

Future Use of NASA Airborne Platforms to Advance Earth Science Priorities

Committee

William H. Brune

Co-Chair

Dr. William H. Brune is a Distinguished Professor of Meteorology and Atmospheric Science at the Pennsylvania State University and was the department head for more than 15 years. His research interests include atmospheric photochemistry from Earth's surface to the stratosphere; atmospheric aerosol particle formation and aging; uncertainty and sensitivity analysis for atmospheric chemistry models and measurements; and new measurement strategies for atmospheric oxidation processes. He has decades of experience leading scientific missions and making atmospheric composition measurements using large high-altitude balloons and aircraft operated by NSF and NASA. At Johns Hopkins University, where he received Ph.D. in Physics in 1978, he used sounding rockets to measure the ultraviolet spectra from a comet, the diffuse galactic background, and hot stars. While a research associate at Harvard University, he was a member of the team that made airborne reactive halogen measurements over Antarctica and later the Arctic, providing the smoking gun linking human-made halogens to the Antarctic Ozone Hole. In 2015-2016, he was a member of the National Academies committee that produced the report "The Future of Atmospheric Chemistry Research".

Shuyi S. Chen

Co-Chair

Dr. Shuyi S. Chen is a professor of Atmospheric Sciences at the University of Washington. Her research focuses on understanding high-impact weather like hurricanes and winter storms and intraseasonal variability that affect the global weather and climate system and improving their prediction. She studies air-sea interaction and precipitation in the tropics and coastal environment using airborne and satellite observations and coupled atmosphere-wave-ocean models. Dr. Chen has led national and international research programs in both field observations and coupled atmosphere-ocean modeling. Her research group at the University of Washington has developed a first-generation high-resolution Unified Wave Interface – Coupled Model (UWIN-CM) to better understand and predict hurricanes, coastal flooding, and ocean transport in events of oil spill and other hazards. Professor Chen is a lead scientist for several major field campaigns including Coupled Boundary Layer Air-Sea Transfer (CBLAST) in 2003-04, Hurricane Rainbands and Intensity Change Experiment (RAINEX) in 2005, Dynamics of the Madden-Julian Oscillation (DYNAMO) in 2011-12, Convective Process Experiment (CPEX) in 2017 and CPEX-Aerosol and Winds in 2020. She was an editor of Weather and Forecasting of the American Meteorological Society. She served as Vice Chair of the National Academies' Board on the Atmospheric Science and Climate (BASC) in 2016-2019, and member of Steering Committee for the Decadal Survey for Earth Science and Applications from Space (ESAS) in 2017-2018. She was elected the University Corporation for Atmospheric Research (UCAR) Board of Trustees in 2017. Dr. Chen is a Fellow of American Meteorological Society. She received her Ph.D. in meteorology from Penn State University.

Kristie A. Boering

Member

Dr. Kristie A. Boering (NAS) is currently the Lieselotte and David Templeton Professor of Chemistry and holds a joint appointment in the Departments of Chemistry and of Earth and Planetary Science at the University of California at Berkeley. She received a B.A. in Chemistry with a Specialization in Earth Science from the University of California, San Diego in 1985, and a Ph.D. in Physical Chemistry from Stanford University in 1992, followed by postdoctoral studies at Harvard University prior to joining the faculty at UC Berkeley in 1998. Her research spans laboratory, modeling, and field studies to understand the isotopic composition of gases in the atmospheres of Earth and other planets – from the physical chemistry of isotope effects to making and using isotope measurements to understand the evolution of planetary atmospheres and the influence of human activities on Earth's atmosphere and climate. She has participated as a science team member and/or instrument PI in numerous NASA suborbital campaigns involving NASA aircraft (ER-2, DC-8, WB-57F) and/or high altitude scientific balloons. She served on the National Academies joint Space Studies Board and Chemistry Board ad hoc Task Group on "Exploring Organic Environments in the Solar System," (ISBN-13 978-0-309-10235-3, 2007) and was elected to the National Academy of Sciences in 2018.

Catherine F. Cahill

Member

Dr. Catherine F. Cahill is the Director of the Alaska Center for Unmanned Aircraft Systems Integration (ACUASI) at the University of Alaska Fairbanks (UAF). ACUASI is the University of Alaska's Center of Excellence for UAS, leads the Federal Aviation Administration's (FAA) Alaska UAS Test Site and the FAA's University of Alaska Fairbanks UAS Integration Pilot Program site, and is a core university in the Alliance for System Safety of UAS through Research Excellence (ASSURE). Dr. Cahill has a B.S. in Applied Physics from the University of California, Davis (1990), and a M.S. and a Ph.D. in Atmospheric Sciences from the University of Washington (1994) and the University of Nevada, Reno (1996), respectively. After a Fulbright Fellowship to Ireland to study trans-Atlantic air pollution transport, Dr. Cahill migrated north to Alaska to join UAF. Since her arrival in Fairbanks over 20 years ago, she has been conducting research on air pollution, teaching chemistry, and developing new technologies, including obtaining a patent for an on-aircraft volcanic ash detection and alert system. Dr. Cahill is an expert on the long-range transport of atmospheric aerosols and the aerosols' impacts on visibility, global climate, and human health. Dr. Cahill's awards include: a Congressional Fellowship to the U.S. Senate Committee on Energy and Natural Resources (January 2014-July 2015), a Fulbright Graduate Student Fellowship, 1996-1997, a NASA Group Achievement Award (2009), Who's Who in the World, The Alliance to Save Energy 2015 Unsung Hero Award, Induction into the Alaska Innovator Hall of Fame (December 2014), and the Emil Usibelli Award for Distinguished Service (May 2013 - The outstanding faculty award for service at UAF).

James H. Crawford

Member

Dr. James H. Crawford received his B.S. in Mathematics from the United States Military Academy in 1986 and his Ph.D. in Atmospheric Chemistry from the Georgia Institute of Technology in 1997. Since that time, he has been a research scientist at NASA's Langley Research Center, currently serving as the Senior Scientist for Atmospheric Chemistry. Both during his graduate studies and at NASA, his research has been in support of airborne field studies sponsored by NASA's Tropospheric Chemistry Program. Since 1991, he has participated in seventeen airborne field studies in a variety of roles. Using instrumented aircraft to sample the composition of the atmosphere, these studies have spanned the globe from polluted cities to the remote atmosphere (e.g., South Pacific, Antarctic, and Arctic) to understand the chemistry of the atmosphere and the balance between natural and human impacts. Dr. Crawford's interests include the photochemistry of tropospheric ozone and free radicals, the influence of clouds on trace gas transport and chemistry, and the use of satellites to study long-range pollution transport and air quality. He has been the recipient of NASA's Exceptional Achievement and Outstanding Leadership Medals as well as the Presidential Early Career Award for Scientists and Engineers. Dr. Crawford's most recent work has been as a principal investigator for a series of air quality focused field studies in the United States and South Korea aimed to improve the diagnosis of surface air quality conditions from satellite observations. Dr. Crawford served as the Atmospheric Chemistry Editor for the Journal of Geophysical Research-Atmospheres from 2013-2019. He is also heavily involved in promoting international collaboration through the International Global Atmospheric Chemistry (IGAC) project for which he currently serves as Co-Chair of the Scientific Steering Committee.

David Fahey

Member

Dr. David Fahey is the Director of the NOAA Chemical Sciences Laboratory. He joined NOAA in Boulder after receiving advanced degrees in physics from the University of Wisconsin and the University of Missouri. His principal research interests have been measurements of trace gases and aerosols in the troposphere and lower stratosphere using instruments on board research aircraft with an emphasis on stratospheric ozone depletion and the roles of black carbon, biological aerosol, and water vapor in the climate system. He has helped lead a number of Earth science missions using NASA aircraft, including the NASA DC-8, ER-2, WB-57 and Global Hawk UAS. He is also interested in scientific assessments and the communication of scientific results to stakeholders, decision-makers, and the public. He is currently a Co-Chair of the Scientific Assessment Panel of the Montreal Protocol on Substances that Deplete the Ozone Layer. He is a coauthor of recent assessments of stratospheric ozone depletion, aviation and climate change and the role of black carbon in the climate system. Dr. Fahey has received the U.S. Department of Commerce Silver and Bronze Medals for Meritorious Federal Service, the American Meteorological Society Henry G. Houghton Award, and is a Fellow of the American Geophysical Union.

Sarah T. Gille

Member

Dr. Sarah T. Gille is a professor in the Oceans and Atmospheres Section at Scripps Institution of Oceanography, University of California, San Diego (UCSD). Her research focuses on ocean dynamics and their role in Earth's climate system, primarily in the Southern Ocean, and with a strong focus on upper-ocean processes. She makes use of a combination of remote-sensing data, autonomous instruments, in situ observations, and numerical model output. Gille received a B.S. in physics from Yale University and a Ph.D in physical oceanography from the Massachusetts Institute of Technology-Woods Hole Oceanographic Institution Joint Program in 1995. She carried out postdoctoral research at Scripps and at the University of East Anglia (UK). Before joining Scripps and UCSD in 2000, Gille was an assistant professor in the Department of Earth System Science at the University of California, Irvine. She is a fellow of the American Geophysical Union, and a member of the American Meteorological Society, The Oceanography Society, and the American Association for the Advancement of Science. She has previously participated in a number of National Academies studies including serving on the Committee on Earth Studies from 2000-03; the Climate Panel for the 2007 Earth Science and Applications from Space Decadal Survey, "Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond"; and the Steering Committee for the 2018 report, "Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space".

Vanda Grubišic

Member

Dr. Vanda Grubišic is the Director of the Earth Observing Laboratory at the National Center for Atmospheric Research (NCAR), an NCAR Associate Director, and an NCAR Senior Scientist. Prior to joining NCAR in 2011, she was a Full Professor and the Chair of Theoretical Meteorology at the University of Vienna, Austria – the first woman to be appointed a full professor of any geoscience discipline in the more than 600-year-long history of that university. Prior to that, she was a member of the atmospheric sciences faculty at the Desert Research Institute (DRI) in Reno, NV. Dr. Grubišic received a B.S. in Physics/Meteorology from the University of Zagreb, Croatia in 1987, and an M.Phil. and Ph.D. in Atmospheric Sciences from Yale University in 1992 and 1995. Her area of expertise is mesoscale atmospheric dynamics. She has conducted extensive research on the influence of mountains on the atmosphere through an integrated approach involving observations, theory, numerical simulations, and laboratory experiments, and has played a lead role in several major observational field campaigns using research aircraft in a wide range of geographic regions. At DRI, she directed the NSF-funded Advanced Computing in Environmental Sciences (ACES), a state-wide high-performance computing initiative. As the Director of the NCAR Earth Observing Laboratory, Dr. Grubišic oversees management and operation of a major portion of NSF's Lower Atmosphere Observing Facilities, and, by working collaboratively with the broad scientific community, she is responsible for leading the formulation of strategic directions for future developments of NCAR-managed observing systems. She is a recipient of a number of awards and has served on many national and international scientific steering committees, commissions, and advisory panels, including the NSF Advisory Committee for the Geoscience Directorate (AC/GEO), American Meteorological Society Publication Commission, and the International Commission for Dynamic Meteorology. Dr. Grubišic is a Corresponding Member of the Croatian Academy of Science and Arts, a Fellow of the American Meteorological Society, and an Honorary Member of the Croatian Society of Natural Sciences.

George J. Komar

Member

Mr. George J. Komar is retired after serving a career as a NASA senior executive and a US Air Force (USAF) officer. He has over forty-five years' experience in engineering, program, project, and operational management. He served as the Associate Director in the Earth Science Division and Program Manager for the Earth Science Technology Office at NASA. Mr. Komar has also served as the Deputy Associate Administrator for Technology for the NASA Science Mission Directorate, facilitating the development and optimization of advanced technologies for NASA. He served as the Program Manager for the Landsat 7 Program, the Ocean Topography Experiment (TOPEX)/Poseidon Program and also managed the integration of the NASA Space Station Ground System Program for Space Station Freedom. Prior to his NASA experience, he served in the Air Force in various capacities. In his 21 years of service, he coordinated all USAF headquarters activities for strategic airlift weapons system acquisition programs, managed the flight test activities for the B-1B Bomber, served as a flight test engineer/director and planned, designed, and flight tested electro-optical systems for the USAF. He supervised the maintenance activities for 75 fighter aircraft and has logged numerous flight hours in various USAF aircraft. He received the Meritorious Service Medal with Oak Leaf Clusters and numerous other military awards and recognitions. He has received the NASA Medal for Exceptional Achievement, as well as the NASA Exceptional Leadership Medal. Mr. Komar has an M.B.A. in management and finance from the Hardin-Simmons University, as well as a B.S. in Aeronautics and Astronautics Engineering from New York University, and is a graduate from the Program Managers Course with the Defense Systems Management University, Fort Belvoir, Virginia and the Federal Executive Institute, Charlottesville, Virginia. He is presently serving as a member of the National Academies Committee on Earth Science and Applications from Space (CESAS).

Eric A. Kort

Member

Dr. Eric A. Kort is an Associate Professor of Climate and Space Sciences and Engineering at the University of Michigan. Dr. Kort has expertise in airborne and satellite observations of the Earth system, atmospheric chemistry, and modeling. His work is motivated in understanding current and future levels of greenhouse gases and pollutants. Dr. Kort's research includes developing and deploying airborne-based instruments, using space-based observations, and combining these observations with models to answer science questions and link results to societal issues. He has first-hand experience with more than a dozen scientific airborne campaigns. Dr. Kort received his Ph.D. in Applied Physics from Harvard University in 2011.

Zhong Lu

Member

Dr. Zhong Lu is the Shuler-Foscue Professor of Earth Sciences at Southern Methodist University (SMU). Prior to his appointment at SMU, Dr. Lu was a physical scientist with the U.S. Geological Survey at the Cascades Volcano Observatory. His research interests include technique developments on synthetic aperture radar (SAR), high-resolution digital elevation model generation with interferometric SAR (InSAR), land cover characterization with SAR and Landsat imagery, and InSAR deformation mapping. Dr. Lu conducts research related to volcano deformation mapping, magma supply dynamics, land subsidence and infrastructure stability monitoring and characterization, coastal deformation, and mapping and characterization of human-induced deformation. Dr. Lu received his Ph.D. in geophysics from the University of Alaska, Fairbanks in 1996.

Greg McFarquhar

Member

Dr. Greg McFarquhar is the Director of the Cooperative Institute for Mesoscale Meteorological Studies and Professor in the School of Meteorology at the University of Oklahoma. He had previous positions at the University of Illinois (2001-17) and the National Center for Atmospheric Research (1995-2001), visiting appointments at the Université Blaise Pascal, Clermont-Ferrand, France (2012) and the National Center for Atmospheric Research (2015-16), and was a postdoctoral fellow at the Scripps Institution of Oceanography (1993-94). The overarching theme of Dr. McFarquhar's research is to improve our understanding of the basic properties of clouds and the ability to quantitatively determine the many effects cloud processes have on weather and climate using a combination of aircraft in-situ observations and ground, ship and satellite-based remote sensing of clouds and aerosols, and models with a variety of temporal and spatial scales. He is a former chair of the American Meteorological Society Committee on Cloud Physics and currently Vice-President of the International Commission on Clouds and Precipitation. He is the Chief Editor for the American Meteorological Society's Monographs Collection, an associate editor for the Quarterly Journal of the Royal Meteorological Society, and has active research grants from the National Science Foundation, the Department of Energy, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration. He has formerly served as the Chief Scientist for the Atmospheric Radiation Measurement (ARM) Program's Aerial Facilities (AAF). He has participated in or led 25 different air- or ship-based cloud measurement field campaigns, and is a Fellow of the American Meteorological Society. Dr. McFarquhar received his B.Sc. in mathematics and physics from the University of Toronto, Canada his M.Sc. (1989) and Ph.D. (1993) also from the University of Toronto, specializing in cloud physics.

Walter N. Meier

Member

Dr. Walter N. Meier is currently a senior research scientist at the National Snow and Ice Data Center (NSIDC), Cooperative Institute for Research in the Environmental Sciences, at the University of Colorado, Boulder. He serves as the lead scientist for the NASA Snow and Ice Distributed Active Archive Center (DAAC) at NSIDC where he provides science support for snow and ice data from NASA missions. His research interests are in remote sensing of sea ice and Arctic climate change. Previously, he worked in the Cryospheric Sciences Lab at the NASA Goddard Space Flight Center from 2013 to 2017. From 2003-2013, he was a research scientist at the NSIDC where he was the science and product team lead for passive microwave and sea ice products. He has been a principal investigator on a NOAA-funded development of a sea ice concentration climate data record (CDR) and the NASA-funded GCOM-W AMSR2 science team for sea ice products. He was a lead writer for the sea ice chapter of the Snow, Water, Ice, Permafrost in the Arctic (SWIPA) Assessment Report, published in 2011, and the SWIPA follow-on report, published in 2017. Dr. Meier has served on numerous committees and panels related to sea ice and Arctic climate.

Charles E. Miller

Member

Dr. Charles E. Miller has over 20 years leading NASA satellite and airborne science investigations. He served as Deputy Principal Investigator and Science Team Lead for the Orbiting Carbon Observatory (OCO) which included organizing airborne vertical profile sampling of carbon dioxide (CO₂) and methane (CH₄) to validate the column averaged dry air mole fraction values retrieved from the Total Carbon Column Observing Network (TCCON). He was Principal Investigator for the Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) which was one of NASA's first Earth Ventures Suborbital missions (EV-S1) and ran from 2010-2015 measuring atmospheric CO₂, CH₄, and carbon monoxide to understand the impacts of climate change, permafrost degradation, and disturbance on Arctic carbon cycle dynamics. Dr. Miller flew over 1200 science flight hours in Alaska and NW Canada. Currently Dr. Miller serves as the Deputy Science Lead and Airborne Campaign Coordinator NASA's Arctic Boreal Vulnerability Experiment (ABOVE), which is a decade-long community field campaign designed to test the resiliency and vulnerability of Arctic-boreal ecosystems to climate change. In this role he has coordinated multi-aircraft campaigns in Alaska and Northern Canada in 2017, 2018, and 2019. The 2017 campaign featured 10 different aircraft and their payloads. The campaign strategy involved consideration of long-term ground data records, field sites where ABOVE researchers were actively collecting data, and the need to sample across large ecological, biological and climate gradients. He has flown more than 300 science flight hours on a variety of NASA aircraft during ABOVE. Dr. Miller is also part of the Surface Biology and Geology (SBG) Architecture Study Leadership team. SBG is 1 of the 5 Designated Observables identified in the 2017 ESAS report.

Anne W. Nolin

Member

Dr. Anne Nolin is a Professor in the Geography Department at the University of Nevada, Reno. Dr. Nolin serves as the Director of the Graduate Program of Hydrologic Sciences. Her research focuses on the interactions of climate with mountain snow, snow-forest interactions, and mountains as social-ecological systems. Funded by NASA, NSF, and USGS she has published on "at risk" snow, mountain hydrology, sea ice roughness, snow and ice albedo, melting glaciers from Alaska to the Andes, and new ways of mapping snow and glaciers from space. Nolin has three decades of experience in remote sensing, field measurements, and modeling of changing snow and ice. She is a recognized leader in snow remote sensing and pioneered the development of snow and ice mapping techniques to augment in situ observations and modeling. In addition to fieldwork in the western US and Alaska, she has spent multiple field seasons in Greenland and performed remote sensing analyses over the entire United States, the Canadian Rockies, the Peruvian Andes, and the planet Mars. Since 1997, she has been a member of the NASA Multi-Angle Imaging SpectroRadiometer (MISR) Science Team serving as liaison to the cryosphere community and publishing on multi-angular remote sensing of snow and ice. She served as vice chair of the Water Resources and Global Hydrologic Cycle panel for the 2007 Earth Science and Applications from Space Decadal Survey and subsequently on the National Academies Space Studies Board-Committee on Earth Sciences. Nolin was a member of the Committee on Future Water Resource Needs for the Nation: Water Science and Research at the U.S. Geological Survey. She served for three years on the NASA Advisory Council-Earth Science Subcommittee, three years as president of the Cryosphere Focus Group of the American Geophysical Union (AGU) and two years as chair of the AGU Climate Communication Prize Committee. She served on several steering committees including the NSF Research Coordination Network for High-Performance Distributed Computing in the Polar Sciences, the Mountain Research Initiative, and the National Snow and Ice Data Center. In 2020, Nolin was elected to the Board of Directors of the Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUAHSI). She is co-leader of the NASA Snow Albedo Working Group and a NASA SnowEx Site Leader.

Beat Schmid

Member

Dr. Beat Schmid is a Group Leader in the Atmospheric Sciences and Global Change Division of the Earth and Biological Sciences Directorate, at the Pacific Northwest National Laboratory (PNNL). He has responsibility for 56 staff members in the Earth System Measurements and Data Group. Dr. Schmid is also the Manager of the Department of Energy Atmospheric Radiation Measurement (ARM) Aerial Facility, which provides airborne measurements required to answer science questions proposed by the atmospheric research community. Dr. Schmid is an expert in airborne atmospheric research. He has been involved as a participant or leader in well over twenty (sometimes large multi-agency) aircraft campaigns and has served on the Science Teams for two NASA satellite instruments. He is an author of 99 peer-reviewed journal publications. Dr. Schmid has been awarded two DOE Appreciation Awards and five NASA Group Achievement Awards, including for the development of world's first Airborne Sun-Tracking and Scanning Spectrometer (4STAR). Dr. Schmid has been with PNNL since 2006. Previously he was a Group Leader and Senior Scientist with the Bay Area Environmental Research Institute where he worked in conjunction with the NASA Ames Research Center in Moffett Field, CA. Dr. Schmid received his Ph.D. in Physics from the University of Bern, Switzerland in 1995.

Susan L. Ustin

Member

Dr. Susan L. Ustin is the Associate Director of the John Muir Institute of the Environment at the University of California, Davis and Distinguished Professor Emeritus in the Department of Land, Air, and Water Resources. She is an ecophysiologicalist with expertise in airborne imaging spectroscopy and other remote sensing systems which she has used to investigate questions at a variety of scales from leaf level to global. This research has included mapping vegetation distribution and abundance, including invasive species mapping, and mapping biological soil crust in semiarid regions. She has also developed methods to quantify canopy water content and wildfire risk. Dr. Ustin's experience includes measurements obtained via aircrafts, small drones, NASA satellites, and commercial satellites. She is a past member of NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) Science Team and the Science team for the planned Hyperspectral Infrared Imager (HyspIRI) satellite, among other NASA teams. She has worked with numerous satellite and airborne optical systems, thermal imagers, and small footprint LiDAR and RaDAR. Dr. Ustin is an author or co-author on ~240 journal publications, approximately 150 Scientific proceedings, 36 book chapters, coauthor on a book on Leaf Optics and Editor of Vol. 4, Manual of Remote Sensing. She also served on the NASEM Committee on the Decadal Survey for Earth Science and Applications from Space. Dr. Ustin is currently participating in the community contributions for the pre-phase A plans for the NASA Surface Biology and Geology (SBG) hyperspectral satellite. She holds a Ph.D. from the University of California Davis and graduated in 1983.