactions between terrestrial and space networks. Innovative concepts and game changing approaches with a system view are especially sought.

Shervin Shambayati **shervin.shambayati@aero.org**

Senior Systems Engineering, Aerospace Corporation

Session 02 Communication Protocols and Services for Space Networks

The focus is communication protocols and services supporting space systems, including ground- and space-based methods to increase efficiency, enable new exploration/applications, provide more secure systems, and improve Quality of Service. Techniques include relay communications, routing, delay/disruption tolerant networking, retransmission approaches, adaptive link/network/transport methods, demand access, and advanced scheduling. Novel space network architectures are of key interest, including microspacecraft swarms, sensor webs, and surface networks. Implementation and evolution of communications networking into space systems, as well as application to specific missions, are sought.

Shervin Shambayati **shervin.shambayati@aero.org**

Senior Systems Engineering, Aerospace Corporation

Session 03 Next Generation Space Systems: AESS GLUE

This session solicits papers on advanced, interdisciplinary, topics in Space System Engineering, based on the concept of interdependency of systems. This includes new broadband communications systems and techniques, their use platforms, such as small satellites, Internet-of-Remote Things and Internet-of-Space-Things, software control and implementation of sky communications and networks (SDR and SDN), end-to-end system considerations, augmented 3D reality for manned space missions, integration of navigation, communications and sensing functionalities, and advanced signal processing techniques for emerging space communications and data applications.

Claudio Sacchi claudio.sacchi@unitn.it

Associate professor, University of Trento

Tommaso Rossi tommaso.rossi@uniroma2.it

Engineer, University of Rome Tor Vergata

Session 04 Navigation and Communication Systems for Exploration

Systems, technology, and operations for navigation and/or communication among elements involved in civil, commercial, or national security missions in any orbital domain (Earth and interplanetary). The session focuses on enabling technologies, strategies, new operational concepts and performance improvements for advancing mission capability.

Patrick Stadter patrick.a.stadter@aero.org

General Manager, Agile Acquisition Division, The Aerospace Corporation

David Copeland david.copeland@jhuapl.edu

Principal Professional Staff, Johns Hopkins University/Applied Physics Laboratory

Session 05 Relay Communications for Space Exploration

For a wide range of space exploration scenarios, multi-hop relay communications can provide significant benefits in terms of increased data return and reduced user burden (mass, power, cost) over conventional space-to-ground links. In this session we examine relay communications for both Earth-orbiting missions and missions to the Moon and throughout the solar system. Topics of interest include relay system architecture, relay spacecraft design (for both dedicated relay orbiters and for hybrid science/telecom spacecraft), relay telecommunications payload design, relay communication protocols, mission applications and operational experiences/lessons-learned.

Mazen Shihabi mazen.m.shihabi@jpl.nasa.gov

Technical Group Supervisor, NASA Jet Propulsion Laboratory

Jaime Esper jaime.esper@nasa.gov

Project Manager, NASA Goddard Space Flight Center

Session 06 Space Communication Systems Roundtable : Networking the Solar System

The roundtable will provide a forward-looking view of the development of a Solar System Internetwork - a layered architecture aimed at offering ubiquitous, high-bandwidth communication throughout the solar system in support of robotic and, ultimately, human exploration at the Moon and in deep space. Panelists will assess trends in physical layer capabilities, including migration to higher RF frequencies (Ka-band) and/or to optical wavelengths, as well as higher layers in the protocol stack, including networking protocols such as DTN. Based on assessment of forecasted commercial satcom trends, and building on the multi-hop relay capabilities operating today at Earth and at Mars, the roundtable will describe the evolution towards a true Solar System Internetwork in the coming decades.

E. Jay Wyatt e.jay.wyatt@jpl.nasa.gov

Program Manager, NASA Jet Propulsion Laboratory

Alan Hylton alan.g.hylton@nasa.gov

Network Studies Manager, NASA

Session 07 Innovative Space Communications and Tracking Techniques

This session solicits innovative contributions to improve flight and ground communication and tracking systems such as antenna arrays, software-defined radios, advance receivers, deployable antennas, relay satellites, Ka and Optical communications, novel signal formats, new coding methods, and CubeSat communications and tracking techniques.

Kar Ming Cheung kar-ming.cheung@jpl.nasa.gov

Technical Group Supervisor, NASA Jet Propulsion Laboratory

Alessandra Babuscia alessandra.babuscia@jpl.nasa.gov

Telecommunication Engineer, NASA Jet Propulsion Laboratory

Session 08 Communication System Analysis & Simulation

This session solicits innovative contributions on modeling, analysis, and/or simulation of satellite, aerospace, or terrestrial communication systems. Topics include modeling and design of network services and systems, design and evaluation of communication waveforms, modulations, and coding, modeling of multipath effects in space communications, integration of terrestrial and satellite networks, deep space communication systems, terrestrial and deep space relay space networks, protocols for satellite communication, traffic modeling, traffic engineering and analysis, network optimization and resource provisioning, Delay Tolerant Networking, overlay and virtual networks, cross-layer & cross-system protocol design, and communication network monitoring.

Marc Sanchez Net marc.sanchez.net@jpl.nasa.gov

Telecommunications Engineer, NASA Jet Propulsion Laboratory

Session 09 Communications and/or Related Systems: Theory, Simulation, and Signal Processing

This session solicits innovative contributions on theory, modeling and simulation, and signal processing foundations of satellite, aerospace and terrestrial wireless communications.

David Taggart dtaggart1912@gmail.com

Engineer, Self

Claudio Sacchi claudio.sacchi@unitn.it

Associate professor, University of Trento

Len Yip len.yip@aero.org

Senior Communication Architecture Analyst, Aerospace Corporation

Session 10 Wideband Communications Systems

This session solicits innovative contributions about wideband communication systems in terrestrial, satellite, and hybrid Space-terrestrial communications systems transmitting information at high data rates. Papers dealing with modelling and simulations of communications systems, evaluating performance, or describing hardware/software implementation of communication system components are welcome. Detailed topics include, but are not limited to: Broadband satellite and aerospace transmission; Broadband terrestrial wireless transmission; Millimeter wave communications; Spread-spectrum and CDMA communications; TV and HDTV broadcasting over satellite; Modulation and channel coding techniques; MIMO techniques; Antenna design; Multi-carrier communications; Multi-user transmission; Channel equalization; Carrier and timing synchronization; Radio resource management and scheduling; Emerging technologies for safety-critical and emergency communications; Emerging standards for terrestrial and satellite communications (LTE, LTE-A, WiMax, DVB-S2, IEEE 802.11x); Energy-efficient terrestrial and satellite communications; and networking.

David Taggart dtaggart1912@gmail.com

Engineer, Self

Claudio Sacchi claudio.sacchi@unitn.it

Associate professor, University of Trento

Session 11 Software Defined Radio and Cognitive Radio Systems and Technology

This section presents papers on software and cognitive radio in general, and their application to space communications in particular. Both original and space-centric tutorial papers are welcome.

Eugene Grayver eugene.grayver@aero.org

Principal Engineer, Aerospace Corporation

Genshe Chen gchen@intfusiontech.com

CTO, Intelligent Fusion Technology, Inc.

Session 12 Global Navigation Satellite Systems

This session focuses on recent advances in satellite navigation. Current and future envisioned applications of GPS, GLONASS, Galileo, and Compass global navigation satellite systems (GNSSs) are addressed, as well as global, regional and local augmentation systems. The topics covered include next generation GNSSs, receiver technologies, interoperability, orbit computation, multi-sensor fusion, and navigation model, methods and algorithms.

Lin Yi lin.yi@jpl.nasa.gov

Technical Group Supervisor, NASA Jet Propulsion Laboratory

Sriramya Bhamidipati sriramya.bhamidipati@jpl.nasa.gov

Robotics Technologist, NASA Jet Propulsion Laboratory

Session 13 Space Navigation Techniques

Papers in this session are collected on topics of architecture, hardware and algorithms relating to space navigation techniques including, but not limited to: Ground-based deep space navigation using NASA Deep Space Network, ESA Deep Space Antenna, as well as similar deep space navigation facilities from China, India, Japan, etc.; Navigation at lunar surface and deep space gateway; Navigation in deep space CubeSats missions; Spacecraft formation flying navigation; Navigation in rendezvous missions; Novel navigation methods (e.g. using pulsars); Relative navigation between spacecraft; Spacecraft navigation with GNSS (Papers accepted under this topic can overlap with the GNSS session topics, and please expect coordination in the final program arrangement); Spacecraft navigation with in-situ sensors including but not limited to magnetometers, inertial sensors, etc.; Navigation robustness; Autonomous navigation; Integrated navigation.

Lin Yi **lin.yi@jpl.nasa.gov**

Technical Group Supervisor, NASA Jet Propulsion Laboratory

John Enright **jenright@torontomu.ca**

Professor, Toronto Metropolitan University

Session 14 CNS Systems and Airborne Networks for Manned and Unmanned Aircraft

This session focuses on communications, navigation and surveillance systems, including on-board and ground-based systems for all vehicles operating in the National Airspace System (NAS): manned and unmanned vehicles, fixed wing and rotor-craft, general aviation, civil transport and military that may carry passengers, cargo or are performing surveillance-type missions. Topics range from concept development, simulation and modeling, technology development and verification, through flight testing and certification. Emerging fields include surface wireless networks, ADS-B, Datacomm, airborne network security, UAS integration, satellite-based CNS, and international activities.

Dylan Hasson **dylan.hasson@dot.gov**

General Engineer, Volpe National Transportation Systems Center

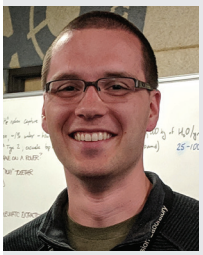
Session 15 Aerospace Cyber Security and Cyber-Physical Systems

Computer networks, information technology, and cyber security are contributing significant advances as well as challenges in aerospace. Systems that integrate with the cyberspace and enable safe, efficient and/or profitable operation and performance, with minimal or no human intervention, are of growing interest. This session focuses on cyber security and privacy developments in the areas including, but not limited to: aerospace software, data and multimedia distribution; air traffic control systems; IVHM; aeronautical and space networked systems; aircraft, airport and airline information systems; UAS/UTM/UAM/AAM, spacecraft and commercial space vehicles; cloud computing, cyber-physical systems, and IoT; and, aerospace cybersecurity regulations and industry standards.

Krishna Sampigethaya **sampiger@erau.edu**

Department Chair and Professor, Embry-Riddle Aeronautical University

Track 5 Small Spacecraft, Low-Cost Missions, Systems and Technologies



Alex Austin
alexander.austin@jpl.nasa.gov

Systems Engineer in the Advanced Design Engineering group at the Jet Propulsion Laboratory. Flight System Systems Engineer for the INCUS mission, as well as the Lead Engineer for Team Xc. B.S. in Aeronautical and Mechanical Engineering and M.S. in Aeronautical Engineering from Rensselaer Polytechnic Institute.

Catherine Venturini
catherine.c.venturini@aero.org

Principal Engineer in the Office of the Chief Technology Officer at The Aerospace Corporation. Leads numerous studies related to small satellite technical trends, mission concepts and capabilities, and new approaches to mission success.

Session 01 Small, Low-Cost Missions in Development and Operations for Space and Earth Exploration

This session will explore the use of small spacecraft (smallsats, CubeSats, etc.) to enable new, exciting low-cost missions for space exploration. This session will focus on small, low-cost missions in development or operations.

Young Lee **young.h.lee@jpl.nasa.gov**

Technical Group Supervisor and Project Support Lead, NASA Jet Propulsion Laboratory

Benjamin Donitz **benjamin.p.donitz@jpl.nasa.gov**

Systems Engineer, NASA Jet Propulsion Laboratory

Lee Jasper **lee.jasper@sdl.usu.edu**

System Engineer , Space Dynamics Laboratory

Session 02 Future Small, Low-Cost Mission Concepts

This session is focused on small mission concepts and missions in formulation. Missions in all areas of space exploration are welcome, including Earth science, planetary science, astrophysics, and heliophysics.

Young Lee young.h.lee@jpl.nasa.gov
Technical Group Supervisor and Project Support Lead, NASA Jet Propulsion Laboratory

Dexter Becklund dexter.becklund@aero.org
Engineering Manager, The Aerospace Corporation

Nathan Barba nathan.j.barba@jpl.nasa.gov
Systems Engineer, NASA Jet Propulsion Laboratory

Session 03 Lessons Learned from Small Spacecraft Missions

The past decade has seen major advancements in the development and demonstration of CubeSat and SmallSat technologies and missions. There are many issues and challenges to flying CubeSats and SmallSats successfully, including performance, cost, risk, reliability, fault tolerance, thermal management, radiation hardness, and mission lifetime. University involvement in CubeSat and SmallSat development has provided an excellent training ground for future spacecraft developers. CubeSat and SmallSat technology demonstrations have been experimental and operational. CubeSat and SmallSat technology and mission developments and demonstrations have experienced total successes, partial successes, and, undoubtedly, a few failures. Each success and failure provide opportunities to learn. The objective of this session is to allow CubeSat and SmallSat developers to share their lessons learned, both good and bad, with the CubeSat and SmallSat community.

Michael Swartwout mswartwo@slu.edu
Professor, Saint Louis University

Bruce Yost bruce.d.yost@nasa.gov
Director, S3VI, NASA Ames Research Center

John Samson jrsamson1970@gmail.com
Research Affiliate / Aerospace Consultantant, Morehead State University

Session 04 Small Missions as an Educational Opportunity

This session focuses on CubeSat/SmallSat applications as part of an educational process.

Michael Swartwout mswartwo@slu.edu
Professor, Saint Louis University

Jin S. Kang kang@usna.edu
Associate Professor, U.S. Naval Academy

Session 05 Instruments and Payloads for Small, Low-Cost Missions

Payloads and instruments for small spacecraft can bring unique challenges, yet can provide capabilities not previously considered. This Session is focused on all types of instruments and payloads for small missions.

Rashmi Shah rashmi.shah@jpl.nasa.gov
Associate Directorate Technologist for Earth Science and Technology, NASA Jet Propulsion Laboratory

Michael O'Connor michael.oconnor.23@spaceforce.mil
Major, United States Space Force

Laila Kazemi laila@arcsecspace.com
ADCS R&D Engineer , arcsec

Session 06 Technologies for Small, Low-Cost Missions

This session seeks papers covering technologies, systems, and RF components for very small spacecraft (secondary platforms such as CubeSat, ESPA and ASAP-class) that enable "big" science and technology missions on a small budget. Papers that evaluate flight or testing results are strongly encouraged.

John Dickinson jrdicki@sandia.gov
Manager, Research & Development, Flight Edge Compute Systems, Sandia National Laboratories

Dimitris Anagnostou danagn@ieee.org
Associate Professor, Heriot Watt University

Michael Mclelland michael.mclelland@swri.org
Vice President, Space Systems Division, Southwest Research Institute

Session 07 Access to Space for Small, Low-Cost Missions

Getting to space can be a roadblock for small space missions due to launch costs and availability. This session focuses on the development of adapters (ESPA, PPOD, etc.), new launch vehicles, the acceptance of risk for accommodating secondary or auxiliary payloads and hosted payload options to create opportunities for small mission access to space.

Kara O'Donnell **kara.a.odonnell@aero.org**

Principal Director, Aerospace Corporation

Nicole Fondse **nicole.fondse@aero.org**

Systems Director, Aerospace Corporation

Session 08 Applications for Distributed Systems of Small Spacecraft

This session focuses on distributed systems, swarms, networks, and constellations of small spacecraft, enabling low cost missions while also creating novel opportunities for new capabilities and science.

Ryan Woolley **woolley@jpl.nasa.gov**

Mission Design Engineer, NASA Jet Propulsion Laboratory

Ashwati Das-Stuart **ashstudas@gmail.com**

Navigation Engineer, NASA Jet Propulsion Laboratory

Rashmi Shah **rashmi.shah@jpl.nasa.gov**

Associate Directorate Technologist for Earth Science and Technology, NASA Jet Propulsion Laboratory

Track 6 Remote Sensing

Jordan Evans
jordan.p.evans@jpl.nasa.gov

Project Manager, Europa Clipper. Previously the Deputy Director for Engineering and Science at JPL and Division Manager of JPL's Mechanical Systems Division. Development experience with space projects at both NASA Goddard and JPL, including FUSE, WFC3, GLAST, LISA, and MSL along with numerous architecture studies.

Darin Dunham
darin@vectraxx.com

LM Fellow and Spiral Chief Engineer, C2BMC Missile Defense National Team, Lockheed Martin, Huntsville. Working on target tracking and discrimination algorithms within the Ballistic Missile Defense System. Served almost 10 years in the Marine Corps. MSEE, Naval Postgraduate School; BSEE, Carnegie Mellon.

Session 01 Systems Engineering Challenges and Approaches for Remote Sensing Systems

The need to make a particular measurement from a particular vantage point drives us to build sophisticated remote sensing instruments and launch them on similarly sophisticated spacecraft, aircraft, submersibles, balloons, etc. This session explores the highly coupled nature of the instrument, platform architecture, flight path design, ground system and mission operations, and the systems engineering challenges and solutions employed.

Topics include instrument influences on platform architectures and flight path design, platform-to-instrument integration, trade studies, trends and novel solutions.

Travis Imken **travis.imken@jpl.nasa.gov**

Systems Engineer, NASA Jet Propulsion Laboratory

Bogdan Oaida **bogdan@jpl.nasa.gov**

Group Supervisor, NASA Jet Propulsion Laboratory

Maria De Soria Santacruz Pich **maria.de.soria-santacruz.pich@jpl.nasa.gov**

Systems Engineer, NASA Jet Propulsion Laboratory

Session 02 Instrument and Sensor Architecture, Design, Test, and Accommodation

This session covers topics related to the physical or functional architecture and design of instruments/sensors. Topics include hardware/software trade studies, fault protection approaches, unique or innovative system interfaces, accommodation of payloads within a system, system-level instrument/sensor testing, instrument/sensor integration, test, and calibration, and approaches to the processes involved in engineering an instrument or sensor.

Matthew Horner **mhorner@jpl.nasa.gov**

Mechanical Systems Engineer, NASA Jet Propulsion Laboratory

Keith Rosette **keith.a.rosette@jpl.nasa.gov**

Deputy Project Manager, NASA Jet Propulsion Laboratory

Session 03 Imaging Spectrometer Systems, Science, and Applications

This session covers the design, assembly, calibration, and operation of imaging spectrometer instruments and hyperspectral sensors. Technology development and data processing techniques are also included, as well as proposed instruments and lessons learned from all phases.

Peter Sullivan peter.sullivan@jpl.nasa.gov

Electrical Engineer, NASA Jet Propulsion Laboratory

Mohamed Abid mabid@jpl.nasa.gov

SRL Payload Chief Engineer, NASA Jet Propulsion Laboratory

Session 04 Radar, IR, and Electro-Optical Sensor Systems and Signal Processing

This session focuses on remote sensing devices, systems, and signal processing. Topics of interest include surveillance and imaging radars, infrared search and track systems, IR components and instrumentation, and electro-optic imagers and their application to environmental, defense, astronomical, and meteorological sensing.

Thomas Backes tdbackes@gmail.com

Research Engineer, Georgia Institute of Technology

Donnie Smith donnie.smith@gatech.edu

Radar Engineer, Waymo

Robert Magnusson magnusson@uta.edu

Professor, University of Texas at Arlington

Session 05 Information Fusion

This session focuses on exploitation of all sources of information, including physical sensor data, context information, and human inputs. Methodologies for effective multi-sensor multi-target tracking and sensor management of disparate sources are of interest, as are algorithms and advances in downstream analysis of track data for situational awareness.

Craig Agate cagate@toyon.com

Chief Scientist, Toyon Research Corporation

Dan Harris m082844@gmail.com

Causal AI Architect, Northrop Grumman Corporation

Session 06 Multisensor Fusion

Papers that address all aspects of information fusion for the integration of multiple sensors are sought. Of particular interest are the theoretical aspects of some popular questions.

When is sensor fusion better than a single sensor? How does one ensure that sensor fusion produces better results? Paper that document algorithms that address one of the many challenges in multisensor/multitarget tracking or multisensor resource management are also sought.

William Blair dale.blair@gtri.gatech.edu

Principal Research Engineer, Georgia Tech Research Institute

Laura Bateman laura.bateman@jhuapl.edu

System Engineer, Johns Hopkins University/Applied Physics Laboratory

Session 07 Applications of Target Tracking

Tracking of targets, both cooperative and uncooperative, moving under water, on water, on land, in air or in space, with sonar, radar or electro-optical sensors. Fusion of data from multiple sensors. Algorithms for handling target maneuvers and data association. Estimation of sensor properties (biases, noise variances). Includes traditional tracking algorithms and AI/ML approaches.

John Glass jglass20@gmail.com

Systems Engineer, RTX

John Grimes john.p.grimes@baesystems.com

Scientist, BAE Systems, Inc

Session 08 Fusion Integration of Sensor Harvesting

Methods for situation awareness/assessment, threat/impact analysis, sensor/processing refinement, user/man-machine interfaces, and mission awareness/responsiveness. Techniques for system design leveraging information fusion for Command, Control, Communications, Computers, and Cyber Intelligence, Surveillance and Reconnaissance (C5ISR) over multi-domain sensor data and intelligence collections. Applications focusing on space, air, and architecture developments for efficient and effective distributed net-centric operations, edge computing, and complex networks. Approaches for software/hardware dynamic data-driven applications systems (DDDAS) improvements, context-enhanced results, and avionics protocols for big data scenarios. Use of information fusion to optimize and coordinate machine analytics with users for human-machine teaming.

Erik Blasch erik.blasch@gmail.com

IEEE Aerospace & Electronic Systems Society, Air Force Research Laboratory

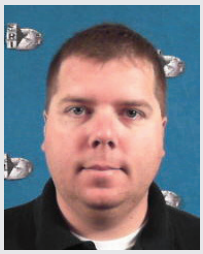
Peter Zulch peter.zulch@us.af.mil

Engineer, Air Force Research Laboratory

Track 7 Avionics and Electronics for Space Applications

John Dickinson
jrdicki@sandia.gov

Experience in spacecraft & payload systems engineering and avionics design & test on Kepler, WISE, JUNO, IBEX, RBSP, MMS, SPP, Solar Orbiter, CYGNSS, and multiple government programs. BSEE, Johns Hopkins University; MSEE, Georgia Institute of Technology.



Patrick Phelan
pphelan@swri.org

Manager at Southwest Research Institute (SwRI) in San Antonio, TX, USA in the Space Systems Division. B.S., Computer Engineering and M.S., Electrical Engineering, Georgia Institute of Technology.

Session 01 High Performance Computing and On-Board Data Processing for Space Applications

Explore innovations and new developments in spacecraft on-board and embedded computing architectures. Example hardware topics: processors, data handling and companion processing ASICs and FPGAs, multicore processing architectures, application of soft-core embedded FPGA processors, emerging GPU technologies for space-based applications, on-orbit reconfiguration, and new or applied standards for embedded space electronics applications. Example software topics: machine learning techniques, embedded cluster computing, on-board big data analytics, power-aware optimal reconfiguration algorithms, reconfigurable software-implemented hardware fault tolerance algorithms and designs, evolutionary platforms, and autonomous computing designs. Papers should address, as applicable: processing performance, size-weight-power (SWaP) comparisons of different components and architectures, standardized form factors, protocols and interfaces, radiation hardness by design, process, or technology, mitigation of other spacecraft environmental factors, software support, and integration and test of elements. Descriptions and performance of actual development, test, flight, or mission usage are highly sought.

Jamal Haque **jamal_haq@yahoo.com**

Chief Satellite Architect, Lockheed Martin Space Systems Company

Robert Merl **merl@lanl.gov**

Electrical Engineer, Los Alamos National Laboratory

Session 02 Peripheral Electronics, Data Handling, and Interconnects for Space Applications

This session explores novel concepts for hardware and software technologies that support but are peripheral to the main computing core. Example topics include: novel instrument or payload hardware and software technologies; network connections architectures; high speed interconnects; mixed signal and systems-on-a-chip technologies; onboard signal, data, and command processing; telecommand reception, decoding, and distribution; payload data pre-processing; dedicated accelerators for data processing; transmission and storage (e.g. compression, encoding, parallel processing for payloads (GIPs, GFLOPs), etc.); fault-tolerance mechanisms; autonomous operations, reconfigurable approaches, and failsafe strategies; emerging and novel designs and tests for high performance embedded computing platforms; temporal and spatial reuse of systems' resources; sensor, detector, and imager readout circuits; high resolution/ high speed ADCs and DACs; resource efficient (mass/ volume) miniaturized multi-channel/ parallel systems; circuit designs for analog and digital processing functions; and designs for integrated communications systems applications on a chip.

Patrick Phelan **pphelan@swri.org**

Manager - R&D, Southwest Research Institute

Mark Post **mark.post@york.ac.uk**

Senior Lecturer, University of York

Michael Epperly **mepperly@swri.edu**

Senior Program Manager, Southwest Research Institute

Session 03 Assembly, Integration, and Test for Electrical Space Systems

This session explores all aspects of assembly, integration, and test of electrical space systems. This includes assembly, integration, and test efforts at the board-level for RF, analog, or digital card assemblies; box-level for command, telemetry, data handling, data processing, control, power, or mixed-purpose avionics; subsystem-level for instruments/payloads; or system-level for entire spacecraft electrical subsystems. Papers can address innovative uses of test software, test scripts, mission simulation, human-computer interface, electrical support ground equipment, and harnessing to accomplish integration and test. Papers also address unique system engineering and configuration control approaches to manage test, and transition from system test to launch and mission operations.

Eric Bradley **eric.w.bradley6.civ@us.navy.mil**

Computer Engineer, Naval Research Laboratory

Eric Rossland **eric.rossland@nrl.navy.mil**

Electronics Engineer, Naval Research Laboratory

Session 04 Power Electronics for Aerospace Applications

This session explores advanced power electronics designs and systems for space and avionics applications. Example topics include: power devices; wide bandgap power semiconductors; power electronics; electro-magnetic devices; photo-voltaic modules; energy storage and battery management systems and power systems. Papers discuss technical aspects of power electronics including extreme thermal and power requirements, radiation hardening, efficiency and power management, tolerance to aerospace environments, and reliability.

Christopher Iannello chris.iannello@nasa.gov

NASA Technical Fellow for Electrical Power, NASA NESC

Thomas Cook thomas.cook@swri.org

Senior Research Engineer, Southwest Research Institute

Session 05 Electronics for Extreme Environments

This session explores innovations in electronics technologies and packaging that help enable operation of electronics in extreme environments, including space. Technologies resilient to extremes in temperature, radiation, and launch vehicle environments are relevant. Example topics include: materials and techniques for assembling and testing microelectronics; component packaging, attachment, and connectors; thermal/mechanical/electrical/radiation performance comparisons; reliability and failure analyses; adaptation of manufacturing methods for space applications; and integration of diverse modules such as MEMS, power electronics, sensors, optics, RF and microprocessors.

Mohammad Mojarradi mohammad.m.mojarradi@jpl.nasa.gov

Manger, Componnent Engineering and Assurance, NASA Jet Propulsion Laboratory

Session 06 Fault Tolerance, Autonomy, and Evolvability in Spacecraft and Instrument Avionics

This session explores adaptation, including Fault Tolerance, Autonomy, and Evolvability, in space electronics. Adaptation reflects the capability of a system to maintain or improve its performance in the presence of internal or external changes, such as faults and degradations, uncertainties and variations during fabrication, modifications in the operational environment, or incidental interference. This session addresses all aspects of adaptivity for spacecraft and instrument avionics with the scope of papers encompassing theoretical considerations, design solutions, and actual techniques applied to space flight operations.

Tom Hoffman thoffman@jpl.nasa.gov

Project Manager, NASA Jet Propulsion Laboratory

Didier Keymeulen didier.keymeulen@jpl.nasa.gov

Principal, Member Technical Staff, NASA Jet Propulsion Laboratory

Session 07 Guidance, Navigation, and Control Technologies for Space Applications

This session explores sensor, actuator, algorithm and processing innovations related to the guidance, navigation, and control of space vehicles. This session welcomes manuscripts that discuss technologies applicable to satellites, probes, landers, launchers, and other space-related missions.

Leena Singh lsmindstorm@gmail.com

Senior Staff, MIT Lincoln Laboratory

Matthew Lashley matthewvlashley@gmail.com

Senior Research Engineer, Georgia Tech Research Institute

John Enright jenright@torontomu.ca

Professor, Toronto Metropolitan University

Session 08 Emerging Technologies for Space Applications

This session explores a wide range of advanced, novel, and cutting edge device technologies for space applications. Example topics include: advanced MEMS devices; 3D circuit printing; innovative embedded electronics applications (including multi-functional components); as well as the leveraging of advanced commercial electronics for space applications. This session also serves as a catch-all for unique advanced technology topics that do not fit cleanly into other sessions or are inherently multi-disciplinary in nature.

William Jackson william.jackson01@l3harris.com

Senior Scientist, L3Harris Technologies

Michael Mclelland michael.mclelland@swri.org

Vice President, Space Systems Division, Southwest Research Institute

Session 09 COTS Utilization for Reliable Space Applications

This session explores the use of commercial, off-the-shelf electronics and technologies in a space environment. Using commercial electronics not intended for an application in a space environment is becoming increasingly common. Topics of interest include: adaptations of COTS electronics for fault tolerance and environmental resilience; flight proven COTS electronics; novel implementations of electrical functions using COTS components; and results of COTS component use. Papers address theoretical considerations, design solutions, and actual techniques applied to space flight operations.

Douglas Carssow douglas.carssow@nrl.navy.mil

Electronics Engineer, Naval Research Laboratory

Session 10 Designing Spacecraft Hardware for Electromagnetic Compatibility, Signal Integrity, and Power Integrity in Space Applications

This session explores the advanced and innovative techniques recently developed that ensure spacecraft hardware are designed and hardened for electromagnetic compatibility (EMC) with emphasis on signal integrity and power integrity (SI/PI) of the unit electronics. Topics of interest include: risks posed by Electromagnetic Interference (EMI), SI/PI, DC magnetic cleanliness and Electrostatic Discharge (ESD) present in spacecraft instruments, International Space Station instruments, spacecraft & space launch vehicle systems, robotics, and crewed vehicles. Papers address a wide range of topics and present innovative modeling and hardware solutions to EMC on the part, board, box, system, multi-system, planetary, and interplanetary levels. The harshness of the space environments necessitates a broader view of EMC issues than traditional terrestrial projects, often leading to creative methods and solutions that can benefit our society's efforts elsewhere on Earth.

Jeffrey Boye **jeffrey.boye@jhuapl.edu**

Engineer, Johns Hopkins University/Applied Physics Laboratory

Pablo Narvaez **pablo.narvaez@jpl.nasa.gov**

Principal Engineer/Section Manager, NASA Jet Propulsion Laboratory

Track 8 Spacecraft & Launch Vehicle Systems & Technologies

Greg Chavers
greg.chavers@nasa.gov

Strategic architect and integration manager for science and technology at the Marshall Space Flight Center. B.S., Aerospace Engineering, Auburn University; M.S. and Ph.D., Physics, University of Alabama, Huntsville.

Lisa May
lisa.may@aeroconf.org

Lockheed Martin's Deep Space Exploration Strategy & BD Lead for Commercial Civil Space. Portfolio includes robotic science solutions, including deep space planetary missions. M.S., Mechanical Engineering and B.A., Speech Communications, University of Virginia.

Session 01 Human Exploration Beyond Low Earth Orbit

This session seeks papers addressing the broader aspects of human and scientific exploration including planning, development, system concepts, and execution of missions beyond low Earth orbit toward the lunar surface and on to Mars. Sample topics include systems architecture studies of human missions to cislunar space, the Moon and Mars, design reference mission analyses, strategic concepts, broader trade study and systems engineering analyses for any aspect of human and scientific space exploration systems beyond low-Earth orbit, and post-mission analyses and lessons learned from executed missions. Lunar landers, surface systems and sustainable concepts for lunar exploration extensibility toward Mars exploration missions are in focus.

Kevin Post **kevin.e.post@nasa.gov**

Mission Design Engineer, Booz Allen Hamilton

Chel Stromgren **chel.stromgren@nasa.gov**

COO, Binera, Inc.

Session 02 Human Exploration Systems Technology Development

This session seeks papers dealing with technology development for human exploration of space. This can include development efforts with technology readiness levels anywhere from laboratory to full-scale flight demos. It can also include assessments of technology needs of programs, program elements, or individual mission concepts.

Matthew Simon **matthew.a.simon@nasa.gov**

Capabilities Integration Lead, NASA Langley Research Center

Erica Rodgers **erica.rodgers@nasa.gov**

Senior Analyst, NASA Headquarters

Session 03 Advanced Launch Vehicle Systems and Technologies

This session seeks papers covering on-going development and future advances in space transportation from Earth to orbit and distant destinations. Topics including transportation architectures, launch vehicles, infrastructure, transportation business and enabling technologies are of interest.

Melissa Sampson **melissa.sampson@lmco.com**

Strategy & External Engagement Lead, Lockheed Martin

Randy Williams **randall.l.williams@aero.org**

Systems Director, The Aerospace Corporation

Session 04 Commercial Services for Lunar and Mars Exploration

This session seeks papers related to commercial services, such as Commercial Lunar Payload Services (CLPS), Human Landing Systems (HLS), and Deep Space Logistics (DSL), etc for the exploration of Moon and Mars. This includes opportunities and challenges for mission planners and project / program management within NASA as well as opportunities and challenges for the commercial providers. Lessons learned on past and near-term missions are valuable to evolving the commercial services approach and are of high interest. Perspectives on business cases for commercial services is of interest.

Paul Niles paul.b.niles@nasa.gov

Planetary Scientist, NASA Johnson Space Center

Steve Matousek steven.e.matousek@jpl.nasa.gov

Manager, Advanced Studies, Mars Exploration Program, NASA Jet Propulsion Laboratory

Session 05 Human Factors & Performance

This session seeks papers on human performance, integration, and operations within complex spacecraft systems. Suggested human factors topics may include cockpit and flight deck displays and controls, autonomous crew performance, handling qualities and flight performance, human-robotic interaction and performance, team performance and dynamics, training, countermeasures technologies/ systems, and behavioral health and performance during short- and long-duration spaceflight. Papers including operations to experimental and modeling approaches, both in the laboratory and in spaceflight analog locations are of interest.

Jessica Marquez jessica.j.marquez@nasa.gov

Human System Engineer, NASA Ames Research Center

Kevin Duda kduda@draper.com

Senior Program Manager, Space Systems, The Charles Stark Draper Laboratory, Inc.

Session 06 Space Human Physiology and Countermeasures

This session focuses on the physiological aspects of humans in space and current or future countermeasures and technologies to maximize human health and performance in the space environment. Suggested topics include (but are not limited to) bone loss, muscle atrophy, psychological effects, sensory-motor deconditioning, extravehicular activity, cardiovascular adaptation, Spaceflight Associated Neuro-ocular Syndrome (SANS), decompression sickness, radiation, exercise, injury biomechanics, or artificial gravity. Physiological and psychological aspects of missions at Space Analogue sites are also of interest. Both experimental and modeling approaches are welcome.

Ana Diaz Artiles adartiles@tamu.edu

Assistant Professor, Texas A&M University

Andrew Abercromby andrew.abercromby-1@nasa.gov

Lead - Human Physiology, Performance, Protection and Operations (H-3PO) Laboratory, NASA Johnson Space Center

Torin Clark torin.clark@colorado.edu

Associate Professor, University of Colorado-Boulder

Session 07 Mechanical Systems, Design and Technologies

This session seeks papers on spacecraft configurations, structures, mechanical and thermal systems, devices, and technologies for space flight systems and in situ exploration. Papers addressing mechanical systems design, ground testing, and flight validation are also encouraged.

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Mechanical Systems Engineer, NASA Jet Propulsion Laboratory

Peter Rossoni peter.rossoni-1@nasa.gov

Lead Engineer, NASA Goddard Space Flight Center

Session 08 Spacecraft Propulsion and Power Systems

This session seeks papers on the development and infusion of in-space propulsion and power generation, storage, and management technologies for future NASA deep space science missions and Earth orbiting applications. The session's primary focus is on in-space applications and is not intended for human spaceflight topics or launch vehicles.

Erica Deionno erica.deionno@aero.org

Principal Director, The Aerospace Corporation

Richard Hofer richard.r.hofer@jpl.nasa.gov

Supervisor, Electric Propulsion, NASA Jet Propulsion Laboratory

Session 09 Nuclear Space Power Generation

The Nuclear Space Power Generation session invites papers on all things nuclear and related to space power: concepts for dynamic power systems and static generators at all scales, conversion technologies, fuel processing, reactors for manned and unmanned space missions, lessons learned and best practices, plans for future devices, models and simulations, test results, government policies, nuclear launch safety, infrastructure, and technologies on any scale that address the future success of space missions.

Christofer Whiting chris.whiting@udri.udayton.edu

Principal Research Scientist, University of Dayton

Concha Reid concha.m.reid@nasa.gov

Program Manager, NASA

Session 10 Systems and Technologies for Ascent from Lunar and Planetary Bodies

This session covers both the individual technologies, the system level interactions and trades, and the issues that influence the design of ascent systems leaving the surface of planetary bodies, such as the Moon, Mars, Phobos and others within our solar system. It addresses issues like the impacts of thermal constraints, propulsion design and performance, GN&C, aerodynamic impacts, and packaging constraints for both crewed and robotic ascent vehicle design. This includes cargo return from the lunar and Martian surface including samples as well as ascent for humans.

Tara Polsgrove **tara.polsgrove@nasa.gov**

Chief Lander Architect, Human Landing System, NASA Marshall Space Flight Center

Ashley Karp **ashley.c.karp@jpl.nasa.gov**

Mars Launch Manager, NASA Jet Propulsion Laboratory

Track 9 Air Vehicle Systems and Technologies for Atmospheric Platforms

Christopher Elliott
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Principal Research Engineer at CMElliott Applied Science LLC. Ph.D. and M.S., Aerospace Engineering, University of Texas, Arlington; B.S., Aerospace Engineering, University of Texas, Austin.

Tom Mc Ateer
thomas.mcateer@navy.mil

Systems of Systems Test and Evaluation, Naval Air Warfare Center Aircraft Division, Patuxent River, MD.

Session 01 Air Vehicle Modeling and Simulation

This session focuses on methodology and techniques for the modeling and simulation of atmospheric vehicles including piloted, remotely piloted, and autonomous platforms including fixed wing, rotary wing, and any other aerial vehicle(s). The Air Vehicle Modeling and Simulation is open to any atmospheric vehicle concept including fixed wing, rotary wing, propulsive and buoyant lift applications for Earth-based or other Planetary Atmospheric GNC applications (atmospheric referring to the envelope of gases that surrounds any planet or dwarf planets or moons within or outside the solar system).

Will Goins **wgoinsaerospace902@gmail.com**

Sr. Principal Electronics Engineer, Ierus Technologies

Richard Hoobler **rhoobler@utexas.edu**

Graduate Research Assistant, University of Texas at Austin

Session 02 Air Vehicle Autonomy and Artificial Intelligence for Atmospheric Platforms

This session includes papers on all aspects of autonomy and artificial intelligence and machine learning for Air Vehicle applications including piloted, remotely piloted, and autonomous platforms in atmospheric flight. Example topics may include human and automony interaction; real time prognostics and integrity monitoring and mitigation; path planning in dynamic and uncertain environments; conflict detection and resolution; and work from experimental to operational applications.

Will Goins **wgoinsaerospace902@gmail.com**

Sr. Principal Electronics Engineer, Ierus Technologies

Kerianne Hobbs **kerianne.hobbs@afrl.af.mil**

Aerospace Engineer, Air Force Research Laboratory

Session 03 Air Vehicle Integrated Systems, Sensors, Safety-Critical Hardware, and Avionics

This session includes a broad focus on topics ranging from integrated systems, sensor technologies and safety critical hardware, and operator feedback and avionics technologies for atmospheric flight applications including piloted, remotely piloted, and autonomous platforms. Papers may address concepts and practices for the design, integration and testing of these systems for improving aircraft performance, operator situational awareness, survivability, energy state, and airspace deconfliction. Novel sensor concepts and sensor fusion, aircraft state estimation, and operator feedback are all important example topics for this session.

Andrew Lynch **vvtp01@gmail.com**

General Manager, Tactical Air Support Inc.

Will Goins **wgoinsaerospace902@gmail.com**

Sr. Principal Electronics Engineer, Ierus Technologies

Thomas Fraser **thomas.w.fraser@lmco.com**

Engineer, Lockheed Martin Corp

Session 04 Air Vehicle Flight Guidance, Navigation, and Control Theory and Application

This session focuses on Atmospheric Flight Control and includes theory, application, and future or historical operational example topics ranging from guidance algorithms and path planning; navigation state estimation and sensing and control variable construction; to flight control law loop closure design, synthesis, and evaluation. The Air Vehicle Flight GNC session is open to any atmospheric vehicle concept including piloted, remotely piloted, and autonomous platforms categorically ranging from fixed wing, rotary wing, propulsive and buoyant lift applications for Earth-based or other Planetary Atmospheric GNC applications (atmospheric referring to the envelope of gases that surrounds any planet or dwarf planets or moons within or outside the solar system). Example topics may include linear and nonlinear derivation, analysis and simulation results to experimental or operational flight events and lessons learned.

Tom Mc Ateer **thomas.mcateer@navy.mil**

System of Systems Test and Evaluation, NAVAIR

Richard Hoobler **rhoobler@utexas.edu**

Graduate Research Assistant, University of Texas at Austin

Nikolaus Ammann **nikolaus.ammann@dlr.de**

Research Scientist, German Aerospace Center - DLR

Session 05 Air Vehicle Distributed, Cooperative, and Multi-Vehicle GNC

This session focuses on atmospheric flight applications including piloted, remotely piloted, and autonomous platforms utilizing the concept of distributed systems and/or agents either working together cooperatively or competitively in a multiple vehicle environment. Example topics may range from resource allocation and command and control of complex, autonomous systems to self-organization and autonomous operation and decision making. Guidance, Navigation, and Control (GNC) concepts may include the successful design, deployment, operation, evaluation, and certification of any homogeneous or mixed type of multi-vehicular GNC system.

Christopher Elliott **cmelliott.llc@gmail.com**

Principal Research Engineer, CMElliott Applied Science LLC

Session 06 Air Vehicle Flight Testing, Verification, and Validation

This session focuses on methodology and techniques for the flight testing, and verification and validation (V&V) of atmospheric vehicles including piloted, remotely piloted, and autonomous platforms including fixed wing, rotary wing, and any other aerial vehicle(s). The Air Vehicle Flight Testing, and V&V session is open to any atmospheric vehicle concept including fixed wing, rotary wing, propulsive and buoyant lift applications for Earth-based or other Planetary Atmospheric GNC applications (atmospheric referring to the envelope of gases that surrounds any planet or dwarf planets or moons within or outside the solar system).

Christopher Elliott **cmelliott.llc@gmail.com**

Principal Research Engineer, CMElliott Applied Science LLC

Track 10 Software and Computing

Kristin Wortman
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Principal professional staff, Space Exploration Sector's Space Mission Assurance group at Johns Hopkins University Applied Physics Laboratory located in Laurel, MD. B.S., Computer and Information Science; M.S., Software Engineering, University of Maryland University College.

Virgil Adumitroaie
virgila@jpl.nasa.gov

Data Scientist, JPL. Working on planetary atmospheric and magnetospheric modeling. Past research in high-speed turbulent combustion modeling, data dimensionality reduction, neural networks, decision support, climate data assimilation, and scientific software development. Ph.D., ME, University at Buffalo.

Session 01 Computational Modeling

The focus of this session is Computational Modeling in any discipline, with emphasis on the mathematical model of the phenomenology and on the numerical algorithms used for solution. Disciplines include fluid dynamics and fluid/thermal sciences, earth and planetary physics, systems engineering studies, sensor management and sensor modeling, and radar and signal processing.

Virgil Adumitroaie **virgila@jpl.nasa.gov**

Data Scientist, NASA Jet Propulsion Laboratory

Seungwon Lee **seungwon.lee@jpl.nasa.gov**

Data Scientist, NASA Jet Propulsion Laboratory

Session 02 Innovative Software Engineering and Management Techniques and Practices

Practices followed during development and management of aerospace software systems vary across the industry. This divide seems to be growing as emerging markets, such as commercial space and cubesats, adopt techniques from other software domains while the traditional aerospace market works to tailor existing processes. Suggested topics covering both experience and research in software engineering and management techniques with both flight and ground system development such as: innovative software architectures, software management techniques to ensure and measure software progress, effective review processes, COTS integration and code reuse strategies, new design methods, and unique approaches to software test and verification. Other software engineering topics will also be considered in this session.

Kristin Wortman kristin.wortman@jhuapl.edu

Principal Professional Staff, Johns Hopkins University Applied Physics Laboratory

Ronnie Killough rkillough@swri.org

Program Director - R&D, Southwest Research Institute

Session 03 Software Architecture and Design

Appropriate software architecture is critical to the design, development and evolution of all software systems, and its role in the engineering of software-intensive applications in the aerospace domain has become increasingly important. This session solicits novel ideas on the foundations, languages, models, techniques, tools, and applications of software architecture technology. Topics include software architecture for space mission systems; architecture across software, system and enterprise boundaries; architectural patterns, styles and viewpoints; architecture frameworks; design reasoning, capturing and sharing design decisions; and open architectures, product-line architectures, and systems of systems software architects' roles and responsibilities.

Martin Stelzer martin.stelzer@dlr.de

Research Associate, German Aerospace Center - DLR

Peter Lehner peter.lehner@dlr.de

Team Lead Mobile Manipulators, German Aerospace Center - DLR

Session 04 Software Quality, Reliability and Safety Engineering and Other Illities

The focus of this session is to share systematic practices followed in aerospace to ensure an adequate confidence level that a software system conforms to its requirements and will perform in a safe and reliable manner. Software quality, reliability and safety engineering covers methodologies and techniques used for assessment of the development cycle, verification, validation and test programs, standards, models, certifications, tools, data analysis and risk management. This session is also a forum for discussion on other illities, such as software maintainability.

Kristin Wortman kristin.wortman@jhuapl.edu

Principal Professional Staff, Johns Hopkins University Applied Physics Laboratory

Robert Klar robert.klar@swri.org

Institute Engineer, Southwest Research Institute

Session 05 Model-based Systems and Software Engineering

This session is concerned with the application, or potential application, of advanced model-based approaches, methodologies, techniques, languages, and tools to the aerospace domain. Topics ranging from theoretical and conceptual work in these areas to specific, concrete applications, in scope from small software systems to complex monolithic systems to large system-of-systems, are welcome. Other driving current themes include: coordination and usage of multiple types of models, e.g., digital twins, descriptive versus behavioral models; the use of MBSE simulations and analyses in support of architecture development; the application of information visualization techniques for improved MBSE deliverables; the use of MBSE in specialized domains such as fault protection or electrical systems engineering. The Session's areas of interest including model-based architecture and analysis, design, control systems, verification and testing, simulation, domain specific languages and transformations, aircraft, spacecraft, instruments, flight systems, ground systems, planning and execution, guidance and navigation, and fault management.

Aleksandra Markina Khusid amarkina@gmail.com

Department Manager, MITRE Corporation

Hongman Kim hongman.kim@jpl.nasa.gov

Systems Engineer, NASA Jet Propulsion Laboratory

Session 06 Machine Learning / Artificial Intelligence (ML/AI) for Aerospace Applications

This session considers how to create state-of-the-art single and multi-agent system technologies necessary for developing algorithms, software, or hardware for intelligent, adaptive, and learning systems. Application areas include single and multiple homogeneous or heterogenous platforms and their related systems, e.g., ground movers / stations, single or constellations of spacecraft/satellites, unmanned aerial systems (UAS), etc., including mission systems, and autonomy. Techniques considered will include, but are not limited to, all artificial intelligence, machine learning, and reinforcement learning paradigms, genetic programming and algorithms, swarm intelligence, probabilistic AI, human trust in AI, cooperative multi-agent systems, and training, testing, & verification tools and methodologies. This session invites papers on best practices towards implementing new state-of-the-art autonomy and intelligence systems for aerospace. Papers on novel AI/ML algorithms for single and multi-agent systems including centralized and decentralized protocols, guaranteed stability, robustness, and performance bounds, and comparison with conventional closed-loop control systems are of particular interest.

Daniel Clancy daniel.clancy@gtri.gatech.edu

Senior Research Engineer, Georgia Tech Research Institute

Georges Labrèche georges@tanagraspace.com

Spacecraft Operations Engineer, Tanagra Space / European Space Agency

Session 07 Human-Systems Interaction

Humans are the most critical element in system safety, reliability, and performance. Their creativity, adaptability, and problem-solving capabilities are key to resilient operations across the different aerospace applications. This session focuses on the technologies and techniques leading to effective interfaces and interaction between humans and spacecraft, robots, and other aerospace systems. Specific topics of interests include HCI-HMI, multimodal sensory integration such as vision, haptics and audio, HCI-HMI for tele-operation interfaces, virtual, augmented and mixed reality environments, scientific visualization and natural user interfaces as applied to design, production, operations, and analysis, as well as training and for decision support. Novel solutions/experiences from other domains and their application in aerospace domain, specifically contributing to an efficient human systems interaction are also of interest.

Janki Dodiya **janki.dodiya@iu.org**

Professor for Augmented/Virtual Reality and Human Computer Interaction, IU International University of Applied Science

Andreas Gerndt **andreas.gerndt@dlr.de**

Head of Department, German Aerospace Center - DLR

Session 08 Image Processing and Computer Vision

The focus of this session is both theoretical and experimental work on Image Processing and Computer Vision in aerospace applications. The disciplines include, but not limited to image-based navigation, image classification, image reconstruction, image segmentation, feature extraction, image compression, object detection and tracking, image correlation, coding and limitations, computational complexity, adaptive algorithms, video coding (e.g., MPEG, H.265), hardware and bandwidth limitations, key improvements, contributions, and lesson learned.

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Engineer, Johns Hopkins University/Applied Physics Laboratory

Marco Sewtz **marco.sewtz@dlr.de**

Scientific Staff, German Aerospace Center - DLR

Timothy Chase **tbchase@buffalo.edu**

Ph.D. Candidate/Computer Engineer, University at Buffalo/NASA Goddard Space Flight Center

Track 11 Diagnostics, Prognostics and Health Management (PHM)

Andrew Hess
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Consultant to government and industry on advanced diagnostics, prognostics, data and predictive analytics, CBM, smart manufacturing, health and asset management of machines and engineering systems. Previously program office lead for the JSF PHM effort. Current President of the PHM Society.

Wolfgang Fink
wfink@arizona.edu

Edward and Maria Keonjian Endowed Chair, University of Arizona with joint appointments in the Departments of ECE, BME, SIE, AME, and Ophthalmology and Vision Science. AIMBE Fellow, PHMS Fellow, SPIE Fellow, UA da Vinci Fellow, UA ACABI Fellow, and Senior Member IEEE. Ph.D., Physics, University of Tübingen, Germany.

Session 01 PHM for Aerospace Systems, Subsystems, Components, Electronics, and Structures

Advanced Diagnostics and PHM can be and is applied separately or concurrently at the device, component, subsystem, structure, system and/or total platform levels. This session will give PHM developers, practitioners, integrators, and users a chance to discuss their capabilities and experiences at any or all of these application levels. Discussion of the integration of PHM capabilities across these various levels of application is welcome and encouraged. Applications involving propulsion systems, fuel management, flight control, EHAS, drive systems, and structures are particularly solicited.

Andrew Hess **andrew_hess@comcast.net**

President, The Hess PHM Group, Inc.

David He **davidhe@uic.edu**

Professor, University of Illinois at Chicago

Session 02 PHM for Autonomous Platforms and Control Systems Applications

This session focuses on diagnostics and prognostics for autonomous system applications and control systems. This would include autonomous system architectures, electronic controls, control systems, and electronic systems for both the item under control and the controlling system. Methods for autonomous decision making, fault detection, rate of progression, and consequence or mission risk are encouraged. The session also is looking for novel technical approaches to use diagnostic and prognostic information to provide control input adjustments that can slow or reverse fault progression.

Derek De Vries **derek.devries@ngc.com**

Senior Fellow, Nothrop Grumman Propulsion Systems

Wolfgang Fink **wfink@arizona.edu**

Associate Professor, University of Arizona

Session 03 PHM System Design Attributes, Architectures, and Assessments

Design of complex systems, such as aircraft and space vehicles, requires complex trade-offs among requirements related to performance, safety, reliability, and life cycle cost. The development of effective architectures and implementation strategies are extremely important. This session will focus on the application of methods such as testability, diagnosability, embedding sensors, prognostics, remaining useful life estimates used to design complex aerospace systems, and architectures to design, enable, and implement complex aerospace systems. We invite papers discussing new methodologies, lessons learned in application of health management methods in system design, and operational experience with health management capabilities embedded into systems early in the design process.

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President, The Hess PHM Group, Inc.

Derek De Vries **derek.devries@ngc.com**

Senior Fellow, Nothrop Grumman Propulsion Systems

Session 04 Non-Destructive Testing and Sensor Technologies for PHM Applications

This session is designed to bring together researchers and engineers developing sensors applicable to SHM and IVHM. Papers are invited on MEMS, MOEMS, nanotechnology, BIOS, quantum dots, chemical sensors, optical sensors, and imaging sensors that can be integrated with nondestructive testing applications for structural health monitoring and diagnostics. Description of novel and disruptive sensor technologies is solicited.

Morteza Safai **morteza.safai@boeing.com**

Sensors Engineer / Technical Fellow, Boeing Company

David He **davidhe@uic.edu**

Professor, University of Illinois at Chicago

Session 05 PHM for Non-Aerospace Applications

This session seeks contributions in non-aerospace but related applications, e.g., automotive industry, trains, marine, oil & gas, etc. Both programmatic and technology presentations are solicited, particularly those focused on capabilities, cost benefits, and lessons learned.

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President, The Hess PHM Group, Inc.

David He **davidhe@uic.edu**

Professor, University of Illinois at Chicago

Session 06 PHM for Commercial Space Applications

This session seeks papers on diagnostics, prognostics, health management (PHM) and autonomous fault management for satellites, satellite in-space servicing, and other commercial space applications (e.g., asteroid mining, etc.). Papers are sought in the areas of satellites, launch vehicles, and other new space ventures (e.g., tourism, natural resource exploitation). Papers may address research, actual flight experience, and future planning related to satellite and launch vehicle PHM and fault management.

Wolfgang Fink **wfink@arizona.edu**

Associate Professor, University of Arizona

Andrew Hess **andrew_hess@comcast.net**

President, The Hess PHM Group, Inc.

Derek De Vries **derek.devries@ngc.com**

Senior Fellow, Nothrop Grumman Propulsion Systems

Session 07 PHM for Human Health and Performance

This session is an effort to bridge PHM to Space Medicine as part of Integrated System Health Management (ISHM) and healthcare domains as applied to High Value Human Asset. PHM4HHP is focused on tracking status of very healthy individuals 24/7, as well as ensuring a sustained top-level performance required on manned space exploration missions. Papers are sought that show how systems engineering and MBSE with PHM techniques and methodologies, such as predictive analytics, predictive diagnostics, root cause analysis, virtual sensors, data and information fusion, data mining, and big data analytics with computationally generated biomarkers can serve as a scientific and engineering foundation for building both evidence-based and analytics-based individual health maintenance/support for human assets. Objectives include developing and demonstrating PHM capabilities for assessing, tracking, predicting, and ultimately improving long-term individual human health status to ensure mission success.

Alexandre Popov **alexandre.popov@mail.mcgill.ca**

NASA Emeritus Docent at the U.S. Space and Rocket Center and AIAA Systems Engineering Technical Committee (SETC) Member, McGill University

Wolfgang Fink **wfink@arizona.edu**

Associate Professor, University of Arizona

Session 08 PHM and Digital Engineering and Transformation

This session solicits contributions in the areas of PHM applications focused around the recent Digital Twin and Digital Thread paradigm, Model Based System Engineering, and Enterprise-wide Digital Transformation in aerospace and associated industries. Of particular interest are solutions, architectures, and technologies that leverage or enhance the use of DTs and MBSE for end-to-end PHM management and the delivery of enhanced overall situation awareness.

Andrew Hess **andrew_hess@comcast.net**

President, The Hess PHM Group, Inc.

Mark Walker **mwalker@eecomputing.com**

Director AI, Autonomous Systems, End to End Enterprise Solutions

Session 09 Panel: PHM from a Practitioner's Perspective – a Potpourri of Capabilities, Issues, Case Studies, and Lessons Learned

Practitioners in the PHM field are solicited to share their experiences and observations as part of a distinguished panel of experts. A short presentation will be required of all participants that describes their focus topic within the PHM and CBM+ domains. This session will cover a broad range of research, lessons-learned experiences and application topics covering the challenges and innovative engineering and/or business approaches associated with the development and implementation of PHM capabilities and CBM+ architectures. The session will feature presentations by senior leaders in the field and a panel discussion. Panel members from PHM communities, academia, government, and industry, will focus on strategies that have resolved or will resolve historical issues, and challenges, and provide insight. Interested parties should contact the session organizers.

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President, The Hess PHM Group, Inc.

Derek De Vries **derek.devries@ngc.com**

Senior Fellow, Nothrop Grumman Propulsion Systems

Track 12 Ground and Space Operations

Mona Witkowski
mona.m.witkowski@jpl.nasa.gov

OCO-2 Project Manager, CloudSat Deputy Project Manager and Gravity Recovery and Climate Experiment (GRACE) Follow-On Operations Mission Manager at JPL. Recipient of NASA Exceptional Service Medal for TOPEX/Poseidon Mission Assurance and NASA Exceptional Achievement Medal for Deep Space Network Risk Management.

Michael Machado
michael.j.machado@nasa.gov

Nearly 30 years of Mission Operations experience as either a contractor or civil servant at NASA's Goddard Space Flight Center. Formerly the International Earth Science Constellation Mission Operations Manager as well as the Associate Branch Head for the GSFC Mission Validation and Operations Branch (Code 584).

Session 01 Orbital, Surface and Payload/Instrument Mission Operations

This session solicits papers which highlight innovative approaches for conducting spacecraft orbital, surface and payload/instrument mission operations. Responding to in-flight anomalies, mission operations challenges, automation, risk reduction and space debris collision avoidance are also topics that are encouraged. Additional topics solicited include: challenges to managing single or multi-mission operations, managing multiple payloads, operating satellite constellations, small satellite operations, team development, staffing, cost reduction and lessons learned for future missions.

Mona Witkowski **mona.m.witkowski@jpl.nasa.gov**

Project Manager / Deputy Project Manager, NASA Jet Propulsion Laboratory

Heidi Hallowell **heidi.hallowell@baesystems.us**

Staff Consultant GNC Engineer, Ball Aerospace

Session 02 Mission Planning, Mission Operations Systems and Ground Architectures

This session focuses on the design, development and implementation of mission operations systems, ground data systems and flight-ground interfaces. Topics may include: methods and technologies that support all aspects of mission design, development, planning, testing, and operations. This can include areas related to uplink (e.g., procedures, planning, scheduling, commanding/sequencing), downlink (e.g., telemetry and data processing and analysis, and response) and strategic planning. We also welcome ideas related to the design, integration, and automation of efficient ground systems. Submissions will be evaluated primarily on novelty, technical innovation, and broader impact to the planning and operations communities.

Kedar Naik **kedar.naik@baesystems.us**

Staff Consultant - AI Technical Lead, BAE Systems, Space & Mission Systems

Rob Lange **robert.d.lange@jpl.nasa.gov**

Mission System Systems Engineer, NASA Jet Propulsion Laboratory

Session 03 Human Space Flight Development, Processing, and Operations

This session focuses on all aspects of Human Spaceflight development, processing, and operations across all mission phases, including the development of commercial human spaceflight transportation and destination capabilities in LEO and beyond including the Commercial Crew and Commercial LEO Development Programs. Research topics include the design, development and operations of manned spacecraft and extraterrestrial destination hardware and support systems. Operations research focused on human pre-flight, in-flight, and post-flight activities is also encouraged. Additionally, research dedicated to specific areas such as mission analogs, flight operations including IVA and EVA, launching, landing, and recovery of crewed spacecraft, and the effects on human beings during all mission types and phases is also encouraged.

Michael Lee **michael.r.lee@nasa.gov**

Deputy Manager, Mission Management & Integration, NASA Kennedy Space Center

William Koenig **william.j.koenig@nasa.gov**

Production Operations Lead, NASA Kennedy Space Center

Session 04 Resilient and Cyber Secure Systems for Mission Operations

Cyber secure, resilient space systems are necessary to ensure continuity of operations and operators ability to execute their missions successfully. This session welcomes novel approaches, tailored to the aerospace domain, for ground systems as well as those spanning both space and ground segments. Examples of resilient operational technologies and systems include: cryptography, architectures (e.g. Zero Trust Architectures (ZTA)), compute and network infrastructure (e.g. redundant, failover systems), software, root of trust (RoT), intrusion detection/prevention, vulnerability/red team assessments, approaches to simplify and streamline Risk Management Framework (RMF) implementations, access control and others. We are also interested in applications of advanced technologies like AI-based analytics, blockchain, active defense, embedded agents, lessons learned in attempted attacks/breaches. Note: if presenting on vulnerabilities, please follow responsible disclosure practices to ensure operators' abilities to protect their systems.

John Kenworthy **john.kenworthy2@baesystems.us**

Senior Manager Manager, BAE Systems

Session 05 Automation and Machine Learning Applications in Spacecraft Operations

This session invites contributions that are concerned with the applications of machine learning and data science techniques to deal with the increasing amounts of data being collected in spacecraft operations on flight and/or ground segments. These techniques could be related to any subsystem of the spacecraft, including telecom, power, thermal, or specific instrument data and that of the ground segments. Topics ranging from theoretical and conceptual treatment in these areas to specific and operational treatments are solicited. The benefits of these techniques are very wide in scope from enhancing operator productivity by providing diagnostic tools that detect and explain causes of anomalous behavior either in real-time or by post-processing, to automating mission operations. These benefits are also crucial for smaller missions, such as the emerging CubeSats missions, that typically have very lean teams. Some consideration is made for the computing platforms required for the algorithms.

Zaid Towfic **zaid.j.towfic@jpl.nasa.gov**

Group Supervisor, NASA Jet Propulsion Laboratory

Dennis Ogbe **do@ieee.org**

Signal Analysis Engineer, NASA Jet Propulsion Laboratory

Session 06 Robotics, Autonomy and Operations

This sessions addresses the challenges and opportunities of space robotics autonomy and operations. Topics include autonomous systems, robotics, perception, machine learning, AI and their practical application to space robotics. Papers are solicited that discuss approaches for operating spacecraft with autonomous capabilities, advances in onboard and ground automation and tools, software and systems engineering for operability, fault tolerance and recovery, and human-robot interaction for both manned and unmanned missions. Approaches that address the unique challenges that come with operating robots in space, such as risk, uncertainty, harsh environment, communication delays, and limited resources are also encouraged, as are analyses of successes and challenges, highlights of latest trends, technologies, and best practices that can be leveraged to operate robots effectively in space.

Vandi Verma **vandi@jpl.nasa.gov**

Deputy Manager Mobility and Robotic Systems Section, NASA Jet Propulsion Laboratory

Alexandra Holloway **alexandra.holloway@jpl.nasa.gov**

Flight Software Engineer, NASA Jet Propulsion Laboratory

Track 13 Systems Engineering, Management, and Cost

Jeffery Webster
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Retired Senior Systems Engineer. NASA Jet Propulsion Laboratory: Project Support Lead-Project Support Office; Mission Systems Concepts Section-Mars Trace Gas Orbiter; Project Planner & Systems Engineering; Associate Engineer, Mission & Systems Concepts Section. Publications and awards available upon request.

Torrey Radcliffe
torrey.o.radcliffe@aero.org

Associate Director, Space Architecture Department, The Aerospace Corporation. Background in preliminary spacecraft design, space architecture development and portfolio analysis of manned and unmanned systems. S.B., S.M. and Ph.D. in Aeronautics and Astronautics from MIT.

Session 01 Systems Architecture, Engineering and System of Systems

This session is dedicated to papers dealing with the fundamental challenges associated with architecting and high level systems engineering of large-scale systems and systems-of-systems, including development and application of tools and techniques that support both architecting and system engineering processes (e.g., Architecture Descriptions, Model Based Systems Engineering, Architecture Decision Support), maintaining the integrity of "the architecture" across the project lifecycle, and discussions of successful (and not so successful) architecting and systems engineering endeavors with an emphasis on the lessons learned.

Lisa May **lisa.may@aeroconf.org**
NextGen Strategy & BD Sr Manager, Lockheed Martin Space

Daniel Selva **dselva@tamu.edu**
Associate Professor, Texas A&M University

Dean Bucher **dean.a.bucher@aero.org**
Principal Director, The Aerospace Corporation

Session 02 Management and Risk Tools, Methods and Processes

This session addresses tools, methods, and processes for managing aerospace system development programs/projects, mission operations, technology development programs, systems engineering organizations, and artificial intelligence (AI)/machine learning (ML) programs/projects related to the aerospace domain. Topics include analyzing risks; managing all life cycle phases of programs/projects; using project-level management disciplines including project management, systems engineering, scheduling, safety and mission assurance, and configuration management; and improving training and capability retention (passing expertise between generations of systems engineers); and managing aerospace technology development programs. Applications include commercial, military and civil space systems, and commercial and military aircraft systems. This session also covers the topic of risk management in aerospace endeavors including new insights from the successful application of risk management, lessons learned when risk management did not prevent realization of consequences, and managing new risks associated with AI/ML.

Jeremiah Finnigan **jeremiah.finnigan@jhuapl.edu**
Senior Professional Staff, Johns Hopkins University/Applied Physics Laboratory

Joshua Calkins **jjcalkins@ebad.com**
Systems Engineering Manager, Ensign-Bickford Aerospace & Defense (EBAD)

Session 03 Cost and Schedule Tools, Methods, and Processes

This session addresses cost and schedule analysis tools, methods, processes, and results including design trades for design concepts and technologies throughout a project's life cycle. Topics addressed include cost or schedule model development, regression analysis and other tools, historical studies addressing trends, databases, government policies, industry training, mission cost analysis, operations and supporting/infrastructure cost, mission portfolio analysis, case histories, lessons learned, process control, and economic and affordability analysis that assesses program/project viability.

Stephen Shinn **stephen.a.shinn@nasa.gov**
NASA Deputy Chief Financial Officer, NASA Headquarters

Eric Mahr **eric.m.mahr@aero.org**
Senior Project Leader, The Aerospace Corporation

Session 04 Advances in Conceptual Design Methods and Applications

This session is dedicated to the discussion of the current state of practice and future advances in conceptual design methods and applications. The goal is to foster the application of Digital Engineering (DE) in conceptual design, concurrent engineering, and collaborative engineering practices across the lifecycle, including advances in team-based systems engineering methods and novel applications of concept design methods. Example topics include MBSE applications, optimization techniques, results visualization, digital twin integration, and trade space exploration.

Rob Stevens **robert.e.stevens@aero.org**
Director of Model Based Systems Engineering Office, Aerospace Corporation

Alfred Nash **alfred.e.nash@jpl.nasa.gov**
Lead, A-Team, NASA Jet Propulsion Laboratory

Session 05 System Simulation and Verification

This session addresses the design, implementation, and use of system-level simulations to measure or verify the performance and utility of space, ground, and related systems.

Virgil Adumitroaie virgila@jpl.nasa.gov

Data Scientist, NASA Jet Propulsion Laboratory

Gregory Falco gfalco@cornell.edu

Assistant Professor, Cornell University

Session 06 System Verification & Validation and Integration & Test

This session focuses on the Verification & Validation and Integration & Test processes and case studies for Projects/Flight/Sub systems, and systems of systems.

Benjamin Solish bsolish@jpl.nasa.gov

Systems Engineer, NASA Jet Propulsion Laboratory

Sarah Bucior sarah.bucior@jhuapl.edu

Systems Engineer, Johns Hopkins University Applied Physics Laboratory

Session 07 Strategic Technology Planning, Management & Infusion

This session addresses strategic planning, research, development, and infusion of innovative technology to meet the future needs of civil space, commercial space, and national security space users. It includes technology strategy and roadmaps, technology maturation, and mission infusion to overcome the valley of death. This session also focuses on opportunities as well as legal and operational challenges as associated with partnerships, technology transfer, commercialization, and recent developments in aerospace startup accelerators for public and private sectors.

Theodore Bujewski tbujewski@yahoo.com

Director, Science and Technology Integration, US Space Force, Department of Defense

Andrea Belz abelz@usc.edu

Vice Dean, Transformative Initiatives, University of Southern California

Charles Player charles.j.player@aero.org

Principal Director, Innovation Laboratory, The Aerospace Corporation

Session 08 Promote (and Provoke!) Cultural Change

"Culture Eats Strategy for Breakfast!"*Culture is a byproduct of habits, and this session explores how to create habits, environments, and nutrients that help great things grow. (*Peter Drucker, noted management consultant, educator, and author).

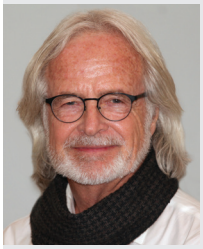
David Scott 2davescott@gmail.com

NASA Retiree

John Ryskowski jfryskowski@yahoo.com

President, JFR Consulting

Track 14 Government Plans, Policies and Education



Richard Mattingly rlmattingly@aeroconf.org

Member of the Mars Program Formulation Office at NASA's Jet Propulsion Laboratory (JPL) in charge of numerous architectural studies on Mars Sample Return starting in the early 2000's, currently Chief Engineer for it's Sample Receiving Facility. Managed systems engineering groups for JPL's projects implemented in partnership with industry, and instrument and payload development. Previously involved in the formulation and development of many of JPL's planetary and Earth-orbiting spacecraft and payloads since the 1970's.

Session 01 PANEL: Technology Development for Science-Driven Missions

Planning for and developing technology is an ongoing process for Planetary Science Missions. The science community and associated technologists are key stakeholders in that process. This panel focuses on a topic of interest each year.

Lorraine Fesq lorraine.m.fesq@jpl.nasa.gov

Chief Technologist, Mission Systems and Operations Division, NASA Jet Propulsion Laboratory

Session 02 PANEL: Emerging Technologies for Mars Exploration

This panel will discuss the unique technology needs and recent progress for future Mars exploration, including those for robotics explorers as well as groundbreaking technologies for future human missions. Panelists will highlight a variety of emerging technologies that can enable these future pathways for Mars exploration.

Larry Matthies **lhm@jpl.nasa.gov**

Technology Coordinator, Mars Exploration Program, NASA Jet Propulsion Laboratory

Session 03 PANEL: Access To Space and Emerging Mission Capabilities

The high cost of launch continues to be a roadblock to space missions large and small. The development of adapters (ESPA, PPOD, e.g.), the development of new launch vehicles, the acceptance of risk for accommodating secondary or auxiliary payloads, and the explosion of cubesat and smallsat capability have led to some creative approaches to space missions. This panel is meant to showcase how our space colleagues are leveraging these emerging capabilities.

Kara O'Donnell **kara.a.odonnell@aero.org**

Principal Director, Aerospace Corporation

Nicole Fondse **nicole.fondse@aero.org**

Systems Director, Aerospace Corporation

Session 04 PANEL: Progress and Plans for the Deep Space Human Exploration Architecture

NASA has been charged with leading a sustainable program of exploration with commercial and international partners to enable human expansion beyond low-Earth orbit (LEO). Realizing this vision requires advancement of key capabilities and an implementation approach that pulls from the best NASA and the global industry can offer. NASA's human exploration activities are driving the development of high-priority technologies and capabilities using a combination of unique in-house activities and public-private partnerships to develop and test prototype systems that will form the basis for future human spaceflight missions. This panel will discuss the current plans and status of the NASA exploration programs implementing the deep space architecture including progress toward the first flights of SLS and Orion, development of the Gateway, Human Landing System, and plans for lunar and Mars exploration capabilities.

Stephen Creech **steve.creech@nasa.gov**

Assistant Deputy Associate Administrator (Technical) Moon to Mars Program ESDMD, NASA Headquarters

Session 05 PANEL : Mars Exploration Science: Mars Sample Return and Beyond

The panel will present the science of the Mars Exploration Program, which will include the latest discoveries from ongoing missions such as MRO, Curiosity, TGO, and the most recent explorer, InSight. Panel discussion will address questions driving future missions. What do we hope to learn from the next mission, the Mars 2020 Rover, and the samples cached for return to Earth? What is the potential for future missions and the discoveries they could make?

Mitch Schulte **mitchell.d.schulte@nasa.gov**

Program Scientist, NASA Headquarters

Session 06 PANEL: NASA's Earth System Observatory Overview

NASA's Earth System Observatory (ESO) is an array of Earth-focused, interconnected satellite missions focused on five study areas: Surface Biology and Geology, Mass Change, Aerosols, Surface Deformation and Change, and Clouds, Convection, and Precipitation. The data gathered from the ESO missions will provide actionable science to inform decisions related to climate change, disaster mitigation, wildfires, and improve real-time agricultural processes, among many other applications. Targeting launch dates in the late 2020s and early 2030s, each satellite in the ESO will deliver its own valued information, but by working as a single observatory, the data and imagery taken together will provide the global community with a 4D, holistic view of Earth, from bedrock to atmosphere. This panel will provide an overview of the ESO; an update on the ESO missions currently in formulation; and how NASA and its partners will make ESO data accessible to users all over the world.

Carla Procaccino **carla.t.procaccino@nasa.gov**

Program Executive, NASA Headquarters

Session 07 PANEL: Mars Exploration Program Future Plan

Over the past two decades NASA and the Mars Exploration Program (MEP) have been making progressive steps to better understand the planet and to search for past and present life at Mars. The Mars Exploration Program is now at an inflection point at which it must adapt to the changing space business environment (i.e., broadening international participation and expanding commercial interest/capability), address critical/aging infrastructure, and prepare for a human presence at Mars. Mars continues to pose key questions that call for a coordinated program of scientific exploration: Explore the Potential for Martian Life, Support Human Exploration of Mars, and Discover Dynamic Mars. Emerging capabilities enable a new era of competitive missions, strengthened infrastructure, transportation opportunities, advanced technologies, and inclusive exploration. This presentation will outline co-equal program science themes, the initiatives for the future of the MEP, and the aspirational timeline for robotic exploration at Mars from present through 2043.

Tiffany Morgan **tiffany.m.morgan@nasa.gov**

Mars Exploration Program, Deputy Director, NASA Headquarters

Session 08 NASA's Future Plans in LEO

In this discussion, panelists will update NASA's progress and plans for International Space Station operations through 2030 and transition of activities to commercial LEO destinations. The panelists will discuss policy, strategies, and activities for continued presence in LEO, including discussion of the anticipated NASA LEO Microgravity Strategy.

Robyn Gatens **robyn.gatens@nasa.gov**

Director, ISS, NASA Headquarters

Session 09 Commercial Services for Space Exploration

In recent decades, U.S. space companies have developed business models to enable commercial transportation services for space exploration. One notable example is the Launch Services Program (LSP), where entities compete for NASA's launch task orders. LSP missions adhere to NASA's standards, facilitating programs like the Commercial Crew Launch Program for low Earth orbit (LEO). Beyond LEO, the Commercial Lunar Payload Services (CLPS) initiative allows companies to compete for orders to transport NASA payloads to cis-lunar space. The goal is for NASA to be a primary, but not exclusive, client for cis-lunar payloads, boosting robotic missions, scientific output, and reducing costs. These savings may enable non-NASA payloads from academia, private sectors, and other agencies, fostering a commercial ecosystem. Discussions will explore commercial service models, draw insights from past programs, and assess ongoing initiatives' commercial viability, including predictions for potential services at Mars and on other deep space exploration programs

Greg Chavers **greg.chavers@nasa.gov**

Strategic Architect and Integration Manager, NASA Marshall Space Flight Center

Junior Engineering & Science Conference

Yellowstone Conference Center
Big Sky, Montana March 3 - 4, 2025

Junior Conference Submission Deadlines
Junior Abstract Deadline: January 14, 2025
Junior Presentation Deadline: February 11, 2025

Who may participate

Any student, 1st through 12th grade, who is registered at the conference as an official guest of a primary registrant, is eligible to present a paper as a Junior Engineering & Science Speaker.

Number of participants

To provide sufficient time for each presentation, the number of participants will be limited to 25. Preference will be given to the earliest submissions.

Topics

Topics with direct or tangential relationship to science, engineering, or mathematics are encouraged.

Student's Research

The presentation should describe one of the following:

1. An original idea accompanied by supportive reasoning and data
2. An experiment, invention or field work
3. A review summarizing a topic of interest.

How to Submit Your Presentation

1. Write a short **abstract** describing your topic.
2. Have your parent or guardian who is registered for the conference register you as a junior engineer, complete a release form, and submit your abstract to Session 15.01 (Junior Conference) on the conference website, www.aeroconf.org (select Session 15.01 Junior Engineering Conference). **Registration opens on November 30**, and spaces fill quickly. You will receive an email confirmation of acceptance.
3. Prepare a 5–10 slide PowerPoint presentation of your work. The title slide should include your name, age, grade, special interests, and (if you choose) a photo of yourself. You may have help from an adult, but the presentation should be primarily your own work.
4. Once your abstract is confirmed, submit your PowerPoint presentation to the conference website as soon as possible. **The presentation deadline is Tuesday, February 11, 2025**. No late presentations will be included in the conference.
5. Prior to the conference all Junior Engineering & Science presentations will be loaded onto a single laptop. You will have an opportunity to practice before giving your presentation.
6. After the last presentation, all participants will receive an electronic copy of the Junior Engineering & Science Conference Proceedings.

Please check the Junior Conference webpage for additional information: https://aeroconf.org/junior-engineering

2025 Junior Engineering & Science Conference Contacts

Co-Chair **Rich Terrile** — E-mail **rich.terrile@jpl.nasa.gov**
Co-Chair **Christine Terrile** — E-mail **christine@aeroconf.org**

Back Cover – *This artist's rendering shows NASA's Europa Clipper spacecraft, which is aiming for launch readiness by Octotcer 2024.* ***Photo Credit: NASA/JPL-Caltech***

2025 IEEE Aerospace Conference

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