USRA

Universities Space Research Association

&

Space Policy Institute

THE GEORGE WASHINGTON UNIVERSITY

Present a Symposium on

CISLUNAR SPACE

Research for Today, Training for Tomorrow

How Can Evolving Cislunar Capabilities Contribute to Science, Commerce, and Security?

March 23, 2023
1:00 p.m.

Holiday Inn
Washington DC National Mall

USRA Universities Space Research Association

1:00 p.m.
Welcome and Introductory Remarks

JEFFREY ISAACSON
President and
Chief Executive Officer,
Universities Space
Research Association

SCOTT PACE
Director, Space Policy Institute,
George Washington University

1:10 p.m.
Frederick A. Tarantino Memorial Address

ROBERT CABANA
Associate Administrator,
NASA

1:45 p.m.
Coffee and Light Lunch Break

2:00 p.m.
Cislunar Technical Challenges and Opportunities

Accelerating activity in cislunar space necessitates new scientific advances in energy, communications, and logistics. Space is also becoming an arena for technological shows of economic and military force. Panelists will discuss the technical challenges and opportunities in the coming decades.

JAMES FREE
Associate Administrator for
Exploration Systems Development,
NASA

BADRI YOUNES
Deputy Associate Administrator
for Space Communications and
Navigation, NASA

LINDSAY MILLARD
Principal Director for Space,
Office of the Under Secretary of
Defense for Research and
Engineering

EMMA RAINEY
Senior Scientist, Johns Hopkins
University Applied Physics
Laboratory

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3:15 p.m.
Coffee Break

3:45 p.m.
Commercial Innovations and Opportunties in Cislunar Space

Panelists will provide insight for universities preparing for near-term government and commercial research opportunities in cislunar space. With rapidly increasing spaceflight activities in cislunar space, attendees will hear from government and commercial sector leaders about upcoming innovations and potential opportunities for their respective institutions in space research and development.

VINT CERF
Vice President and Chief Internet Evangelist, Google

CURTIS HERNANDEZ
Principal for Space Policy, Amazon Web Services

JUSTIN KASPER
Advanced Technologies, BWX Technologies, Inc.

DAN HENDRICKSON
Vice President Business Development, Astrobiotic

5:00 p.m.
Invitation to the Reception

BRIAN GILCHRIST
Chair, USRA Council of Institutions

Background image: NASA's uncrewed Orion spacecraft snapped this black and white photo of Earth on Nov. 17, 2022, the second day of the 25.5-day Artemis I mission.

Image Credit: NASA

Background image: On flight day 20 of the Artemis I mission, Orion captured the Moon on the day of return powered flyby Dec. 5, 2022.

Image Credit: NASA


Biographies

USRA Universities Space Research Association

Jeffrey Isaacson

President and Chief Executive Officer, Universities Space Research Association

Dr. Jeffrey A. Isaacson became USRA's seventh President and Chief Executive Officer in 2014. USRA operates in association with 116 leading universities to support NASA, DoD, DOE, and NSF in the areas of science, technology development, and facility management. USRA was founded in 1969 by NASA and the National Academy of Sciences.

Prior to joining USRA, Dr. Isaacson was Vice President for Defense Systems and Assessments at Sandia National Laboratories, where he was responsible for development and integration of advanced science and technology into state-of-the art systems for the DoD, NNSA, and other national security agencies. His executive oversight included U.S. Nuclear-Detonation Detection System payloads and ground system; the Advanced Hypersonic Weapon; and the Laser Dynamic Range Orbiter Inspection System, which flew on numerous Space Shuttle missions.

From 2007 to 2011, Dr. Isaacson was at RAND Corporation, where he was Vice President and Director of the Arroyo Center, the U.S. Army's FFRDC for studies and analysis. He had returned to RAND from Lockheed Martin Space Systems Company, where he directed systems engineering, integration, and test of the Space Based Infrared System-High. Dr. Isaacson led the SBIRS SEIT organization through Nunn-McCurdy recertification, the first GEO end-to-end intersegment test, and completion of on-orbit checkout of the first SBIRS HEO payload. Prior to joining Lockheed Martin in 2004, Dr. Isaacson served in a variety of research and management positions for nearly 13 years at RAND, including Vice President and Director of the National Defense Research Institute, an FFRDC supporting the Office of the Secretary of Defense.

Dr. Isaacson served 25 years in the U.S. Navy Reserve, retiring as Captain. A member of the Navy Space Cadre, his military career included assignments at the Joint Space Operations Center and the National Reconnaissance Office. He is qualified as an Information Dominance Warfare Officer and certified as a DAWIA Level 2 Program Manager. He is a veteran of Operation Enduring Freedom, having served on active duty in Afghanistan from 2009 to 2010.

Dr. Isaacson is a former Chair of the Army Science Board. He earned degrees at Columbia University, Princeton University, and the Massachusetts Institute of Technology, where he received his Ph.D. in theoretical physics.

Background image: Earth rising over lunar horizon

Image Credit: NASA

Scott Pace

Director,
Space Policy Institute, GWU

Dr. Scott Pace is the Director of the Space Policy Institute and a Professor of the Practice of International Affairs at George Washington University's Elliott School of International Affairs. He is also on the faculty of the Trachtenberg School of Public Policy and Public Administration. His research interests include civil, commercial, and national security space policy, and the management of technical innovation.

Dr. Pace rejoined the faculty of the Elliott School in January 2021 after serving as Deputy Assistant to the President and Executive Secretary of the National Space Council from 2017-2020.

From 2005-2008, he served as the Associate Administrator for Program Analysis and Evaluation at NASA. Prior to NASA, Dr. Pace held several leadership and management positions at various agencies.

A recipient of numerous prestigious awards including the Order of the Rising Sun with Gold and Silver Stars from the Government of Japan in 2021, Dr. Pace was also honored with the Office of the Secretary of Defense Group Achievement Award in 2020, the NASA Outstanding Leadership Medal in 2008, the US Department of State's Group Superior Honor Award and the NASA Group Achievement Award in 2004. He has been a member of the US Delegation to the World Radiocommunication Conferences and was also a member of the US Delegation to the Asia-Pacific Economic Cooperation Telecommunications Working Group, 1997-2000. More recently, he has served as a member of the U.S. Delegation to the UN Committee on the Peaceful Uses of Outer Space in 2009, 2011-17, and 2022.

A former member of the Board of Trustees of Universities Space Research Association, he is a Member of the International Academy of Astronautics, an Associate Fellow of the American Institute of Aeronautics and Astronautics, a Fellow of the American Astronautical Society, and a member of the Board of Governors of the National Space Society.

He holds a Bachelor of Science degree in Physics from Harvey Mudd College in 1980; Master's degrees in Aeronautics & Astronautics and Technology & Policy from the Massachusetts Institute of Technology in 1982; and a Doctorate in Policy Analysis from the RAND Graduate School in 1989.

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Robert Cabana

Associate Administrator,
NASA

A former NASA astronaut, Robert Cabana currently serves as the agency's associate administrator, its third highest-ranking executive and highest-ranking civil servant. Prior to his current position, he was director of NASA's John F. Kennedy Space Center in Florida.

A graduate of the U. S. Naval Academy, he was commissioned a second lieutenant in the U.S. Marine Corps and completed Naval Flight Officer training in Pensacola in 1972. Cabana then served as an A-6 bombardier/navigator with Marine Air Wings in Cherry Point, North Carolina, and Iwakuni, Japan. He graduated with distinction from the U.S. Naval Test Pilot School in 1981 and served in the Flight Systems Branch at the Naval Air Test Center until 1984.

Mr. Cabana was selected as an astronaut candidate in June 1985. He was assigned to the Lyndon B. Johnson Space Center Astronaut Office, serving in a number of leadership positions. A veteran of four spaceflights, Cabana has logged 38 days in space, serving as the pilot on STS-41 and STS-53 and mission commander on STS-65 and STS-88.

Following his retirement as a colonel from the Marine Corps in September 2000, Mr. Cabana was appointed a member of the Federal Senior Executive Service. He served in numerous, challenging senior management positions at Johnson Space Center in Houston, ultimately becoming deputy director.

In October 2007, Mr. Cabana was appointed director of NASA's John C. Stennis Space Center in Mississippi. A year later he was reassigned as the tenth director of the John F. Kennedy Space Center.

Mr. Cabana's many achievements have been recognized with induction into the Astronaut Hall of Fame and being named an Associate Fellow in the American Institute of Aeronautics and Astronautics and a Fellow in the Society of Experimental Test Pilots. A recipient of numerous personal awards and decorations, his honors include the Distinguished Flying Cross, the Presidential Distinguished Rank Award, and the National Space Club Florida Committee's Dr. Kurt H. Debus Award. He also is a recipient of the Rotary National Award for Space Achievement's National Space Trophy.

James Free

Associate Administrator for Exploration Systems Development, NASA

James Free was selected as the associate administrator for the Exploration Systems Development Mission Directorate at the agency's Headquarters in Washington by NASA Administrator Bill Nelson on Sept. 20, 2021.

A former retired NASA civil servant, he spent the past few years in a variety of private sector roles including most recently chief operating officer and senior consultant for Lead Off the X. Prior to his tenure at Lead Off the X, he served as senior vice president of Aerospace Systems at Peerless Technologies.

Mr. Free retired from NASA in 2017, most recently serving as the agency's deputy associate administrator for technical for the Human Exploration and Operations Mission Directorate. He was responsible for assisting the associate administrator in providing strategic direction for all aspects of NASA's human spaceflight exploration mission.

He served in a variety of positions at Johnson Space Center in Houston and Glenn Research Center in Cleveland. He worked on various projects and programs spanning everything from the International Space Station and electric actuation technologies to the Orion and Prometheus spacecraft.

Mr. Free went on to serve as deputy director before his appointment as the Glenn director, where he was responsible for planning, organizing, and directing the activities required in accomplishing the missions assigned to the center.

He is the recipient of the Presidential Rank Award, NASA Distinguished Service Medal, NASA Outstanding Leadership Medal, NASA Exceptional Service Medal, NASA Significant Achievement Medal, and numerous other awards.

A native of Northeast Ohio, he earned his bachelor's degree in aeronautics from Miami University in Oxford, Ohio, and his master's degree in space systems engineering from Delft University of Technology in the Netherlands.

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Badri Younes

Deputy Asscociate Administrator for Space Communications and Navigation, NASA

Mr. Younes is presently the Deputy Associate Administrator and Program Manager for Space Communications and Navigation (SCaN). He is responsible for NASA's space communications and navigation infrastructure and services, as well as data standards and spectrum. Mr. Younes manages the SCAN Program Office at NASA Headquarters and oversees all NASA telecommunications and navigation projects and networks, including NASA's Space Network (SN), Near-earth Network (NEN), and Deep Space Network (DSN). Mr. Younes is also responsible for the development of enabling technologies critical to meeting the Agency's vision for an integrated SCaN architecture aligned with NASA's future space exploration needs.

Prior to returning to NASA in 2007, Mr. Younes was the Department of Defense (DoD) Director for Spectrum Management with responsibility for spectrum policy and strategic planning and implementation. Under his leadership, the Department has successfully negotiated major win-win agreements with the FCC, NTIA, and US private sector. He had successfully led the DoD spectrum management organization to become more proactive in addressing RF and spectrum issues. Mr. Younes was instrumental in transforming the management and use of the electromagnetic spectrum within and outside the Department.

Mr. Younes' experience spans over thirty years of leadership in microwave and RF systems engineering and technology. His interpersonal skills and rich linguistic ability have been instrumental in furthering US objectives. He has over twenty years of involvement in various forums of the International Telecommunications Union (ITU), and has provided direct support to US ambassadors to a number of World Radio Conferences (WRCs).

In addition to his many professional individual and team awards, Mr. Younes is also a recipient of the 2005 Meritorious Presidential Rank Award. He is a member of Tau Beta Pi, engineering honor society. He holds a Masters in Electronics Engineering from Catholic University of America and had completed all his PhD requirements except for the dissertation.

Lindsay Millard

**Principal Director for Space,
Office of the Under Secretary of Defense
for Research and Engineering**

Dr. Lindsay Millard joined the Office of the Under Secretary of Defense for Research and Engineering (OUSD [R&E]) as the Principal Director for Space in September 2020. In this role, Dr. Millard is responsible for leading the Department of Defense's (DoD's) research and engineering efforts needed to assure our space capabilities and maintain our competitive advantage in the space domain.

Prior to joining OUSD (R&E), Dr. Millard served as a program manager at the Defense Advanced Research Projects Agency in the Tactical Technical Office where her focus was to enable big capabilities on small satellites. Drawing from her strong technical expertise in satellite systems engineering, remote sensing, sparse-aperture telescopes, astrodynamics, and guidance, navigation, and control, Dr. Millard successfully turned developmental programs into real capabilities for the United States and demonstrated the potential of rapid space system acquisition by leading a program that took 18 months from contract award to satellite launch.

Prior to joining DoD, Dr. Millard served as an engineer at the RAND Corporation where she led studies for Project Air Force and the National Security Research Division. During her time at RAND, Dr. Millard was detailed to the Office of the Deputy Assistant Secretary of Defense for Space Policy where she led negotiations for the U.S. Government on the Combined Space Operations Memorandum of Understanding and managed engagements with Five Eyes partners and space-faring nations in the Asia-Pacific region.

Prior to the RAND Corporation, Dr. Millard was an adjunct researcher at Purdue University, where she explored design strategies for imaging spacecraft formations moving under the influence of many celestial bodies.

Dr. Millard has also served as a researcher and engineer at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center, the National Academies' National Research Council, the NASA Jet Propulsion Laboratory, and NASA Kennedy Space Center's International Space Station Program.

Dr. Millard holds a Bachelor of Science and a Master of Science in Aerospace Engineering from the University of Michigan and a Doctor of Philosophy in Aerospace Engineering from Purdue University.

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Emma Rainey

Senior Scientist,
Johns Hopkins University
Applied Physics Laboratory

Dr. Emma Rainey is a scientist with over 15 years of experience contributing to space science and defense missions. She is a member of the Principal Professional Staff at the Johns Hopkins University Applied Physics Laboratory (APL), where she currently serves as Acting Assistant Branch Supervisor for Space Systems and Analysis. In this role, Dr. Rainey is responsible for personnel management, staff development, and overall performance for approximately 300 engineers and scientists supporting APL's programs in civil and national security space.

Since joining APL in 2014, Dr. Rainey has served in a variety of leadership positions. For three years Dr. Rainey served as Group Supervisor for Applied Space Research, where she was responsible for overseeing a group of approximately 45 scientists and engineers working on a wide range of space applications, including space-based remote sensing, planetary defense, and cislunar technology. Dr. Rainey has also served in multiple technical roles leveraging her expertise in space science and hypervelocity impact phenomena. She is APL's Project Scientist for the Missile Defense Agency Spacebased Kill Assessment program, and was a Co-Investigator on NASA's Double Asteroid Redirection Test (DART) mission. In 2021 and 2022, Dr. Rainey served as Conference Chair for APL's Cislunar Security Conference, after serving as Technical Committee Chair for the inaugural conference in 2020.

Dr. Rainey earned a B.S. in Geophysics and Physics from the University of Minnesota, a M.S. in Planetary Science from the California Institute of Technology, and a Ph.D. in Geophysics & Space Physics from UCLA, where she conducted fundamental research on the properties of minerals at high pressure and high temperature. Dr. Rainey has authored or co-authored more than 20 peer-reviewed publications on geophysics, hypervelocity impact phenomena, and planetary defense.

Vint Cerf

Vice President and Chief Internet Evangelist, Google

Dr. Vinton G. Cerf serves as vice president and chief Internet evangelist for Google. In this role, he contributes to global policy development and continued standardization and spread of the Internet.

A former senior vice president of Technology Strategy at MCI, Dr. Cerf guided the corporate technology strategy development at the organization.

Widely known as one of the "Fathers of the Internet," Dr. Cerf is the co-designer of the TCP/IP protocols and the architecture of the Internet. In December 1997, President Clinton awarded Dr. Cerf and his colleague, Dr. Robert E. Kahn, the U.S. National Medal of Technology for founding and developing the Internet.

Drs. Cerf and Kahn were named the recipients of the ACM Alan M. Turing award (sometimes referred to as the "Nobel Prize of Computer Science") in 2004 for their work on the Internet protocols. In November 2005, President George Bush awarded them the Presidential Medal of Freedom -- the highest civilian award given by the United States to its citizens. In April 2008, they received the prestigious Japan Prize and in 2013 the two of them and three others received the Queen Elizabeth Prize in Engineering.

During his tenure with the U.S. Department of Defense's Advanced Research Projects Agency, Dr. Cerf played a key role leading the development of Internet and Internet-related packet data transport and security technologies.

He has served as a member of the Board of Directors at several organizations. He serves on the Jet Propulsion Laboratory Advisory Committee and holds an appointment as a distinguished visiting scientist, working on the design and implementation of an interplanetary Internet. Dr. Cerf is a Fellow of the several scientific organizations including IEEE, ACM, and AAAS, and is a member of the US National Academy of Engineering.

A recipient of numerous additional awards and commendations in connection with his work on the Internet, he has been identified by People Magazine as one of that year's "25 Most Intriguing People."

Dr. Cerf holds a Bachelor of Science degree in Mathematics from Stanford University and Master of Science and Ph.D. degrees in Computer Science from University of California, Los Angeles.

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Justin Kasper

Advanced Technologies,
BWX Technologies, Inc.

Justin C. Kasper is Chief of Technology, at BWXT Advanced Technologies, Inc. supporting the development and demonstration of new nuclear power and propulsion systems for terrestrial and space applications.

Before coming to BWXT, he was a Professor in the University of Michigan College of Engineering, and a Civil Servant at the Smithsonian Institution. Dr. Kasper is an experimental physicist with 25 years of experience in the development of sensors and systems for exploring space. He was the project scientist for the radiation sensor on Lunar Reconnaissance Orbiter and principal investigator on Parker Solar Probe and the SunRISE Explorer mission.

He is a Fellow of the American Physical Society and has served on committees for the National Academy of Sciences Space Studies Board and Intelligence Community Studies Board. He is the recipient of the Copernicus Award, the Henry Russel Award, the NASA Silver Achievement Medal, and the Presidential Early Career Award for Scientists and Engineers.

He received his AB in Physics from the University of Chicago and PhD in Physics from the Massachusetts Institute of Technology.

Curtis Hernandez

**Principal for Space Policy,
Amazon Web Services**

Curtis Hernandez is an expert in national-level space policy, executive and legislative branch processes and a 25-year veteran space operator in the United States Air Force.

Prior to his tenure with Amazon Web Services, he worked for LeoLabs Inc., and served as the Director of National Security Space Policy.

He champions the adoption of modernized and innovative solutions that promote activity in space, and interfaces with policymakers, operators, professional staff members, and national level leaders to drive space policy and procurement initiatives that capitalize on the unique and innovative capabilities of the commercial space industry.

With his background in the commercial space industry and as the Director of National Security Space Policy for the National Space Council, Mr. Fernandez brings extensive experience and perspective on space policy. While on the staff for the National Space Council, he led interagency teams to author the 2020 National Space Policy, Space Policy Directive-5 (SPD-5) on cybersecurity for space systems, SPD-7 on space-based positioning, navigation, and timing, and guided the implementation of SPD-3, the National Space Traffic management policy across the executive branch. He was also instrumental in driving the establishment of the United States Space Force and re-establishment of the United States Space Command on behalf of the Executive Office of the President.

As a retired United States Air Force Colonel, Mr. Fernandez draws on 25 years of space operations experience in space control, launch and range operations, and command. He is a graduate and former instructor of the United States Weapon school and holds an MSA in Information Resource Management from Central Michigan University, an MMOAS from the Air Command and Staff College, and an MSS from the Air War College.

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Dan Hendrickson

Vice President of Business Development, Astrobiotic

Dan Hendrickson serves as the Vice President of Business Development for Astrobotic, a lunar logistics company based in Pittsburgh, Pennsylvania. Dan leads the company's lunar and space robotics sales efforts. Prior to Astrobotic, Dan served as the Director of Civil and Commercial Space Systems at the Aerospace Industries Association (AIA). During his time at AIA, he was a consensus builder among a council of 50 U.S. space companies to provide the U.S. Government guidance on key space industry views. Dan holds a MA degree in International Science and Technology Policy from the Elliott School of International Affairs at George Washington University and a BS degree in aerospace engineering from the Florida Institute of Technology.

Brian Gilchrist

Chair,
USRA Council of Institutions

Dr. Gilchrist is Professor of Electrical Engineering & Computer Science, Professor of Climate & Space Sciences & Engineering, and Director of the Leinweber Space Innovation Laboratory at the University of Michigan. He also recently completed serving as Director of the Space Physics Research Laboratory/ XTRM Labs.

Dr. Gilchrist specializes in experimental plasma electrodynamics, principally for in-space applications with a focus on plasma sensors, spacecraft charging, and electric propulsion. His research activities span the development of advanced space electric propulsion applications, in-space plasma effects and measurements, and ground-based experimental simulations of high-speed space plasma flows to investigate current collection and sheath physics. Dr. Gilchrist is Principal Investigator for NASA's sub-orbital rocket mission: The Beam-Spacecraft Plasma Interaction and Charging Experiment (BSPICE). He also is Co-Investigator and an Instrument Principal Investigator on the NASA/SwRI ICOVEX CubeSat mission. He was Principal Investigator for the NASA Miniature Tether Electrodynamics Experiment (MiTEE) CubeSat Mission. He was Co-Investigator and Instrument Principal Investigator for the NASA MSFC ProSEDS electrodynamic tether mission, and also was experiment Principal Investigator for the Shuttle Electrodynamics Tether System on the NASA TSS-1R mission.

About USRA

Founded in 1969, under the auspices of the National Academy of Sciences at the request of the U.S. Government, the Universities Space Research Association (USRA) is a nonprofit corporation chartered to advance space-related science, technology and engineering. USRA operates scientific institutes and facilities, and conducts other major research and educational programs. USRA engages the university community and employs in-house scientific leadership, innovative research and development, and project management expertise.

www.usra.edu

About the Space Policy Institute

The George Washington University Elliott School of International Affairs, a world leader in research, graduate study, and informed discussion related to issues of science, technology, and public policy, established a Space Policy Institute in 1987. The Institute conducts research, offers graduate courses and organizes seminars, symposia, and conferences on topics related to domestic and international space policy. It operates as a research and policy program of the Center for International Science and Technology Policy of GW's Elliott School of International Affairs, but also relies on support from The George Washington University as a whole, in addition to funding from a number of individual, corporate, foundation, and government sources. The Institute is directed by Dr. Scott Pace.

SPI focuses its activities on policy issues related to the space efforts of the United States, as well as the cooperative and competitive interactions in space between the US and other nations. The Institute provides a setting in which scholars, policy analysts, practitioners, and students can work together to examine and evaluate options for the future in space. It is an affiliate of the International Space University, the European Space Policy Institute and the Beijing Institute of Technology, Institute of Space Law.

https://spi.elliott.gwu.edu/

“To constitute an entity by means of which universities and other research organizations may cooperate with one another, with the governments of the United States and other nations, and with other organizations toward the development and application of space-related science, technology, and engineering.”

— From the USRA Articles of Incorporation

“I would like to propose that the Academy take initiative in convening the representatives of a number of appropriate universities to discuss the formation of such a consortium.”

— James Webb, NASA Administrator, 1961 – 1968

In his 1967 letter to Frederick Seitz, President of the National Academy of Sciences

Background image: A gibbous moon visible in this view of Earth’s horizon and airglow, photographed by an astronaut in 2007.

Image Credit: NASA

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