Decadal Survey for Earth Science and Applications from Space 2028-2037 (ESAS 2028)

Committee

Anna M. Michalak

Co-Chair

Anna M. Michalak is the director of the Climate and Resilience Hub at the Carnegie Institution for Science and a faculty associate in environmental science and engineering in the Division of Geological and Planetary Sciences at the California Institute of Technology. Michalak served as director of the Department of Global Ecology at the Carnegie Institution for Science. Michalak's research focuses on characterizing natural and human emissions of greenhouse gases at urban to global scales and on assessing climate impacts on freshwater and coastal water quality. Michalak is the lead author of the U.S. Carbon Cycle Science Plan, a visiting faculty researcher at Google, a Leopold Environmental Leadership Fellow, a fellow of the American Geophysical Union, a fellow of the American Association for the Advancement of Science, and the recipient of the American Geophysical Union's Simpson Medal. Michalak received a Ph.D in civil and environmental engineering from Stanford University, and served on a number of National Academies committees, including as the co-chair of the Review of Progress Toward Implementing the Decadal Survey-Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space, and as a member of the Committee on Earth Science and Applications from Space.

R. Steven Nerem

Co-Chair

R. Steven Nerem is a professor in the Department of Aerospace Engineering Sciences, director of the Colorado Center for Astrodynamics Research, and a fellow of the Cooperative Institute for Environmental Sciences at the University of Colorado at Boulder. Nerem's research interests include sea-level change, satellite altimetry, Earth's gravity field, satellite geodesy, precision orbit determination, and astrodynamics. Nerem is the recipient of numerous awards including the NASA Exceptional Scientific Achievement Medal, the American Astronautical Society's Earth Science and Applications Award and the American Geophysical Union's (AGU) Geodesy Section Award; and is a fellow of the AGU and the American Association for the Advancement of Science (AAAS). Nerem received a Ph.D. in aerospace engineering from the University of Texas, Austin, and served as a member of a number of National Academies committees including current service on the Committee on Solid Earth Geophysics, and previous service on the Committee on Earth Science and Applications from Space, and the Committee on Evolving the Geodetic Infrastructure to Meet New Scientific Needs.

Ryan Abernathey

Member

Ryan P. Abernathey is co-founder and chief executive officer of Earthmover PBC, a company developing infrastructure to enable the use of scientific data at scale. Abernathey previously served as an associate professor of Earth and environmental sciences at Columbia University and the Lamont-Doherty Earth Observatory and conducted postdoctoral research at Scripps Institution of Oceanography. Abernathey is a physical oceanographer whose research has focused on large-scale ocean circulation and its relationship with Earth's climate using climate models and satellite observations. Abernathey's expertise also includes scientific computing, artificial intelligence, open science, and the development of infrastructure for analyzing and managing large-scale Earth science datasets. Abernathey helped found Pangeo, an open-science community focused on open, reproducible, and scalable science, and has served on NASA's Surface Water and Ocean Topography science team and as director of Data and Computing for the National Science Foundation (NSF) Science and Technology Center Learning the Earth with Artificial Intelligence and Physics. Honors include an Alfred P. Sloan Research Fellowship in Ocean Sciences, an NSF CAREER Award, The Oceanography Society Early Career Award, and American Geophysical Union Charles S. Falkenberg Award. Abernathey earned a PhD in climate physics and chemistry from the Massachusetts Institute of Technology.

Steven J. Battel

Member

Steven J. Battel is president of Battel Engineering and an adjunct clinical engineering professor in three departments at the University of Michigan. Battel has served as a systems engineer, design engineer, and manager for more than 140 NASA and Department of Defense space projects. Battel's areas of expertise include systems engineering, low-noise instrumentation, analog electronics, electromagnetic compatibility, avionics, and power systems for space applications. Battel is internationally recognized for expertise in the design and development of high-voltage electronics for space systems, particularly systems designed to operate in challenging space and planetary environments. Battel is a member of the National Academy of Engineering, a fellow of the American Institute of Aeronautics and Astronautics and the American Association for the Advancement of Science, a Senior Member of the Institute of Electrical and Electronics Engineers, and a member of Sigma Xi. Battel earned a BS in electrical engineering from the University of Michigan. Battel previously served on the National Academies Space Studies Board, Aeronautics and Space Engineering Board, and the Committee on Earth Sciences and Applications from Space, and has participated in four previous decadal surveys. Battel has a consulting relationship with NASA's Goddard Space Flight Center and the Jet Propulsion Laboratory and serves in a technical advisory role with the Environmental Defense Fund on the MethaneSat mission.

Robin E. Bell

Member

Robin E. Bell is a special research scientist at Columbia University's Lamont-Doherty Earth Observatory, where Bell studies Earth's large ice sheets to understand their dynamics and potential future changes. Bell's expertise spans geophysics, polar science, ice-sheet dynamics, and the development of technologies for investigating challenging polar environments. Bell has led major expeditions to Antarctica and Greenland that contributed to discoveries of volcanoes beneath the ice, characterization of subglacial Lake Vostok, mapping of mountain ranges beneath the Antarctic ice sheet, and new understanding of subglacial water movement. Bell has also organized scientific collaborations, advanced technologies for polar research, and led initiatives to broaden participation in science and address bias, bullying, and harassment in the scientific community. Bell is a fellow and former president of the American Geophysical Union and has received an honorary doctorate from Middlebury College. Bell earned a PhD in geophysics from Columbia University. Bell previously chaired the National Academies Polar Research Board and led efforts supporting the development of the International Polar Year.

William J. Blackwell

Member

William J. Blackwell is a laboratory fellow in the Applied Space Systems Group at MIT Lincoln Laboratory, where Blackwell leads the development of advanced microwave remote sensing systems for Earth science applications. Blackwell was principal investigator of NASA's TROPICS Earth Venture mission and has served on the NASA Aqua and National Polar-orbiting Partnership Science Teams and as the Integrated Program Office sensor scientist for the Advanced Technology Microwave Sounder within the National Polar-orbiting Operational Environmental Satellite System. Blackwell's research focuses on atmospheric microwave remote sensing, satellite instrument development and calibration, geophysical retrieval algorithms, and applications of signal processing and estimation theory to Earth observations. This work has advanced satellite observations of tropical cyclones, precipitation, atmospheric temperature and humidity, and severe weather. Blackwell is a fellow of the Institute of Electrical and Electronics Engineers and an associate fellow of the American Institute of Aeronautics and Astronautics and has received the MIT Lincoln Laboratory Technical Excellence Award, the NOAA David Johnson Award, and multiple NASA Group Achievement Awards. Blackwell earned a ScD in electrical engineering and computer science from the Massachusetts Institute of Technology. Blackwell has served on the National Academies Committee on Radio Frequencies.

Paula S. Bontempi

Member

Paula S. Bontempi is professor of oceanography at the University of Rhode Island's Graduate School of Oceanography, where Bontempi previously served as dean. Bontempi also served as acting deputy director of NASA's Earth Science Division and as a physical scientist and program manager for ocean biology and biogeochemistry at NASA Headquarters. Bontempi's expertise includes Earth and ocean remote sensing, phytoplankton ecology, marine bio-optics, Earth system science, ocean worlds, ocean economics, and sensor development. Bontempi served as a NASA program scientist supporting instrument and mission science, including the Sea-Viewing Wide Field-of-View Sensor, the Suomi National Polar-orbiting Partnership, and the Plankton, Aerosol, Cloud, ocean Ecosystem mission. Bontempi is a fellow and president of The Oceanography Society and chairs the Research and Education Coalition for Ocean Sciences. Honors include the NASA Exceptional Service Medal, American Geophysical Union Ocean Sciences Award, and Texas A&M University Geosciences Distinguished Alumni Award. Bontempi earned a PhD in oceanography from the University of Rhode Island. Bontempi has served on National Academies committees addressing future directions for Southern Ocean and Antarctic nearshore and coastal research and NASA Science Activation.

Andrea Donnellan

Member

Andrea Donnellan is head and professor of the Department of Earth, Atmospheric, and Planetary Sciences at Purdue University and a distinguished visiting scientist at NASA's Jet Propulsion Laboratory. Donnellan previously served as a senior research scientist at the Jet Propulsion Laboratory, holding several management positions. Donnellan's research focuses on earthquakes, crustal deformation, land-surface processes, and cascading hazards using remote sensing and computational modeling. Donnellan leads NASA's Surface Topography and Vegetation Study and has served as a member of the NISAR Science Team. Donnellan is a fellow of the American Geophysical Union and the American Association for the Advancement of Science. Honors include the Presidential Early Career Award for Scientists and Engineers, the NASA Software of the Year Award, and a named glacier in Antarctica in recognition of Donnellan's contributions to research on the continent. Donnellan earned a PhD in geophysics from the California Institute of Technology. Donnellan previously served on the National Academies Committee on Spatial Data Enabling USGS Strategic Science in the 21st Century.

Mark R. Drinkwater

Member

Mark R. Drinkwater manages ViaEO Consulting, which provides specialist advisory services in the Earth observation space domain. Previously, Drinkwater served at the European Space Agency (ESA), managing ESA's Earth and Mission Science Division and supporting the design and development of ESA's Earth Explorer research, polar-orbiting meteorological, and Copernicus Sentinel satellite missions. Prior to joining ESA, Drinkwater served as a senior staff scientist at NASA's Jet Propulsion Laboratory (JPL). Drinkwater has served as a senior advisor on the Instrumentation and Future Technologies Technical Committee of the Geoscience and Remote Sensing Society at the Institute of Electrical and Electronics Engineers (IEEE), ESA Senior Advisor on cryosphere and climate, and chair of the World Meteorological Organization Polar Space Task Group. Drinkwater is an IEEE Senior Member and member of the Electromagnetics Academy, with honors including NASA/JPL excellence and group awards, ESA corporate team achievements, and an IEEE Prize Paper Award. Drinkwater earned a PhD from the University of Cambridge. Drinkwater served as a reviewer of the National Academies decadal survey, Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space.

Kathleen (Kass) Green

Member

Kass Green is founder of Kass Green & Associates, where Green works on remote sensing mapping and policy projects for public agencies, development organizations, and nongovernmental organizations. Green previously served as president of Space Imaging Solutions and co-founded and led Pacific Meridian Resources, a natural resources GIS and remote sensing firm. Green's expertise focuses on applications of geographic information systems and remote sensing to water management, forestry, wildlife habitat, stormwater runoff, agricultural monitoring, fuels management, wetlands, and change detection. Green has developed object-oriented machine-learning techniques integrating high-resolution imagery, lidar point clouds, GIS datasets, and moderate-resolution imagery to map vegetation and wildland fuels. Green has served as president of the American Society for Photogrammetry and Remote Sensing (ASPRS) and the Management Association for Private Photogrammetric Surveyors. Honors include the William T. Pecora Award and the ASPRS Lifetime Achievement Award. Green is an author of Imagery and GIS: Best Practices for Extracting Information from Imagery and Assessing the Accuracy of Remotely Sensed Data: Principles and Practices. Green has served on NASA's Earth Science Applications Committee and federal advisory committees for NOAA and the Department of the Interior and has participated in multiple National Academies activities addressing Earth science and applications.

Kelly A. Hereid

Member

Kelly A. Hereid is head of Catastrophe Research and Development at Liberty Mutual, where Hereid leads work to develop and deploy the company's view of catastrophe risk and assess physical and transition climate risks. Hereid's expertise spans catastrophe risk, climate science, insurance and reinsurance, and the financial implications of climate-related risks. Hereid has provided expert guidance on climate risk in the financial sector to government organizations, including the Council of Economic Advisers, the President's Council of Advisors on Science and Technology, the Federal Reserve Bank of New York, and the Federal Insurance Office. Hereid serves on the NOAA Science Advisory Board and on the board of the International Society of Catastrophe Managers and contributes regularly to insurance industry education, research, and regulatory working groups. Hereid is a Certified Catastrophe Risk Management Professional. Hereid earned a PhD in geological sciences from the University of Texas at Austin.

Gregg A. Jacobs

Member

Gregg A. Jacobs is a researcher in physical oceanography at the University of Southern Mississippi and previously served as head of the Ocean Dynamics and Prediction Branch at the Naval Research Laboratory. Jacobs' research focuses on ocean prediction, including satellite and in situ observation processing, data assimilation, and modeling systems. This work contributed to the first operational global and regional data-assimilative ocean prediction systems and coupled ocean, atmosphere, ice, and wave forecast systems. Jacobs' recent research includes adaptive sampling using uncrewed vehicles in conjunction with NASA's Submesoscale Ocean Dynamics Experiment, relationships between observational and numerical model resolutions, and applications to acoustics problems. Jacobs led the Operational Altimeter Algorithm Team for the National Polar-orbiting Operational Environmental Satellite System program and contributed to the Ocean Observatories Initiative, the Consortium for Advanced Research on Transport of Hydrocarbon in the Environment, and the NASA Surface Water and Ocean Topography mission review activities. Jacobs earned a PhD in aerospace engineering from the University of Colorado Boulder.

Walter N. Meier

Member

Walter N. Meier is a senior research scientist at the National Snow and Ice Data Center at the Cooperative Institute for Research in Environmental Sciences. Meier previously served as a research scientist at NASA's Goddard Space Flight Center and the National Snow and Ice Data Center and as an adjunct professor at the U.S. Naval Academy. Meier's research focuses on remote sensing of sea ice and polar climate and includes the development of sea ice data products derived from passive microwave instruments. Meier is the lead scientist for NASA's Snow and Ice Distributed Active Archive Center at the National Snow and Ice Data Center and collaborates with NASA, NOAA, and the Japan Aerospace Exploration Agency on sea ice products. Meier is a member of the World Meteorological Organization Global Climate Observing System Steering Committee and the American Geophysical Union. Meier earned a PhD in aerospace engineering sciences from the University of Colorado Boulder, with an interdisciplinary focus on atmospheric and ocean sciences. Meier served on the National Academies Committee on Future Use of NASA Airborne Platforms to Advance Earth Science Priorities.

Catherine B. Olkin

Member

Cathy Olkin is operations lead for the Interplanetary Science Program at Relativity Space. Olkin previously served as vice president of Infrared Missions and Data at Muon Space, where Olkin led the formulation of the FireSat mission, whose goal was to detect and monitor wildfires globally. Olkin was also responsible for the development of a multispectral infrared instruments and the data pipelines to turn the raw data into actionable intelligence. Olkin has held leadership roles on NASA planetary missions and has expertise in mission formulation, remote sensing instrument design, and the interpretation of remote sensing and astronomical data. Olkin is also a dedicated mentor seeking to support the next generation of engineers and scientists. Olkin's space mission work and mentoring activities have received both individual and group recognition, including Aviation Week's Program Excellence Award for NASA's Lucy mission and the American Astronautical Society's Neil Armstrong Space Flight Achievement Award for NASA's New Horizons mission. Olkin earned a PhD in Earth, atmospheric, and planetary sciences from the Massachusetts Institute of Technology.

Christa D. Peters-Lidard

Member

Christa D. Peters-Lidard is principal at WtrSense, LLC and a distinguished visiting scientist at Schmidt Sciences. Peters-Lidard previously served as director of the Sciences and Exploration Directorate at NASA's Goddard Space Flight Center. Peters-Lidard's other positions at Goddard include deputy director for Hydrosphere, Biosphere, and Geophysics, and chief of the Hydrological Sciences Laboratory. Peters-Lidard's expertise includes Earth observations, hydrology, land-surface modeling, and data assimilation. Peters-Lidard led the development of NASA's Land Information System, a framework that integrates satellite and in situ observations with Earth system models. Peters-Lidard is a member of the National Academy of Engineering and a fellow of the American Association for the Advancement of Science, the American Geophysical Union, and the American Meteorological Society. Honors include the COSPAR Zeldovich Medal, the Arthur S. Flemming Award, the NASA Outstanding Leadership Medal, and the NASA Software of the Year Award. Peters-Lidard earned a PhD in civil engineering and operations research from Princeton University. Peters-Lidard currently serves on the National Academies Space Studies Board.

James T. Randerson

Member

James T. Randerson is the Ralph J. and Carol M. Cicerone Professor of Earth System Science at the University of California, Irvine, with appointments in Earth system science and civil and environmental engineering. Randerson previously held a faculty position at the California Institute of Technology. Randerson studies the global carbon cycle and ecosystem responses to climate change by integrating satellite observations, field measurements, and Earth system models. Randerson has contributed scientific leadership to the Community Earth System Model and served on the Biological and Environmental Research Federal Advisory Committee for the Department of Energy Office of Science. Randerson currently serves on scientific advisory boards for the Symbiosis Coalition and The Nature Conservancy. Randerson is a member of the National Academy of Sciences and a fellow of the American Geophysical Union (AGU). Honors include the AGU James B. Macelwane Medal and the AGU Piers J. Sellers Global Environmental Change Mid-Career Award. Randerson earned a PhD in biological sciences from Stanford University. Randerson serves on the technical advisory board for the Symbiosis Coalition, which creates nature-based climate solutions projects for its coalition members, and worked as science team lead for the Environmental Defense Fund's FireSat project.

Christopher Ruf

Member

Chris Ruf is the Frederick Bartman Collegiate Professor of Climate and Space Science and director of the Space Institute at the University of Michigan. Ruf previously held positions at Hughes Space and Communications, the Jet Propulsion Laboratory, and Pennsylvania State University. Ruf's research focuses on spaceborne remote sensing methods, applications, and technologies. Ruf is the principal investigator for NASA's Cyclone Global Navigation Satellite System mission and leads its science team, with research focused on mesoscale convective systems over oceans and surface hydrological processes over land. Ruf is a member of the National Academy of Engineering, a fellow of the American Meteorological Society and the Institute of Electrical and Electronics Engineers, and vice chair for Commission F of the U.S. National Committee of the International Union of Radio Science. Ruf has also held editorial leadership positions for journals in geoscience, remote sensing, and atmospheric and oceanic technology. Ruf earned a PhD in electrical and computer engineering from the University of Massachusetts, Amherst. Ruf has served as a panel member for two National Academies Earth Science and Applications decadal surveys. Ruf is also an advisor to Muon Space.

Christopher J. Scolese

Member

Christopher Scolese recently retired as director of the National Reconnaissance Office, overseeing national space systems and programs. Scolese previously worked at NASA, serving in leadership roles at NASA Headquarters and at NASA Goddard Space Flight Center. Scolese's professional background spans space systems acquisition, oversight, development, launch, operations, military service, and education. Scolese has overseen the development, launch, and operation of satellites and other spacecraft supporting Earth observation, heliophysics, astrophysics, and planetary science, including orbiters, landers, and rovers. Scolese is an honorary fellow of the American Institute of Aeronautics and Astronautics and a member of the Institute of Electrical and Electronics Engineers. Honors include the Dr. Robert H. Goddard Memorial Trophy, the National Intelligence Distinguished Service Medal, the Department of Defense Distinguished Public Service Medal, the Rotary National Award for Space Achievement, the Dr. Wernher von Braun Space Flight Trophy, and the NASA Distinguished Leadership Medal. Scolese earned a PhD in systems engineering from George Washington University.

Julie A. Vano

Member

Julie A. Vano is research director at the Aspen Global Change Institute, a nonprofit organization dedicated to advancing global change science and solutions. Vano is a hydrologist whose work connects scientific research with water management and decision making, particularly through collaborations with water utilities and federal agencies. Vano has advised and led projects for NASA, the Bureau of Reclamation, the U.S. Army Corps of Engineers, NOAA, NSF, and the Water Utility Climate Alliance. Vano co-leads the Robust Information in Context Task Team for the World Climate Research Programme's Regional Information for Society Core Project. Vano has served as president of the American Geophysical Union's Science and Society section. Vano earned a PhD in civil and environmental engineering from the University of Washington. Vano has co-chaired the National Academies Committee to Advise the U.S. Global Change Research Program and previously supported the Water Science and Technology Board as a Christine Mirzayan Science and Technology Policy Fellow.

Roger M. Wakimoto

Member

Roger M. Wakimoto is vice chancellor for Research & Creative Activities and a professor in the Department of Atmospheric and Oceanic Sciences at the University of California, Los Angeles. Wakimoto previously served as assistant director for the Geosciences Directorate at the National Science Foundation and as director of the National Center for Atmospheric Research. Wakimoto is an atmospheric scientist specializing in severe weather research, with expertise in the observation and analysis of severe storms and other atmospheric phenomena. Wakimoto is a fellow and honorary member of the American Meteorological Society and a fellow of the American Association for the Advancement of Science. Wakimoto is a past president of the American Meteorological Society and serves as chair-elect on the board of directors of the American Association for the Advancement of Science. Wakimoto earned a PhD in geophysical sciences from the University of Chicago. Wakimoto currently serves on the National Academies committee to produce a revised, expanded, and online version of On Being a Scientist: A Guide to the Responsible Conduct of Research.