Decadal Survey for Earth Science and Applications from Space - Panel on Climate Variability and Change: Seasonal to Centennial

Committee

Carol A. Clayson

Co-Chair

DR. CAROL ANNE CLAYSON (co-chair) is the director of the Ocean and Climate Change Institute. She is also a senior scientist in the Department of Physical Oceanography at the Woods Hole Oceanographic Institution. Dr. Clayson has been tenured faculty at Florida State University and Purdue University, and was also the former Director of the Geophysical Fluid Dynamics Institute. Her research covers the areas of air and sea interaction, satellite remote sensing, and ocean modeling. She is the recipient of a National Science Foundation (NSF) CAREER award and the Office of Naval Research Young Investigator Award. She received a Presidential Early Career Award for Scientists and Engineers from President W. Clinton. Dr. Clayson received her Ph.D. in aerospace engineering sciences from the University of Colorado, Boulder. Previously, Dr. Clayson served as a member of the Academies' Board on Atmospheric Sciences and Climate including the Committee on the Future of Rainfall Measuring Missions and the Committee to Review the NASA Earth Science Enterprise Strategic Plan.

Venkatachalam Ramaswamy

Co-Chair

DR. VENKATACHALAM RAMASWAMY (co-chair) is the director of NOAA's Geophysical Fluid Dynamics Laboratory (GFDL). He is also a lecturer with the rank of professor in the Atmospheric and Oceanic Sciences Program and the Princeton Environmental Institute at Princeton University. His primary interests include numerical modeling of the global climate system, advancing the understanding of atmospheric physics and chemistry and related processes in climate, and investigating the climatic variations and changes due to natural and human-influenced factors. At GFDL he directs one of the world's major climate research and modeling centers with the mission to develop and apply advanced numerical models for understanding global and regional climate, and conduct research on predictability/ predictions and projections of climate. Prior to becoming the director of GFDL, he held the senior scientist position. His honors include: fellow, American Meteorological Society (AMS) and American Geophysical Union (AGU); AMS Houghton Award and Walter Orr Roberts Lecture; WMO Norbert-Gerbier International Award for best scientific paper (3-time recipient); Presidential Rank for Meritorious Senior Professional; Bert Bolin Lecture (Stockholm University); Ogura Lecture (University of Illinois); Distinguished Lecture (Lawrence Berkeley Laboratory; KAUST, Saudi Arabia); Joseph Priestley Lecture (Chemical Heritage Foundation); and member of the IPCC team that was a co-recipient of the 2007 Nobel Peace Prize. Dr. Ramaswamy earned his Ph. D. in atmospheric sciences from the State University of New York at Albany. He has previously served on the Academies Panel on Informing Effective Decisions and Actions Related to Climate Change as well as the Panel on Aerosol Radiative Forcing and Climate Change.

Arlyn E. Andrews

Member

DR. ARLYN E. ANDREWS is a chemist at the NOAA Earth System Research Laboratory in Boulder, Colorado. Previously, she worked at NASA Goddard Space Flight Center, where she contributed to the initial development of concepts for active and passive CO2 satellite sensors. Dr. Andrews has measured carbon dioxide from the surface to the stratosphere on a variety of airborne platforms, including NASA's ER-2 aircraft -- a modified U-2 spy plane, and high-altitude balloons. She is currently responsible for a network of sites measuring carbon dioxide, methane, and related gases from broadcast towers, and she leads NOAA's Carbon Tracker-Lagrange regional modeling framework for estimating emissions of carbon dioxide and methane and biological uptake of carbon dioxide by terrestrial ecosystems. She served as a member or the Carbon Cycle Science Steering Group for the US Carbon Cycle Science Program. She earned her Ph.D. in Earth and Planetary Science from Harvard University. She has not previously served on an Academies committee.

Enrique Curchitser

Member

DR. ENRIQUE CURCHITSER is a professor of Oceanography and Climate in the Department of Environmental Sciences at Rutgers University. His main research interests include ocean circulation and its role in the climate system, dynamics of boundary currents and shelf circulation, physical-biological interactions, development of coupled Earth System Models, and multi-scale climate dynamics and numerical modeling. His group at Rutgers University, the Earth System Modeling Lab, assembles an interdisciplinary team of scientists and students that makes use of numerical models to address a range of climate related problems. Specific projects include the role of upwelling systems in climate and ecosystem dynamics, downscaling of climate models to coastal systems and exploring the links between coupled eco- and human-systems and climate. Dr. Curchitser is the State Department appointed academic delegate to the North Pacific Marine Science organization and chair of the Climate Variability (CLIVAR) research focus on Eastern Boundary Upwelling Systems as well as a member of the Ocean Model Development Panel (CLIVAR-OMDP).

Lee-Lueng Fu

Member

DR. LEE-LUENG FU (NAE) is a senior research scientist at the Jet Propulsion Laboratory (JPL), where he is also a fellow. He has been the project scientist for JPL’s satellite altimetry missions for oceanographic and geodetic studies since 1988, including TOPEX/Poseidon, Jason-1, and Jason-2. He is currently the project scientist for the U.S./France joint Surface Water and Ocean Topography Mission (SWOT), which is being developed as the next generation altimetry mission for measuring water elevation on Earth. Dr. Fu's research has been focused on the variability of sea level in relation to ocean circulation and climate. He received a B.S. in physics from National Taiwan University and a Ph.D. in oceanography from Massachusetts Institute of Technology and Woods Hole Oceanographic Institution. He is a member of the U.S. National Academy of Engineering, and a fellow of the AGU and the AMS. Recently he was awarded the COSPAR International Cooperation Medal for his leadership in the development and continuation of satellite altimetry missions. He has served on the Academies Committee on Earth Science and Applications from Space (thru 6/30/2016) and the Committee on a Framework for Analyzing the Needs for Continuity of NASA-Sustained Remote Sensing Observations of the Earth from Space (thru 3/31/2015).

Guido Grosse

Member

DR. GUIDO GROSSE is a research group lead at the Alfred Wegener Institute (AWI) in the Periglacial Research Department in the Helmholtz Centre for Polar and Marine Research in Potsdam, Germany. At AWI, Dr. Grosse is leading the European Research Council (ERC) Project PETA-CARB, where a broad range of remote sensing observations are coupled with soil carbon stock estimates to better understand carbon pools and dynamics in Arctic permafrost regions. He is also the lead for two work packages in the ESA GlobPermafrost project. His research focuses on the study of climate change impacts in Arctic permafrost environments by using high to medium resolution remote sensing, geospatial information systems, and extensive field work. Previously, Dr. Grosse was on the faculty of the Geophysical Institute of the University of Alaska Fairbanks, where he was Principal Investigator and Co-Investigator in multiple NASA, NSF, and Alaska LCC projects focusing on remote sensing of permafrost landscape dynamics and associated ecosystem, hydrological, and biogeochemical processes. He served as a lead of the Thermokarst Working Group in the Permafrost Carbon Network (PCN), lead of the working group on Vulnerability of High Latitude Soil Carbon to Disturbance within the North American Carbon Program (NACP), and was part of the Cryosphere Hazard Working Group in Alaska. He participated in more than 35 Arctic field campaigns in Siberia and Alaska, has authored or co-authored more than 65 peer-reviewed journal articles. He earned his Ph.D. for geology at Alfred Wegener Institute Potsdam and the University of Potsdam, Germany. He has not previously served on an Academies' committee.

Randal D. Koster

Member

DR. RANDAL D. KOSTER is a research scientist at the NASA Goddard Space Flight Center (GSFC). His early work focused on the analysis of global water isotope geochemistry. Most of his tenure at GSFC, though, has been dedicated to two research thrusts: (i) the development of improved treatments of land surface physics for atmospheric general circulation models, and (ii) the analysis of interactions between the land and atmosphere, using these models. He has examined many questions regarding land-atmosphere feedback, including: Can knowledge of soil moisture conditions at the beginning of a seasonal weather forecast improve the forecast? Can we find evidence in the observational record that variability in land surface states has an effect on rainfall, air temperature, and other atmospheric variables? He is the 2016 winner of the AMS's Hydrological Sciences Medal. He received his Sc.D. from Massachusetts Institute of Technology. He served on the Academies Committee on Assessment of Intraseasonal to Interannual Climate Prediction and Predictability.

Sonia Kreidenweis

Member

DR. SONIA M. KREIDENWEIS is a University Distinguished Professor and the associate dean for research in the College of Engineering at Colorado State University (CSU). At CSU, Dr. Kreidenweis has led the initiation and development of the program in atmospheric chemistry, specializing in her own group in the characterization of aerosol physical and optical properties. Her research interests include the study of aerosol-cloud interactions via observations and modeling, methods for the detection, characterization, and parameterization of cloud condensation nuclei and ice nucleating particles, and application of aerosol-water interaction concepts to visibility and climate. She is a recipient of the Sinclair Award of the American Association for Aerosol Research (AAAR), and is a fellow of the AAAR and of the AMS. She earned her Ph.D. in chemical engineering from the California Institute of Technology, Pasadena, CA. She served as a member of the Academies' Committee on International Transport of Air Pollution, the Committee on Opportunities to Improve the Representation of Clouds and Aerosols in Climate Models with National Collection Systems, and the Committee on Atmospheric Chemistry.

Emilio F. Moran

Member

DR. EMILIO F. MORAN (NAS) is John A. Hannah Distinguished Professor at Michigan State University at the Center for Global Change and Earth Observations. He was previously Distinguished Professor and the James H. Rudy Professor of Anthropology at Indiana University. He is the author of ten books, fifteen edited volumes, and more than 190 journal articles and book chapters. He is formally trained in anthropology, geography, ecology, soil science and satellite remote sensing. His work for the past 20 years has been focused on linking the social and natural sciences addressing questions on land use and land cover change, and population and environment. His research has been supported by NSF, NIH, NOAA, and NASA. His three latest books, Environmental Social Science (Wiley/Blackwell 2010), People and Nature (Blackwell 2006), and Human Adaptability, 3rd edition (Westeview 2007) address broad issues of human interaction with the environment. He is a past Guggenheim fellow, a fellow of the Linnean Society of London, fellow of the American Anthropological Association and the Society for Applied Anthropology, fellow of the American Association for the Advancement of Science, and is elected a member of the U.S. National Academy of Sciences. He earned his Ph.D. for anthropology from the University of Florida. He served on the Academies' Division Committee for the Behavioral and Social Sciences and Education, the Committee on the Human Dimensions of Global Change, and the Geographical Sciences Committee.

Cora E. Randall

Member

DR. CORA E. RANDALL is a professor at the University of Colorado (CU), Boulder. She is also chair of the Department of Atmospheric and Oceanic Sciences and a faculty member of the CU Laboratory for Atmospheric and Space Physics. Her main area of expertise is remote sensing of the earth's middle atmosphere, with particular emphasis on the polar regions. She investigates processes related to stratospheric ozone depletion, polar mesospheric clouds, and atmospheric coupling through solar and magnetospheric energetic particle precipitation. She teaches courses in chemistry, climate, radiative transfer and remote sensing. Dr. Randall is a current or prior member of numerous international satellite science teams, and is principal investigator on the Cloud Imaging and Particle Size (CIPS) experiment on the NASA Aeronomy of Ice in the Mesosphere (AIM) satellite mission. She has won a number of awards in recognition of her scientific contributions, and is an elected fellow of the American Geophysical Union and American Association for the Advancement of Science. She earned her Ph.D. in chemistry from the University of California, Santa Cruz. She has not previously served on an Academies' committee.

Philip J. Rasch

Member

DR. PHILIP J. RASCH is the chief scientist and laboratory fellow at the Pacific Northwest National Laboratory (PNNL). Prior to working for PNNL, Dr. Rasch held several positions throughout NCAR. His main focus has been on understanding the connections between clouds, chemistry, and climate of the Earth system. Work in this broad area has required basic contributions in numerical methods for atmospheric models, as well as contributions in the representation of cloud and aerosol processes, and processes that control the transport, production, and loss of trace constituents in the atmosphere. He is interested in climate change and the water cycle, as well as the role of aerosols on the climate system. He has also worked and published regularly on the controversial subject of climate engineering (geoengineering). Dr. Rasch was a chair of the International Global Atmospheric Chemistry Program of the IGBP. He led activities for the WCRP/IGBP "Atmospheric Chemistry and Climate" activity. He has served in various editorial positions for international journals and served on advisory panels for NSF, DOE, NASA, and the AMS. He has been a contributing author to NASA, the WMO, and the IPCC assessment documents. He earned his Ph.D. in meteorology from Florida State University. He has previously served on the Academies' Committee on Geoengineering Climate: Technical Evaluation and Discussion of Impacts, and Committee for Review of CCSP Draft Synthesis and Assessment Product 3.2.

Eric Rignot

Member

DR. ERIC J. RIGNOT is a professor at the University of California Irvine, CA in the Department of Earth System Science. He is also a senior research scientist and joint faculty appointee at the Jet Propulsion Laboratory. Dr. Rignot has 26 years of experience in glaciology, polar physical oceanography, ice-ocean interaction, synthetic-aperture radar applications for ice sheet mass balance, low-frequency radar sounding of glaciers, airborne surveying of Greenland and Antarctica, and numerical ice sheet modeling. He has received the NASA Exceptional Scientific Achievement Medal, NASA Outstanding Team Leadership, NASA Group Achievement, JPL Director Award, Nobel Peace Prize in 2007, IPCC AR4 Authors, AGU Fellow, and Thomson Reuters Highly Cited Researcher. He is a member of CLIVAR, NSF's SEARCH, NASA's Sea Level Change Team; he is the Science Lead for Operation IceBridge Mission over land ice and a member of the Science Definition Team for NASA/ISRO SAR Mission. He earned his Ph.D. in electrical engineering from the University of Southern California, Los Angeles. He served as a member of the Academies Committee on a Framework for Analyzing the Needs for Continuity of NASA-Sustained Remote Sensing Observations of the Earth from Space.

Christopher Ruf

Member

DR. CHRISTOPHER RUF is a professor of atmospheric science and electric engineering at the University of Michigan in the Climate and Space Department. Dr. Ruf is principal investigator for the NASA CYGNSS Earth Venture Mission, which will measure ocean surface wind speed in tropical cyclones with rapid sampling using a constellation of eight microsatellites in low earth orbit. CYGNSS is scheduled to launch in fall 2016. His research interests include remote sensing technology and earth science applications related to climate and weather studies. Previously, Dr. Ruf was on the faculty of the Pennsylvania State University in the Department of Electrical and Computer Engineering and on the technical staff of the NASA Jet Propulsion Laboratory/Caltech. He earned his Ph.D. in electrical engineering from the University of Massachusetts, Amherst. He served as a member of the Academies' Committee on the Scientific Uses of the Radio Spectrum, Survey Steering Committee for "Earth Science and Applications from Space: A Community Assessment and Strategy for the Future": Weather Panel, and the Committee on Radio Frequencies.

Ross J. Salawitch

Member

DR. ROSS J. SALAWITCH is a professor of atmospheric sciences at the University of Maryland, College Park (UMCP) in the Departments of Atmospheric and Oceanic Science, Chemistry and Biochemistry, and the Earth System Science Interdisciplinary Center. At UMCP, Dr. Salawitch leads a research effort focused on stratospheric ozone layer depletion and recovery, air quality, the global carbon cycle, and climate change. All of these efforts involve the use of various computer models and a suite of observations to quantify the effects of human activity on the composition of Earth's atmosphere. Previously, Dr. Salawitch was on the research staff of the Jet Propulsion Laboratory, California Institute of Technology (Caltech), and also served at various times as Visiting Research Associate and Lecturer at Caltech. He is the recipient of the Yoram Kaufman Award for Unselfish Cooperation in Research from the Atmospheric Sciences Section of American Geophysical Union and is a Fellow of the American Association for the Advancement of Science. He earned his Ph.D. in applied physics from Harvard University, for research on the cause of the Antarctic Ozone Hole. He has not previously served on an Academies committee.

Amy K. Snover

Member

DR. AMY K. SNOVER serves as the director of the Climate Impacts Group and Assistant Dean of Applied Research at the University of Washington in the College of the Environment. She is also affiliate associate professor. She works to improve society's resilience to natural and human-caused fluctuations in climate by bridging the gap between science and decision-making. Working with a broad range of stakeholders, Snover helps develop science-based climate change planning and adaptation guidance, identify research priorities, and advise on strategies for building climate resilience. She has been recognized as a White House Champion of Change for Climate Education and Literacy, was a convening lead author for the Third U.S. National Climate Assessment and lead author of the groundbreaking 2007 guidebook, Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments, with over 3000 copies now in use worldwide. Current areas of research include defining successful climate change adaptation, exploring the role of cities in adaptation and identifying the time of emergence of management-relevant aspects of climate change. Amy received her Ph.D. in environmental chemistry from the University of Washington. She has not previously served on an Academies committee.

Julienne C. Stroeve

Member

DR. JULIENNE C. STROEVE is a senior research scientist at the National Snow and Ice Data Center (NSIDC) which is within the Cooperative Institute for Research in Environmental Sciences (CIRES). Subsequently her polar research interests have focused on the sea ice cover and include sea ice predictability, climate change and associated local and large-scale impacts, particularly in the Arctic. She has conducted several Arctic field campaigns. Dr. Stroeve's work has been featured in numerous magazines, news reports, radio shows, and TV documentaries. She has given keynote addresses around the world on polar issues and has briefed former Vice President Al Gore. She has published more than fifty articles in peer-reviewed journals and contributed to several national and international reports on Arctic climate change and polar processes. She received a Ph.D. in geography from the University of Colorado, Boulder, for her work in understanding Greenland climate variability. Dr. Stroeve serves on the NSF Geosciences Advisory Committee. She is has served on the Academies' Committee for the Antarctic Sea Ice Variability in the Southern Climate-Ocean System Workshop and has served on the Committee on Designing an Arctic Observing Network.

Bruce A. Wielicki

Member

DR. BRUCE A. WIELICKI is a senior scientist for radiation sciences at NASA Langley Research Center. He is currently science team lead of NASA's CLARREO Pathfinder mission to the International Space Station, a mission which started in 2016 and is planned for launch in 2020. Dr. Wielicki was principal investigator on the NASA CERES instruments from 1990 through 2008. He has also been a Co-Investigator on CALIPSO, CloudSat, Landsat, and ERBE NASA missions. His research interests are in climate change, climate sensitivity, cloud feedback, Earth's radiation budget, cloud remote sensing, radiative transfer theory, and testing of climate models. He has published over 110 journal articles with over 5500 citations. Dr. Wielicki has received two Presidential Rank awards, four NASA medals including the Distinguished Service Medal, which is NASA's highest award. He is a fellow of the AMS and has received the AMS Houghton Award. He has served on numerous national and international committees. Dr. Wielicki has served on two Academies' study committees: the 2013 Total Solar Irradiance study for NOAA, and the 2015 Continuity of NASA Earth Observations from Space: a Value Framework.

Gary W. Yohe

Member

DR. GARY W. YOHE is the Huffington Foundation Professor of Economics and Environmental Studies at Wesleyan University. He has been on the faculty at Wesleyan for more than 30 years. He is the author of more than 100 scholarly articles, several books, and many contributions to media coverage of climate issues. Most of his work has focused attention on the mitigation and adaptation/impacts sides of the climate issue. Involved since the early 1990's with the Intergovernmental Panel on Climate Change that received a share of the 2007 Nobel Peace Prize, he served as a lead author for four different chapters in the Third Assessment Report that was published in 2001 and as convening lead author for the last chapter of the contribution of Working Group II to the Fourth Assessment Report that was published in 2007. In that Assessment, he also worked with the Core Writing Team to prepare the overall Synthesis Report. He was a convening lead author for Chapter 18 of the Contribution of Working Group II to the Fifth Assessment Report on "Detection and Attribution" and a lead author for Chapter 1 on "Points of Departure". He received his Ph.D. in economics from Yale University. Most recently he has served on the Academies' Committee to Advise the U.S. Global Change Research Program, the Board on Environmental Change and Society and the Committee on the Human Dimensions of Global Change. He was also a Vice Chair of the 2014 National Climate Assessment Development and Advisory Committee for the Obama Administration.