A Mid-Term Assessment of NSF Progress on the 2015 Strategic Vision for Antarctic and Southern Ocean Research

Committee

Oscar M. Schofield

Chair

Oscar M.E. Schofield, is a distinguished professor and the chair of the Department of Marine and Coastal Sciences at Rutgers, The State University of New Jersey. He is interested in how plankton dynamics structure marine food webs and feedback on the ocean's biogeochemistry. His research focus has combined genetics and biochemistry with the development of new ocean observing technologies (satellites, radars, and autonomous underwater vehicles). He is co-director and co-founder of the Coastal Ocean Observation Laboratory, which has been awarded and managed over fifty million dollars in competitive awards from NOAA, Office of Naval Research, Department of Homeland Security, NASA and the National Science Foundation. Dr. Schofield's research efforts have focused on polar and temperate waters with extensive efforts in the Southern Ocean, with ongoing research along the West Antarctic Peninsula and the Ross and Amundsen Seas. He completed his BA and PhD in Biology at the University of California, Santa Barbara. He was a member of the 2015 study committee.

Amy Barger

Member

Amy Barger is the Vilas Distinguished Achievement Professor in the Department of Astronomy at the University of Wisconsin-Madison. Her research interests include observational cosmology; distant galaxies and supermassive black holes; observations at X-ray, optical, near-infrared, submillimeter, and radio wavelengths; and the star formation and accretion histories of the universe. She led the discovery of extreme star-formation activity in distant, dusty galaxies in blank regions of sky. She also showed that the growth of supermassive black holes in galaxies was greater and more recent than expected. Dr. Barger has held Sloan, Packard, and Guggenheim Fellowships, and she is an elected Fellow of both the American Physical Society and the American Association for the Advancement of Science. She was awarded the Maria Goeppert Mayer Award in Physics by the American Physical Society and both the Newton Lacy Pierce Prize and the Annie Jump Cannon Award in Astronomy by the American Astronomical Society. She earned a B.A. in Physics and in Astronomy-Physics from the University of Wisconsin-Madison and a Ph.D. in Astronomy from King's College, University of Cambridge, where she was a Marshall Scholar.

Calvin R. Clauer

Member

C. Robert Clauer is emeritus professor in the Department of Electrical and Computer Engineering at Virginia Polytechnic Institute and State University. His research interests include experimental and theoretical investigations of the electrodynamic coupling between the solar wind, magnetosphere, and ionosphere using global arrays of ground based and satellite based instruments, utilization of computer networks to form knowledge networks in the support of scientific and educational activities, and experimental and theoretical investigations of the geomagnetic storm time ring current. Dr. Clauer has over two decades of research activity in the areas of solar-terestrial relationships, solar wind-magnetosphere-ionosphere coupling, storm and substorm phenomenology, and magnetospheric electrodynamics. He pioneered the development and operation of autonomous environmental monitoring platforms in remote regions of the Arctic and Antarctic. He previously served on the National Academy of Sciences, Engineering and Medicine’s Polar Research Board and the Committee on the Development of Strategic Vision for the Antarctic Program. Dr. Clauer received his Ph.D. in Geophysics and Space Physics from the University of California, Los Angeles in 1980.

Indrani Das

Member

Dr. Indrani Das is associate research professor at Lamont-Doherty Earth Observatory. Her research interests include mass balance of Antarctic ice sheets and ice shelves, deep ice processes in mountain glaciers, satellite remote sensing of glaciers and ice sheets, and ice surface hydrology. Dr. Das also studies paleo observations of accumulation rates and the climate history of the Greenland ice sheet. She studies physical processes that impact the mass balance and stability of ice sheets and ice shelves using a combination of satellite remote sensing, airborne radar and laser altimeter, ground based measurements, and modeling. Dr. Das received her Ph.D. in Atmospheric Physics from Indian Space Research Organization in 2007. As a postdoctoral scholar at the University of Alaska, Fairbanks, she studied the mass balance of Alaskan glaciers using airborne laser altimetry.

H. W. Detrich, III

Member

H William Detrich is Professor of Biochemistry and Marine Biology in the Department of Marine and Environmental Sciences, Northeastern University, Boston, and his laboratory is located at the Marine Science Center in Nahant, Massachusetts. He has studied the cold adaptation of Antarctic marine fishes for more than 35 years, during which he has conducted more than 20 research expeditions to Palmer Station and McMurdo Station in Antarctica and has worked frequently in the Palmer Archipelago on board the ARSV Laurence M. Gould. Using comparative genomic and biochemical approaches, Dr. Detrich studies how the notothenioid fish of the Antarctic evolved novel traits that enabled them to survive and thrive in the chronically frigid Southern Ocean (–1.8 to +1°C). His laboratory determined the evolutionary mechanism by which the Antarctic icefishes, a subgroup of the notothenioids, lost their hemoglobin genes, and he is now exploiting the complete anemia (absence of red blood cells) of the icefishes to discover novel genes required for red cell formation. In 2019, an international consortium including Dr. Detrich published the first genome of an icefish (Chaenocephalus aceratus), which will accelerate the evolutionary understanding of these remarkable creatures. Dr. Detrich’s lab is also studying the potential impact of a warming Southern Ocean on embryonic development of the notothenioids. His research is relevant both to understanding how Antarctic fishes will respond to climate change and to developing new therapeutics to treat human anemias. He brings to his research a background in biochemistry, molecular, cellular and developmental biology, and genomics. Dr. Detrich received his Ph.D. from Yale University.

Michael N. Gooseff

Member

Michael Gooseff is a professor in the Institute of Arctic and Alpine Research (INSTAAR) and in the Department of Civil Architectural & Environmental Engineering at the University of Colorado. He is currently the Lead Principal Investigator of the McMurdo Dry Valleys LTER project in Antarctica and the Co-Director of the Hydrologic Sciences Graduate Program at Colorado University. Dr. Gooseff conducts on-going research in Antarctica and in Arctic Alaska. Dr. Gooseff has served on the editorial boards of Eos, Hydrology and Earth System Sciences, WIRES Water, and Water Resources Research. He previously served on the Board of Directors of the Consortium of Universities for the Advancement of Hydrologic Science, Inc, and he is active with the Hydrology Section of the American Geophysical Union. In 2011, he chaired an NSF review committee for Office of Polar Programs. He earned his B.C.E. from Georgia Institute of Technology and his M.S. and Ph.D. degrees from the University of Colorado, Boulder.

Kenneth M. Halanych

Member

Kenneth M. Halanych is Stewart Schneller Endowed Chair and Alumni Professor in the Department of Biological Sciences at Auburn University. His research interests include marine invertebrate evolution, genomics, Antarctic biodiversity, evolutionary origins and relationships of animal phyla, and diversification of chemosynthetic fauna. His efforts in the Antarctic have focused on understanding patterns of genetic connectivity around the continent and across the polar front. Dr. Halanych is a fellow for the American Association for the Advancement of Science. He has also served on the Research Board of the Gulf of Mexico Research Initiative that funded research on oil and dispersants after the explosion of the Deep Horizon oil-drilling platform. Dr. Halanych serves as Editor-in-Chief of The Biological Bulletin, one of the nation’s oldest scientific journals. He received his B.S. from Wake Forest University and his PhD in Zoology from the University of Texas, Austin.

Mark Halpern

Member

Mark Halpern is professor in the Department of Physics and Astronomy at the University of British Columbia in Vancouver, Canada. His research interests include experimental cosmology, the history of star formation, and measurements of the geometry and contents of the universe using cosmic microwave background radiation. Dr. Halpern’s research measurements of the anisotropy and polarization of the cosmic microwave background and on 21cm measurements of the expansion history of the Universe with CHIME.
Dr. Halpern was awarded the Gruber Cosmology Prize in 2012, the Breakthrough Prize in Fundamental Physics in 2017, the Beals award in 2018, and is a Fellow of the Royal Society of Canada. He earned his B.Sc. and Ph.D. from Massachusetts Institute of Technology.

Alison Murray

Member

Alison Murray is a research professor in the Division of Earth and Ecosystem Sciences at the Desert Research Institute. Dr. Murray is a molecular microbial ecologist and biological oceanographer with research interests centered around utilizing molecular biological and genomic approaches to describe the diversity of life and understand the evolutionary history, ecological roles, and physiological capacity and capabilities of free-living and symbiotic microorganisms, including several which are considered to be at the extremes of where life exists. Dr. Murray's research has taken her and members of her research group to the Antarctic Peninsula and Northwestern Weddell Sea and the McMurdo Dry Valleys of Antarctica, the North Slope of Alaska and coastal Arctic, deep sea hydrothermal vents of the East Pacific Rise, and Yellowstone National Park to study the microorganisms inhabiting these diverse, and extreme ecosystems. Much of her work has been dedicated to developing environmental genomics technologies for detecting and studying organisms sampled directly from the environment. She earned a Ph.D. in Ecology, Evolution, and Marine Biology in from the University of California, Santa Barbara.

Eric Rignot

Member

Eric Rignot is the Donald Bren Professor of Earth System Science in the Department of Earth System Science, University of California, Irvine, and a senior research scientist and joint faculty appointee by the chief scientist at Caltech's Jet Propulsion Laboratory, Pasadena. 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 is a principal investigator on several NASA-funded projects to study the mass balance of the Greenland and Antarctic ice sheets using radar interferometry combined with other methods; the interactions of ice shelves with the ocean; and the dynamic retreat of Patagonian glaciers. He is a member of CLIVAR and NASA's Sea Level Change Team and is the science lead for Operation IceBridge, which uses aircraft-based instruments to study annual changes in thickness of sea ice, glaciers and ice sheets. He earned his Ph.D. in electrical engineering from the University of Southern California, Los Angeles. He is currently a member of the National Academies' Committee on Earth Science and Applications from Space and served on the Committee on the Decadal Survey for Earth Science and Applications from Space: Panel on Climate Variability and Change. He received an M.S. in astronomy and astrophysics from University Paris VI, a double M.S. in Aerospace Engineering and Electrical Engineering from the University of Southern California (USC), and his Ph.D. in Electrical Engineering from USC.

Amelia Shevenell

Member

Amelia Shevenell is an associate professor in the College of Marine Science at the University of South Florida (USF). Dr. Shevenell’s research focuses on generating geochemical and micropaleontologic records from marine sediments to address questions related to Earth’s Cenozoic climate evolution. Her current research addresses Cenozoic Antarctic ice sheet development from far-field and ice proximal records, the role of the high-latitude oceans in Glacial-Interglacial carbon cycling, and Antarctic Holocene climate variability. Research undertaken by the Shevenell Lab is relevant to IPCC concerns that ongoing climate changes are accelerating polar ice cap melting and global sea level rise. Dr. Shevenell is actively involved in several international research programs, including the Integrated Ocean Discovery Program (IODP), and has served on several IODP advisory panels, in addition to proposing and participating in several IODP scientific expeditions. Dr. Shevenell currently serves the broader scientific community in several capacities. In 2020, she was appointed as an Associate Editor for the AGU journal, Paleoceanography and Paleoclimatology; in 2016 she was recognized as an AGU Outstanding Reviewer; and she currently serves as an Advisory Committee Member for the Oregon State Antarctic Core Collection. In 2019, Dr. Shevenell was elected to serve as the Geological Oceanography Counselor on The Oceanography Society governing council, and is a member of their nominations and ethics committees. In 2019, Dr. Shevenell was elected a full member of Sigma Xi, the scientific research honor society and received a USF Faculty Outstanding Research Achievement Award. She received the USF Faculty Outstanding Research Achievement Award in 2019. Dr. Shevenell earned her B.A. in geological sciences with honors from Hamilton College and her M.Sc. and Ph.D. in marine science from the University of California, Santa Barbara. She was a postdoctoral fellow at the University of Washington. Prior to arriving at USF in 2011, Dr. Shevenell was an Assistant Professor at University College London, jointly appointed in the Departments of Geography and Earth Sciences.

Helio Takai

Member

Helio Takai is the interim dean at the School of Liberal Arts and Sciences at the Pratt Institute. He is also currently a collaborating scientist at CERN, the European Organization for Nuclear Research. Before joining the Pratt Institute, he was a physicist at Brookhaven National Laboratory (BNL) for 29 years. Dr. Takai's field of research is experimental physics with expertise in nuclear and elementary particle physics. Interests in basic sciences and instrumentation development have led him to develop instrumentation for the realization of experiments for accelerator-based research ranging from electrostatic accelerators to the Large Hadron Collider in Geneva, Switzerland. He has also designed and implemented cryogenic elementary particle detectors, signal conditioning electronics, and field-programmable gate array signal processing platforms. In his work with cosmic rays, he is particularly interested in the influence of atmospheric effects on the flux of atmospheric muons. In addition, he has developed instrumentation for radiation detection, data acquisition systems, and analysis software. Dr. Takai holds a B.S. in physics and M.S. in nuclear physics from the Universidade de São Paulo, Brazil and a Ph.D in nuclear physics from the Universidade Federal do Rio de Janeiro.

Terry Wilson

Member

Terry Wilson is professor emerita in the School of Earth Sciences and senior research scientist in the Byrd Polar and Climate Research Center at the Ohio State University. Her expertise includes Antarctic geology, structure/tectonics, and geodetic measurement of crustal deformation. Dr. Wilson has led large, international efforts, such as the Polar Earth Observing Network (POLENET), to investigate the interactions between the solid earth and the cryosphere in Antarctica. Her ongoing research addresses neotectonic rifting in Antarctica; ice mass balance, ice load history and glacial rebound patterns; and the contemporary crustal stress field in Antarctica. She has conducted deep field research in Antarctica for 24 seasons. Wilson served as the U.S. Delegate to the Scientific Committee on Antarctic Research (SCAR) for many years, and as Vice President for SCAR from 2014-2018. She received the SCAR Medal for International Coordination in 2018. Wilson received her B.S. in geology from the University of Michigan and Ph.D. in geology from Columbia University.

Eric Wolff

Member

Eric Wolff is Royal Society Research Professor in the Department of Earth Sciences at Cambridge University. His research focuses on using ice cores from Greenland and Antarctica to understand the dynamics of glacial cycles and millennial-scale climate change. He also carries out research into the chemistry of the lower parts of the Antarctic atmosphere. Dr. Wolff has received multiple awards for his research, including the Lyell Medal from the Geological Society, and the Louis Agassiz Medal from the European Geosciences Union. He is a Fellow of the Royal Society, an Honorary Fellow of the British Antarctic Survey, and a founding Chief Editor of the journal Climate of the Past. He led the Royal Society team in a joint initiative with the National Academy of Sciences on explaining climate science, “Climate change: evidence and causes,” in 2013.