

Key Non-Polar Destinations Across the Moon to Address Decadal-level Science Objectives with Human Explorers

Committee

James Day

Co-Chair

JAMES DAY is a professor in the Geosciences Research Division at the University of California, San Diego. Day's research interests include isotope geochemistry, cosmochemistry, petrogenesis of igneous and metamorphic rocks, volcanism, and planet formation and accretion. Day is a geologist and geochemist whose research spans studies of asteroids, Mars, and the Moon, as well as terrestrial basaltic volcanism to further understand crust formation processes and the role of volcanism on Earth system cycles. Day is the recipient of the Nier Prize from the Meteoritical Society, the Houtermans Award from the European Association of Geochemistry, and the Antarctic Service Medal. Day earned a Ph.D. in geochemistry from the University of Durham.

Daniel L. Dumbacher

Co-Chair

DANIEL L. DUMBACHER is a professor of engineering practice in the School of Aeronautics and Astronautics at Purdue University. At Purdue, Dumbacher specializes in program and project management, complex, state-of-the-art systems engineering, and propulsion and power systems engineering. Dumbacher was instrumental in the development of the Purdue Systems Collaboratory, an effort to integrate better the engineering disciplines with business, political science, communications, and philosophy. Formerly, Dumbacher was executive director of the American Institute of Aeronautics and Astronautics and as deputy associate administrator in the Exploration Systems Development Division, for the Human Exploration and Operations Mission Directorate at NASA Headquarters. Dumbacher earned a B.S. in mechanical engineering at Purdue University and an M.B.A. in business administration from the University of Alabama, Huntsville.

Stuart D. Bale

Member

STUART BALE is a Professor of Physics at the University of California, Berkeley and Director of the Space Sciences Laboratory. Bale's primary research expertise is in plasma astrophysics from the experimental point of view, developing experiments to understand these processes and how microscale, kinetic phenomena, affect large-scale plasma dynamics. Bale is also experienced in low frequency (LF) radio astronomy, including space-based applications. He is NASA Principal Investigator for instrument suites on the Wind, STEREO, and Parker Solar Probe spacecraft and for 2 instrument suites being developed for the NASA Commercial Lunar Payload Services (CLPS) program. Bale is a recipient of the 2003 Presidential Early Career Award for Scientists and Engineers (PECASE) and an elected fellow of the American Physical Society (APS) and the American Geophysical Union (AGU). He was awarded the 2025 Arctowski Medal of the National Academy of Sciences (NAS). Bale earned a Ph.D. in physics from the University of Minnesota.

Jessica Barnes

Member

JESSICA BARNES is an assistant professor at the Lunar and Planetary Laboratory at the University of Arizona. Barnes focuses on understanding the origin and evolution of volatiles in the solar system, using nano and microanalytical techniques to study mineralogy, geochemistry, isotopes and petrological histories of a wide range of extraterrestrial materials. Barnes is a member of a project under the Apollo Next-Generation Sample Analysis program and lead scientist for Sample Elements and Isotopes Working Group for the OSIRIS-REx mission. Barnes earned a Ph.D. in planetary and space sciences from The Open University and Natural History Museum, London.

Timothy Cichan

Member

TIMOTHY CICHAN is a systems engineer and the Space Exploration Architect at Lockheed Martin Space Systems, where Cichan leads a multi-disciplinary team of engineers who figure out how to help astronauts and robots visit the Moon, asteroids, and Mars. Cichan previously was the Orion System Architect. Cichan joined Lockheed Martin in 2002 and has worked for both human spaceflight and commercial communication satellite teams, in optimal trajectory design, mission analysis, subsystem development, and systems engineering. Cichan earned an M.S. in aerospace engineering from Penn State.

Mary K. Hudson

Member

MARY K. HUDSON is the Eleanor and A. Kelvin Smith Professor Emerita of Physics at Dartmouth College and a senior research associate at the National Center for Atmospheric Research. Hudson also served for eight years as Chair of Physics and Astronomy at Dartmouth. Current areas of investigation include the evolution of the radiation belts; how the ionized particle outflow is known as the solar wind and the magnetic field of the Sun interact with the magnetic field of the Earth, producing electrical currents in the ionosphere; and the effects of solar cosmic rays on radio communications near the Earth's poles. Hudson was a co-investigator on NASA's Van Allen Probes Mission. Hudson was one of the principal investigators with the Center for Integrated Space Weather Modeling. Hudson is a fellow of the American Geophysical Union (AGU), recipient of the 2017 Fleming Medal, and recipient of the AGU Macelwane Award. Hudson has served on Heliophysics Subcommittee of the NASA Advisory Council. Hudson earned a Ph.D. in physics from the University of California, Los Angeles.

Janet L. Kavandi

Member

JANET L. KAVANDI is president and CEO of Kavandi Consulting, LLC. Kavandi was formerly president and chief science officer at the Sierra Space Corporation, director of the NASA Glenn Research Center, director of flight crew operations, deputy director of health and human performance, and deputy chief of the astronaut corps at the NASA Johnson Space Center. Kavandi completed three spaceflight missions as a U.S. astronaut and is a T-38 pilot with 1200 flying hours. Kavandi serves on several boards, including the Smithsonian National Air and Space Museum, Embry-Riddle Aeronautical University, and the Astronaut Scholarship Foundation. Kavandi has received two Presidential Rank Awards, a Women in Aerospace Lifetime Achievement Award, NASA's Distinguished Service Medal, two Exceptional Service Medals, two Outstanding Leadership Medals, and three Spaceflight Medals, and has been inducted into the Astronaut Hall of Fame. Kavandi earned a Ph.D. in chemistry from the University of Washington-Seattle.

Elliot M. Meyerowitz

Member

ELLIOT M. MEYEROWITZ (NAS) is a Howard Hughes Medical Institute Investigator and the George W. Beadle Professor of Biology at the California Institute of Technology. Meyerowitz has made outstanding contributions toward the understanding of development in plants and animals. Meyerowitz's work was crucial in establishing *Arabidopsis thaliana* as a model plant for molecular-genetic studies. Meyerowitz has identified *Arabidopsis* genes that regulate flower development and genes that determine responsiveness to the plant hormone ethylene. Meyerowitz is a member of the American Academy of Arts and Sciences, the American Philosophical Society, and is a foreign member of the French Académie des Sciences and the U.K.'s Royal Society. Meyerowitz is a recipient of the Balzan Prize, the Gruber Prize in Genetics, and the Wolf Prize in Agriculture. Meyerowitz earned a Ph.D. in biology from Yale University.

Clive R. Neal

Member

CLIVE R. NEAL is a professor of planetary geology in the University of Notre Dame's Department of Civil and Environmental Engineering and Earth Sciences. Neal's research uses petrology, geochemistry, and geophysics to investigate the origin and evolution of the Moon and large igneous provinces, i.e., "supervolcanoes." Neal was instrumental in developing the Lunar Exploration Analysis Group (LEAG) Lunar Exploration Roadmap at the request of the NASA Advisory Council during the Vision for Space Exploration Program and is the Chair Emeritus of LEAG. Neal chaired the NASA Senior Review of Planetary Science Missions, as well as the Mars 2020 Instrument Review Panel, and received the Michael J. Wargo Award for the Integration of Exploration and Planetary Science from NASA's Solar System Exploration Research Virtual Institute. Neal's Ph.D. in mantle petrology was awarded from the University of Leeds. Neal was a member of the National Academies Committee on Extraterrestrial Sample Analysis Facilities.

Parvathy Prem

Member

PARVATHY PREM is a planetary scientist at the Johns Hopkins University Applied Physics Laboratory, whose research focuses on developing and applying computational methods to study solar system bodies and their interactions with the space environment. Prem's current investigations include modeling the origin and transport of volatiles on the Moon and Mercury, assessing the environmental impact of lunar surface activities, and developing radiative transfer models to aid in the interpretation of remote sensing data at radar, infrared, and optical wavelengths. Prem is a co-investigator on NASA's Lunar Reconnaissance Orbiter (LRO) mission and on several teams of the Solar System Exploration Research Virtual Institute (SSERVI). Prem earned a Ph.D. in aerospace engineering from the University of Texas at Austin.

Thomas E. Romesser

Member

THOMAS E. ROMESSER (NAE) is a retired vice president and Chief Technology Officer for Northrop Grumman Aerospace Systems and was also sector vice president of Aerospace Systems. In those roles, Romesser provided senior leadership representation with customers, universities, industry, and the rest of the corporation. Romesser also was responsible for technology development to support future programs while maintaining close linkage to legacy programs. Formerly, Romesser was sector vice president and general manager of the Technology and Emerging Systems Division for Northrop Grumman's former Space Technology sector. In this role, Romesser was responsible for the development and execution of Space Technology's strategy to support both near- and long-term business objectives, system enhancements and technology leverage for new business pursuits. Romesser oversaw activities of the Directed Energy Systems and Advanced Concepts organizations as well as the Space Technology Research Laboratories. Romesser was also vice president of technology development; responsible for the identification, development, and acquisition of Space Technology's strategic technologies; and managed discretionary investments in technology and product development. Romesser earned a Ph.D. in physics from the University of Iowa.

Aenor Sawyer

Member

AENOR SAWYER is an associate professor in skeletal health at the University of California, San Francisco Department of Orthopaedic Surgery. Sawyer has expertise in remote care and space health/medical management as the director of the UC Space Health Program and previously served as the Chief Health Innovation Officer for the Translational Research Institute for Space Health, with more than two decades of experience in development and evaluation of health technologies, telemedicine and remote medical management. Sawyer is founder and director of the Skeletal Health Service where she combines her background as an orthopaedic surgeon, physical therapist and exercise physiologist enabling pediatric to geriatric patients optimize their bone health across the lifespan. Sawyer received an M.D. from the University of California, Davis.

Gayle E. Woloschak

Member

GAYLE WOLOSCHAK is professor of radiation oncology at Northwestern University Feinberg School of Medicine, and prior to that was senior scientist at Argonne National Laboratory. Woloschak's current research is in areas of radiation biology understanding the consequences of radiation exposure on biologic systems, working in both external and internal exposures. Woloschak also carries out research in nanotechnology. Woloschak has conducted significant work with radiation effects from space environments, approaches to mitigate the effects of these exposures, and general radiation protection approaches. Woloschak is a recipient of the Lauriston Taylor award from the National Council on Radiation Protection and Measurements (NCRP) and serves as chair of Program Area Committee 1 (Basic Criteria, Epidemiology, Radiobiology, and Risk) for NCRP. Additionally, Woloschak is vice-chair of Committee-1 (Radiation Effects) and Chair for Task Group 118 (Relative Biological Effectiveness, Quality Factor, and Radiation Weighting Factor) for the International Commission on Radiation Protection. Woloschak is serving as co-chairperson (2023-2024) for the Science Advisory Committee for the Radiation Effects Research Foundation. Woloschak received a Ph.D. from the Medical College of Ohio and did post-doctoral training at Mayo Clinic.