Planetary Science and Astrobiology Decadal Survey 2023-2032: Panel on Mercury and the Moon

Committee

Timothy L. Grove

Chair

TIMOTHY L. GROVE (NAS) is the Robert R. Shrock Professor of Earth and Planetary Sciences in the Department of Earth, Atmospheric, and Planetary Sciences at the Massachusetts Institute of Technology. He is interested in the processes that have led to the chemical evolution of the Earth and other planets, including the Moon, Mars, Mercury, and meteorite parent bodies. His approach to understanding planetary differentiation is to combine field, petrologic, and geochemical studies of igneous rocks with high pressure, high temperature experimental petrology. He is a past president of the American Geophysical Union and the recipient of multiple awards, including the V.M. Goldschmidt Award of the Geochemical Society, the Bowen Award of the American Geophysical Union, and the Pick Award of the Rocky Mountain Association of Geologists. Asteroid 9276 Timgrove is named in his honor. He is the recipient of honorary degrees from the University of Liege and the Université de Lausanne and earned his Ph.D. in geology at Harvard University. Grove is a past member of the National Academies' U.S. National Committee for the International Union of Geodesy and Geophysics.

Brett W. Denevi

Vice Chair

BRETT W. DENEVI is a planetary scientist at the Johns Hopkins University Applied Physics Laboratory. Her research focuses on the origin and evolution of planetary surfaces, particularly the history of volcanism, the effects of impact cratering, and space weathering. She is the deputy principal investigator of the Lunar Reconnaissance Orbiter Camera and science lead of NASA's Lunar Exploration Analysis Group. Denevi is the recipient of the 2015 Maryland Academy of Science outstanding young scientist award, a NASA Early Career Fellowship, seven NASA group achievement awards, and asteroid 9026 Denevi was named in her honor. She earned her Ph.D. in geology and geophysics from the University of Hawaii. She has previously been nominated to serve on a National Academies committee.

James Day

Member

JAMES DAY is a professor in the Geosciences Research Division at the University of California, San Diego. He is also director of the Scripps Isotope Geochemistry Laboratory. His research interests include isotope geochemistry, cosmochemistry, petrogenesis of igneous and metamorphic rocks, planetary dynamics and geodynamics, and planet formation and accretion. In addition, Day is a geologist and geochemist whose research focuses on volcanism and what the mineralogy and composition of rocks can tell about how the planets formed and evolved to their present-day states. He studies asteroids and products formed in the mantle of Mars, the Earth, and the Moon. Day also studies 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. He received his Ph.D. in geochemistry from the University of Durham. Day has not previously served on a National Academies committee.

Alexander J. Evans

Member

ALEXANDER J. EVANS is an assistant professor of Earth, Environmental, and Planetary Sciences at Brown University. His research interests include understanding the evolutionary, tectonic, geodynamic, and geophysical processes of solid planets. His work includes analyses of altimetry, gravity, geomorphology, and tectonics to determine the structure, surface, and internal evolution of solid planets. Prior to joining Brown University, he held postdoctoral research positions at the Lunar and Planetary Laboratory at the University of Arizona, the Southwest Research Institute, the Colorado School of Mines, and Columbia University. Evans is the recipient of numerous awards including the National Association of Graduate-Professional Students' Lifetime Achievement Award and the Massachusetts Institute of Technology's Presidential Fellow Award. He received his Ph.D. in planetary geophysics from the Massachusetts Institute of Technology. Evans has not previously served on any National Academies studies.

Sarah Fagents

Member

SARAH FAGENTS is a researcher at the University of Hawai?i at Manoa with the Hawai?i Institute of Geophysics and Planetology. Her research interests include planetary volcanism, volcanic fluid dynamics, and icy satellite geology. She focuses on understanding the mechanisms of formation of volcanic features on the Earth and other planetary bodies, including the physics of eruptive processes, and the influence that the planetary environment has on the style of eruptions and resulting landforms. Fagents is currently a co-investigator on the Mars 2020 Rover Mission Mastcam-Z, and on the JPL-NAI Titan project Habitability of Hydrocarbon Worlds: Titan and Beyond. She received her Ph.D. in planetary science from Lancaster University. Fagents has not previously served on a National Academies committee.

William M. Farrell

Member

WILLIAM M. FARRELL is a plasma physicist NASA’s Goddard Space Flight Center in the Solar System Exploration Division. His research interests include the study of lightning storms on Earth and the planets, the dusty plasma environment at planetary moons and asteroids, the space environment of the Moon, and planetary auroral and magnetospheric processes. Farrell was a co-investigator on the Cassini mission to Saturn and is currently a co-investigator on the Parker Solar Probe and Wind spacecraft. From 2014 to 2019, he was the principal investigator of the DREAM2 center for space environments leading a team of over 30 investigators on the space weather effects at the Moon and other airless bodies. He is the recipient of numerous awards including the NASA Exceptional Scientific Achievement Medal, the Robert H. Goddard Award for Exceptional Achievement in Science, and the NASA/Goddard Divisional Peer Award. Farrell received his Ph.D. in physics from the University of Iowa. He has not served on any National Academies studies.

Caleb I. Fassett

Member

CALEB I. FASSETT is a planetary scientist at NASA’s Marshall Space Flight Center. His research focuses on using a combination of remote sensing, geologic mapping, and numerical modeling to understand planetary surfaces and geomorphological processes. In addition, his research interests include how observations of impact crater populations can be used to infer the chronology and geologic history of planetary bodies. Prior to joining NASA’s Marshall Space Flight Center, he was a visiting assistant professor at Mount Holyoke College and a postdoctoral research associate at Brown University. Fassett currently supports many activities at Marshall, including the Human Landing System and the Advanced Concept Office. He received a Ph.D. in geosciences from Brown University. Fassett has not previously served on any National Academies studies.

Jennifer L. Heldmann

Member

JENNIFER L. HELDMANN is a research scientist at NASA Ames Research Center. Her research interests focus on the studies of the Moon and Mars. This includes improving our understanding of lunar volatile deposits and studies of recent water on Mars through analysis of spacecraft data, numerical modeling, and terrestrial analog fieldwork. Heldmann is the principal investigator (PI) of the Field Investigations to Enable Solar System Science and Exploration (FINESSE) and Resource Exploration and Science of OUR Cosmic Environment projects. She is the recipient of numerous awards, including the NASA Exceptional Scientific Achievement Medal, NASA Corradini Award for Exploration, multiple NASA Group Achievement Awards including the FINESSE and Mojave Volatile Prospector projects as PI, and a NASA Superior Achievement Award for Science. She received her Ph.D. in planetary science from the University of Colorado, Boulder. She has not served on any National Academies committees.

Masatoshi Hirabayashi

Member

MASATOSHI HIRABAYASHI is an assistant professor in aerospace engineering, an adjunct professor in geosciences at Auburn University, and leads Auburn’s Space Technology and Applications Research Laboratory. Prior to joining his current institution, he was a visiting scholar at the Imperial College, London, a postdoctoral associate at Purdue University, and a research associate at the University of Colorado, Boulder. Hirabayashi’s research interests focus on the Moon, Mercury, and small bodies. This includes the study of geophysical characterizations of surface processes on the lunar surface, investigations of links between surface processes on Mercury and dust environments around this planet, geophysical characterizations of small bodies, and assessing the feasibility of proximity operations around Mercury, the Moon, and small solar system bodies. He received his Ph.D. in aerospace engineering from the University of Colorado, Boulder. Hirabayashi has not served on any National Academies committees.

James T. Keane

Member

JAMES TUTTLE KEANE is a scientist at the Jet Propulsion Laboratory. His research focuses on studying the interactions between orbital dynamics, rotational dynamics, and geologic processes on rocky and icy worlds across the solar system. Prior to joining JPL, he was a postdoctoral fellow in the Joint Center for Planetary Astronomy under the Division of Geological and Planetary Sciences at the California Institute of Technology, and a graduate research associate at the University of Arizona. He has extensive experience with NASA missions, including the GRAIL lunar orbiter and the New Horizons mission to Pluto and the Kuiper belt. He is currently an affiliate of the Keck Institute for Space Studies, a journeyman for the International Association of Astronomical Artists, and a member of the American Geophysical Union, the American Astronomical Society, the AAS Division of Dynamical Astronomy, and the AAS Division for Planetary Science. He is the recipient of numerous awards including the Editor's Citation for Excellence in Refereeing Award from Geophysical Research Letters and the Pellas-Ryder Award of the Geological Society of America. He received his Ph.D. in planetary science from the University of Arizona. He has not previously served on a National Academies committee.

Francis McCubbin

Member

FRANCIS MCCUBBIN is the astromaterials curator at NASA's Johnson Space Center within the Astromaterials Research and Exploration Science Division. As head curator, he is responsible for protecting the scientific integrity of NASA's priceless astromaterials collections and distributing select samples to the global community for further scientific examination. His research focuses on understanding the abundance, distribution, and origin of water in the inner solar system, as well as deciphering the thermal and magmatic evolution of the terrestrial planets, moons, and asteroids. Prior to joining his current organization, McCubbin was a research scientist at the Institute of Meteoritics at the University of New Mexico, and a postdoctoral fellow at the Geophysical Laboratory of the Carnegie Institution for Science. He received his Ph.D. in geosciences from Stony Brook University. He has not served on any National Academies committees

Miki Nakajima

Member

MIKI NAKAJIMA is an assistant professor in the Department of Earth and Environmental Sciences and in the Department of Physics and Astronomy at the University of Rochester. Her research interest includes origin of Earth and the Moon, the Martian moons, the early Earth and lunar environments, and the impact history in the solar system. In particular, she investigates various impact processes and considers their geological, geophysical, and geochemical implications based on theoretical and numerical modeling. Nakajima is a member of the science team for the Japan Aerospace Exploration Agency's Martian Moons Exploration sample return mission. Prior to moving to Rochester in 2018, Nakajima was a postdoctoral fellow at the Carnegie Institution for Science. She received her Ph.D. in planetary science at the California Institute of Technology.

Mark P. Saunders

Member

MARK P. SAUNDERS is an independent consultant. Since retiring from NASA in December 2008, he has been consulting for various NASA offices providing program/project management and systems engineering expertise. This has included support to the Office of Chief Engineer, the Office of Independent Program and Cost Evaluation, the Mars Program and the Science Office for Mission Assessments (at NASA's Langley Research Center). He has participated in the rewriting of NASA's policy on program/project management; advised and supported the agency's independent program/project review process; and has supported the review of various programs and projects. At NASA headquarters, he served as director of the independent program assessment office, where he was responsible for enabling the independent review of the agency's programs and projects at life cycle milestones to ensure the highest probability of mission success. At the Office of Space Science, he served as program manager for the Discovery Program. He received the Presidential Meritorious Rank Award in 2008; Outstanding Performance awards in 1982, 1994-2008; and the NASA Outstanding Leadership Medals in 1998, 2004, 2006. He earned his B.A. in industrial engineering at the Georgia Institute of Technology. He has served on the several National Academies' committee including the Space Studies Board and the Committee on Astrobiology and Planetary Science.

Sonia M. Tikoo-Schantz

Member

SONIA M. TIKOO-SCHANTZ is an assistant professor at Stanford University in the Department of Geological Sciences. Her research focuses on the use of paleomagnetism and fundamental rock magnetism as tools to investigate problems in the planetary sciences such as dynamo evolution, the origins of magnetic anomalies within planetary crusts, and impact cratering processes. Prior to joining Stanford University, she was an assistant professor at Rutgers University and a postdoctoral research associate at the University of California, Berkeley. She received her Ph.D. in planetary sciences from the Massachusetts Institute of Technology. Tikoo-Schantz has not previously served on a National Academies committee.