Planetary Science and Astrobiology Decadal Survey 2023-2032: Panel on Ocean Worlds and Dwarf Planets

Committee

Alexander G. Hayes

Chair

ALEXANDER G. HAYES is an associate professor in the Department of Astronomy at Cornell University and director of the Cornell Center for Astrophysics and Planetary Science. Hayes has over 15 years of experience in utilizing spacecraft-based platforms to study the properties of planetary surfaces, including an engineering background in instrument design and calibration. Hayes' NASA flight project experience includes Cassini, MER, MSL, Mars2020, Europa Clipper, and Dragonfly. He has also worked on instrument design and characterization for several Missile Defense Agency Programs including THAAD, SM3, and EKV. Hayes' research program focuses on planetary surface processes and solar system exploration, with a special interest in the ocean worlds of the outer solar system. He is a recipient of the Zeldovich Medal from COSPAR and the Russian Academy of Sciences, the Ronald Greeley Early Career Award from the American Geophysical Union, the Sigma Xi Young Scholar Procter Prize, and a NASA Early Career Fellowship. Hayes received his Ph.D. in planetary science from the California Institute of Technology. He is currently a member of the National Academies Committee on Astrobiology and Planetary Science and the COSPAR Panel on Planetary Protection.

Francis Nimmo

Vice Chair

FRANCIS NIMMO (NAS) is a professor in the Department of Earth and Planetary Sciences at the University of California, Santa Cruz. His research interests cover Mars, Venus, Europa, Ganymede, Mercury, the Moon, and Pluto (as well as other icy satellites). Nimmo's research accomplishments include showing that a giant impact could have generated the Martian hemispheric dichotomy; identifying shear-heating as an important process on Enceladus, Europa, and Triton; proposing true polar wander as an important process on Enceladus and Pluto; and explaining the link between plate tectonics and dynamo activity on Mars and Venus. He is the recipient of the 2007 Macelwane medal and Urey Prize, the 2018 Farinella Prize and the 2019 Harold Jeffreys Lectureship. He received his Ph.D. in geophysics from the University of Cambridge. Nimmo previously served on the National Academies Committee for the Review of the Next Decadal Mars Architecture, the Satellites Panel for the Visions and Voyages Decadal Survey, and the Committee on Planetary and Lunar Exploration.

Morgan L. Cable

Member

MORGAN L. CABLE is a research scientist and group supervisor at the Jet Propulsion Laboratory. Her research interests focus on organic and biomarker detection through both in situ and remote sensing techniques. Cable also conducts fieldwork in extreme environments on Earth, searching for life in places such as the Atacama Desert, the summit of Mt. Kilimanjaro, and the lava fields in Iceland. She has held numerous position at the Jet Propulsion Laboratory including a co-investigator for the Dragonfly mission, project staff scientist for the Europa Lander project, and research scientist in the cryogenic chemistry laboratory. Cable is the recipient of numerous awards including the Voyager Award for exceptional work on outer worlds projects, the Bruce Murray Award for Excellence in Education and Public Engagement, and a team award for analysis and refinement of Europa Lander science objectives. She received her Ph.D. in inorganic chemistry from the California Institute of Technology. Cable has not previously served on any National Academies studies.

Alfonso Davila

Member

ALFONSO DAVILA is a research scientist at NASA Ames Research Center. His research interests include the search for a second genesis of life in the solar system using terrestrial analog environments to assess the potential habitability of other planetary bodies and developing strategies for life detection based on first-principles in biology and biochemistry. His work includes conducting field investigations in the most extreme deserts on Earth, providing scientific advice for the maturation of instruments for space exploration, and developing mission concepts to search for evidence of life on Mars, Europa, and Enceladus. Prior to joining his current institution, Davila was a research scientist at the SETI Institute and a postdoctoral researcher at NASA Ames Research Center. He received his Ph.D. in geophysics from the University of Munich. Davila has not previously served on any National Academies studies.

Glen Fountain

Member

GLEN FOUNTAIN is a program manager (retired) at the Johns Hopkins University Applied Physics Laboratory. He led the engineering team for the New Horizons mission to Pluto during the initial concept work. Although Fountain retired in 2016, he remains working in a part time capacity continuing to support the New Horizons mission and other activities of the Space Exploration Sector of the Johns Hopkins University Applied Physics Laboratory. At APL, he was responsible for developing the attitude control system and sensors for the Small Astronomy Satellite series. As part of the system implementation for the MAGSAT satellite in the 1970s (for which he was assistant project scientist), Fountain led the team that developed one of the first microprocessor-based attitude control systems ever flown. He also led a group of engineers developing instruments flown on various missions, including Galileo, Ulysses, Delta 180, Delta 181, and Delta 183. Fountain oversaw hardware development to support missions including the Advance Composition Explorer, NEAR, MSX, CONTOUR, MESSENGER, and the New Horizons mission to Pluto. Fountain received his M.S. in electrical engineering from Kansas State University. He was a member of the National Academies Planetary Science Decadal Survey: Satellites Panel.

Christopher R. German

Member

CHRISTOPHER R. GERMAN is a senior scientist at the Woods Hole Oceanographic Institution. His research interests include the geological controls on seafloor fluid flow and its impacts on ocean budgets, chemosynthetic ecosystems, astrobiology, and the origins of life. He is an aggressive user of new technologies for deep ocean exploration. He is the co-lead for the Network for Ocean Worlds at the Woods Hole Oceanographic Institution, which advances comparative studies to characterize Earth and other ocean worlds across their interiors, oceans, and cryospheres; search for biosignatures; and to understand life in relevant ocean world analogues and beyond. German is the recipient of numerous awards including the Alexander Von Humboldt Foundation’s 2014 research prize, the Peterson Foundation’s 2010 Excellence in Research award in Germany, the 2002 MBE medal for services to marine research in the U.K., and the 2000 Edward A. Flinn Award of the International Lithosphere Panel. He received his Ph.D. in Earth sciences from the University of Cambridge. German has not previously served on any National Academies studies.

Christopher R. Glein

Member

CHRISTOPHER GLEIN is a senior research scientist at the Southwest Research Institute. His research interests and projects include leading investigations of geochemical processes that involve water and/or organic compounds on worlds in the outer solar system. Prior to joining his current institution, Glein was a Deane postdoctoral fellow at the University of Toronto, and a postdoctoral fellow at the Carnegie Institution for Science. He received his Ph.D. in geochemistry from the Arizona State University. He has not previously served on any National Academies studies.

Candice Hansen

Member

CANDICE HANSEN is a senior scientist at the Planetary Science Institute. Her research interests include the seasonal behavior of volatiles, outer planet satellites' tenuous atmospheres, and Enceladus' plumes. In addition, her mission specialties include remote sensing, particularly visible and ultraviolet imagers, and operation of scientific instruments on spacecraft. She is a Juno co-investigator responsible for JunoCam. Hansen has held numerous positions at the Jet Propulsion Laboratory including – deputy principal investigator for the High Resolution Imaging Science Experiment, co-investigator on the Cassini Ultraviolet Imaging Spectrograph, and principal investigator for the New Frontiers mission study concept "Argo". Hansen is a member of the American Geophysical Union and the American Astronomical Society. She is the recipient of numerous awards, including the 2018 NASA Outstanding Public Leadership Medal for her work on JunoCam, the 2009 NASA Exceptional Scientific Achievement Medal, the 2005 NASA Exceptional Service Medal, and the 2002 Jet Propulsion Laboratory Exceptional Leadership Award. She received her Ph.D. in geophysics and space physics from the University of California, Los Angeles. She has no prior experience serving on National Academies committees.

Emily S. Martin

Member

EMILY S. MARTIN is a research physical scientist at the Center for Earth and Planetary Studies at the Smithsonian Institution's National Air and Space Museum. Her research interests include planetary surface processes and tectonic deformation across the solar system, especially the icy bodies of the outer solar system. In addition, she is interested in using preserved geologic histories to better understand the development of ocean worlds. Previously, Martin was a postdoctoral research fellow and visiting researcher at the National Air and Space Museum. She is co-investigator on a NASA Discovery mission team proposal to explore Neptune's moon Triton and is the chair of the Planetary Geology Division of the Geological Society of America. Martin received her Ph.D. in geological sciences from the University of Idaho. She has no prior experience serving on National Academies studies.

Marc Neveu

Member

MARC NEVEU is an assistant research scientist at the University of Maryland, College Park. His research interests include planetary exploration and astrobiology; and the search for the origins, evolution, and distribution of life in the universe. In particular, he seeks to understand whether oceans on other worlds harbor life by simulating their physics and chemistry, as well as through laboratory and field studies of similar places on Earth where microbial life thrives. Previously, he was an astrobiology research assistant at NASA and a postdoctoral researcher at Arizona State University. He is the recipient of numerous awards including a Scialog Fellowship from the Research Corporation for Science Advancement, a NASA Postdoctoral Management Program Fellowship and a NASA Early Career Fellowship. Neveu received his Ph.D. in astrophysics from the Arizona State University. He has not previously served on any National Academies studies.

Carol S. Paty

Member

CAROL S. PATY is an associate professor at the University of Oregon. Prior to joining her current organization, she was an associate professor in the School of Earth and Atmospheric Sciences at the Georgia Institute of Technology. She also worked at the Southwest Research Institute in the Space Sciences and Engineering Division. Her research is focused on understanding planetary magnetospheric dynamics and moon-magnetosphere interactions using a combination of computational simulations and data collected by various space-based instruments. Paty pioneered the application of multifluid plasma dynamic simulations to icy moons and outer planet magnetospheres, and the inclusion of plasma-neutral interactions in global simulations. She was a participating scientist on the Cassini mission to Saturn and is currently a co-investigator on the Plasma Environment Package for the European mission to Ganymede (JUICE). She is also a co-investigator on both the Plasma Instrument for Magnetic Sounding and the Radar for Europa Assessment and Sounding: Ocean to Near-surface instruments for NASA's mission to Europa. She earned her Ph.D. in geophysics and space physics from the University of Washington. Paty previously served on the National Academies Committee on Strategic NASA Science Missions.

Lynnae C. Quick

Member

LYNNAE C. QUICK is a research scientist at NASA’s Goddard Space Flight Center. Her research focuses on geophysical processes on the Ocean Worlds in the solar system and in extrasolar planetary systems. She applies principles of fluid dynamics and heat transfer to model cryovolcanism and ocean crystallization on the icy moons of the giant planets and on dwarf planet Ceres. As a member of the Europa Clipper science team, Quick is a co-investigator on the Europa Imaging System (EIS), and a science team member and lead for the student and early career investigator program science enhancement option (SEO) on the Dragonfly mission. Quick also served as a science collaborator on the Dawn mission. Quick is a member of the AAS Division for Planetary Sciences, the National Society of Black Physicists, the American Geophysical Union, and the American Astronomical Society. She received her Ph.D. in Earth and planetary sciences from the Johns Hopkins University. Quick has not previously served on any National Academies studies.

Jason M. Soderblom

Member

JASON M. SODERBLOM is a research scientist in the Department of Earth, Atmospheric, and Planetary Sciences at the Massachusetts Institute of Technology (MIT). His research interests include exploring the composition, operative geologic processes, and evolutionary history of planetary surfaces through analysis of visible and near infrared images and spectra. Soderblom is a co-investigator on the Mapping Imaging Spectrometer for Europa (MISE) and Europa Imaging System (EIS) instruments selected for the NASA Europa Clipper mission and on the recently selected Dragonfly mission to Titan. Prior to joining MIT, he was a postdoctoral researcher at the University of Arizona and a visiting scientist at Cornell University. He received his Ph.D. in astronomy from Cornell University. He has no prior experience serving on a National Academies committee.

Krista M. Soderlund

Member

KRISTA M. SODERLUND is a research scientist at the University of Texas, Institute for Geophysics. Her research interests include planetary interiors, fluid dynamics, and magnetohydrodynamics. Previously, she was a research associate and postdoctoral fellow at the Institute for Geophysics at the University of Texas at Austin. She was also a graduate student researcher at the University of California, Los Angeles; an undergraduate research fellow at the California Institute of Technology; a consultant at the NASA Jet Propulsion Laboratory; and a researcher at the Florida Institute of Technology. Soderlund's recent projects include ocean dynamics and ice shell properties of icy satellites as well as planetary magnetic fields. She has served as a science team member of the REASON instrument on NASA's Europa Clipper Mission and as a member of the Neptune-Triton Planetary Mission Concept Study. She received her Ph.D. in geophysics and space physics from the University of California, Los Angeles. Soderlund has not previously served on any National Academies studies.