

Future Directions for Southern Ocean and Antarctic Nearshore and Coastal Research

Committee

Paula Bontempi

Co-Chair

Dr. Paula Bontempi has been Dean of the Graduate School of Oceanography at the University of Rhode Island since September 2020. Prior to her current position, Dr. Bontempi served as acting deputy director at NASA's Earth Science Division in the Science Mission Directorate of NASA Headquarters in Washington, D.C., and spent more than 16 years as the physical scientist and program manager for ocean biology and biogeochemistry at NASA Headquarters. She provided leadership, strategic direction, and overall management for the agency's Earth science portfolio, from technology development, applied science, and research to mission implementation and operations. Her scientific interests include Earth and ocean remote sensing, phytoplankton ecology, marine bio-optics, studying the Earth as a system, oceans across the solar system, the connection of ocean exploration to global economics, and the development of ocean sensors. She has a strong interest in mentorship and justice, equity, diversity, and inclusion (JEDI) initiatives in science, technology, engineering and mathematics (STEM). She currently serves as a member of the NASA Unidentified Aerial Phenomenon Independent Study Team. She is a Fellow of The Oceanography Society. Her Ph.D. in Oceanography is from URI-GSO, and she holds a Master of Science Degree from Texas A&M University, and a Bachelor of Science from Boston College.

Dr. Bontempi's husband is a Senior Associate Non-Resident and oversees the Stephenson Ocean Security Project within the Center for Strategic and International Studies in Washington, D.C. Dr. Bontempi serves ad honorum on the Leidos Climate Change Strategic Council on projects that are unrelated to the National Science Foundation.

Alan Mix

Co-Chair

Dr. Alan Mix is a Distinguished Professor of Earth, Ocean, and Atmospheric Sciences at Oregon State University. He also serves as Lead Author on the Intergovernmental Panel on Climate Change 6th Assessment (Oceans, Cryosphere, and Sea Level); President of The Oceanography Society; Chair of the International Geosphere-Biosphere Program Past Global Changes; Visiting Professor at University of Bern, University of Bremen, and Princeton University; and Associate Dean (research) at Oregon State University. Dr. Mix is a seagoing oceanographer, logging 21 expeditions from the Southern Ocean (Patagonia) to the Arctic Ocean (North Greenland) and all latitudes in between, on vessels ranging from coastal to global, including drilling vessels and icebreakers, and land fieldwork in South America, Alaska, Greenland, and the Greenland Ice Sheet. His scientific expertise is in paleoceanography and paleoclimatology, using tools of geochemistry and paleontology. Dr. Mix is a member of the American Association for the Advancement of Science, American Geophysical Union, Geological Society of America, and The Oceanography Society. Dr. Mix's honors include Fellow of Future/Earth PAGES, the Kirk Bryan Award of the Geological Society of America, Fellow of The Oceanography Society, Fellow of The Explorers Club of New York, Fellow of the American Association for the Advancement of Science, Emiliani Lecturer and Fellow of the American Geophysical Union, and the Chapman Lectureship at the University of Alaska. He received his MS, MPhil, and PhD at Columbia University, New York, and his BS in Geology at University of Washington, Seattle. Dr. Mix's prior service to the National Academies includes his membership on the Decadal Survey of Ocean Sciences in 2015.

Kim Sarah Bernard

Member

Dr. Kim Bernard is an Associate Professor in the College of Earth, Ocean, and Atmospheric Sciences at Oregon State University. She is a biological oceanographer, and her research focuses on understanding how climate change and fishing pressure alter zooplankton ecology and thus the structure and function of pelagic ecosystems. For the last 10+ years, Dr. Bernard has been conducting research along the Antarctic Peninsula where she has spent nearly 40 months either at sea aboard the RV Laurence M. Gould and RVIB Nathaniel B. Palmer or at Palmer Station. In 2018, Dr. Bernard was awarded a National Science Foundation Early Career Grant for her research on Antarctic krill. She is currently an executive member and the Outreach and Communication Coordinator of the Scientific Committee for Antarctic Research (SCAR) Krill Expert Group, the Biological Oceanography Councilor of The Oceanography Society, and the Zooplankton Lead on the Biology and Ecosystem Panel of the Global Ocean Observing System. Dr. Bernard obtained her PhD in Marine Biology from Rhodes University in South Africa.

Dr. Bernard served on the Subcommittee of the National Science Foundation Office of Polar Programs Advisory Committee on the U.S. Antarctic Program's Research Vessel Procurement from June 2018 to August 2019 and served as Chair of the Ship Operations Committee, College of Earth, Ocean, and Atmospheric Sciences at Oregon State University, representing OSU at UNOLS from September 2018 to November 2022. She advised a Master's student who included statements about the scientific importance of maintaining a U.S. Antarctic Research Vessel in her thesis.

Edward A. Boyle

Member

Dr. Edward A. Boyle, NAS, is a professor of Ocean Geochemistry in the Department of Earth, Atmospheric and Planetary Sciences at the Massachusetts Institute of Technology. His research interests include a focus on ocean trace metal chemistry in relation to biogeochemical cycling, anthropogenic inputs, and as a tool for understanding the geological history of the ocean. He has worked on lead and other anthropogenic trace metals in Greenland ice cores and on trace metals in estuaries. Dr. Boyle discovered that iron in the deep southwest Pacific derives from distant hydrothermal vents. He is a member of the National Academy of Sciences, previously served as the Director of the MIT-Woods Hole Oceanographic Institute Joint Program, and is a recipient of the Urey Medal of the European Association of Geochemistry. Dr. Boyle received his Ph.D. from the MIT/Woods Hole Oceanographic Institution Joint Program in Chemical Oceanography. His prior experiences at the National Academies includes membership on the Ocean Studies Board from 2010 to 2015, and the Committee on an Ocean Infrastructure Strategy for U.S. Ocean Research and the Marine Chemistry Study Panel.

Daniel Costa

Member

Dr. Daniel Costa is the Director of the Institute of Marine Sciences and a Distinguished Professor at University of California Santa Cruz. He is a Fellow of the California Academy of Sciences and the Society of Marine Mammalogy. His research focuses on the ecology and physiology of marine mammals and seabirds, primarily on their movement and distribution patterns to understand their habitat needs. His Antarctica research started in 1978 and has included the Ross Sea, the Antarctic Peninsula, and the Sub Antarctic Islands of South Georgia, Auckland, and the Falklands. He has been a pioneer in the use of animals to collect oceanographic data. He was the Chief Scientist for two Global Ocean Ecosystem Dynamics winter cruises to the Antarctic Peninsula. He has collaborated with the U.S. Antarctic Marine Living Resource-National Marine Fisheries Service, the British Antarctic Survey, the Australian Antarctic Division, and the French and New Zealand Antarctic Programs. The Costa Spur on the Victoria-land Coast was named to recognize his contributions to Antarctic Research. He has served on international science steering committees, including the Integrated Climate and Ecosystem Dynamics program, The Census of Marine Life, Southern Ocean Global Ocean Ecosystem Dynamics, Climate Impacts on Oceanic Top Predators, the Southern Ocean Observing System, and the Integrated Marine Biogeochemistry and Ecosystem Research. He is active in Scientific Committee on Antarctic Research and a U.S. representative to Scientific Committee on Oceanic Research. Dr. Costa earned his PhD in Biology from the University of California Santa Cruz. He is a member of the National Academies' Ocean Studies Board and has served on three previous activities, most recently, a planning committee member for the 'Technology Developments to Advance Antarctic Research' workshop held in 2021. Dr. Costa was a contributing author on Changing Ocean, Marine Ecosystems, and Dependent Communities for the Intergovernmental Panel on Climate Change in 2019 that made several conclusions regarding the effect of changing climate on marine ecosystems.

Jamin Greenbaum

Member

Dr. Jamin Stevens Greenbaum is an Assistant Research Geophysicist at Institute of Geophysics and Planetary Physics, a division of the Scripps Institution of Oceanography at University of California, San Diego. Dr. Greenbaum's research is focused on the acquisition and synthesis of aerogeophysical and oceanographic data to identify and characterize processes related to ice sheet dynamics, ice-ocean interactions, and continental shelf geology. He has led or participated in fourteen expeditions to Antarctica and two to Greenland where he has operated airborne, shipborne, and ground-based instruments to understand the ice and surrounding ocean. He is a former Fulbright U.S. Scholar and past recipient of the Antarctica Service Medal and a NASA Operation Ice Bridge Instrument Team Group Achievement Award. Greenbaum received B.S. and M.S. degrees in Aerospace Engineering, and a Ph.D. in Geophysics from the University of Texas at Austin.

Dr. Greenbaum was an uncompensated board member of the Ocean Research Project from October 2014 to April 2020. He received free software from Seequent Limited for geophysical data analysis without restrictions on the conduct of the research or the publication of the results. Dr. Greenbaum was a signatory on a letter sent to the National Science Board, the Director of the National Science Foundation, the White House Office of Science and Technology Policy and other science policy leaders regarding the design of the new U.S. Antarctic polar research vessel. This letter documented what the signatories believed were several key components that were missing from the preliminary vessel design.

Ying-Tsong Lin

Member

Dr. Ying-Tsong (YT) Lin is an Associate Scientist with Tenure in the Applied Ocean Physics and Engineering Department at Woods Hole Oceanographic Institution. Dr. Lin also holds an Adjunct Professor position in the Ocean Engineering Department at the University of Rhode Island. Dr. Lin's primary research interests include ocean acoustics, acoustical oceanography, signal processing and internal gravity waves. His most recent research focus is at distributed hydrophone array networks, which combines 3D acoustics, autonomous underwater vehicle technology, and high performance signal processing for detection, classification and localization. He recently led a Woods Hole Oceanographic Institution group winning a grand prize from the W.M. Keck Foundation to build the first Real-Time 3D Acoustic Telescope. Dr. Lin has received the prestigious A B Wood Medal from the Institute of Acoustics, UK in 2015, and Medwin Prize in Acoustical Oceanography from the Acoustical Society of America, USA in 2018. He is a Fellow of the Acoustical Society of America, USA and the 12th person in history and the first person of Asian descent to visit the bottom of Challenger Deep, the deepest-known point of the ocean on Earth. Dr. Lin received an M.S. and Ph.D. in ocean engineering from National Taiwan University and a B.S. in ocean engineering from Taiwan and National Cheng Kung University.

Heather Joan Lynch

Member

Dr. Heather J. Lynch is the Institute for Advanced Computational Sciences Endowed Chair for Ecology & Evolution at Stony Brook University. Dr. Lynch's research is dedicated to understanding the biogeography and population dynamics of Antarctic wildlife, particularly Antarctic penguins, using a suite of research platforms including U.S. research vessels, commercial cruise ships, and smaller yachts. Dr. Lynch has also developed tools for using satellite imagery to survey wildlife and has led several research efforts to unite high-resolution commercial imagery and high performance computing for imagery-enabled science in the polar regions. Dr. Lynch received an NSF CAREER Award for her work on the spatial dynamics of Antarctic penguins and was elected an early career fellow of the Ecological Society of America. Dr. Lynch has been awarded the Blavatnik National Medal for Young Scientists, selected as a AAAS Leshner Leadership Fellow, and recognized as a Pew Marine Conservation Fellow. Dr. Lynch has an A.B. in Physics from Princeton University, and M.A. in Physics from Harvard University, and a Ph.D. in Organismic and Evolutionary Biology from Harvard University.

Dr. Lynch has served on the Science and Operations Advisory Committee of the University of Minnesota's Polar Geospatial Center since 2018, and currently serves as that committee's chair.

W. B. Lyons

Member

Dr. W. Berry Lyons is a Professor at the Ohio State University. Although trained as a marine scientist, most of Lyons' research over the past 30 years has been focused on the geochemistry and biogeochemistry of streams, rivers and lakes. The work has ranged from the relationship of chemical and physical weathering, the impact of climate change on the biogeochemistry of polar aquatic systems, the study of subglacial aquatic systems in Antarctica, and the impact of agricultural practices and urbanization on water quality. He was a co-PI on the McMurdo Dry Valleys Long-Term Ecological Research group project, Antarctica for 24 years, including acting as the lead PI from 1997-2008. He has served as a U.S. representative to the SCAR Geoscience Standing Group. He is a former Director of the Byrd Polar and Climate Research Center and the School of Earth Sciences at Ohio State. He is a Fellow of AAAS, GSA, and AGU. He received his Ph.D. from the University of Connecticut. Dr. Lyons served as Chair of the 2006 NASEM study "Toward an Integrated Arctic Observing Network." Dr. Lyons co-authored Enhanced Trace Element Mobilization by Earth's Ice Sheets in Proceedings of the National Academy of Sciences in 2020 related to the impact of climate change on glacier retreat, subsurface hydrology, and the physical and chemical characteristics of the coastal ocean. Dr. Lyons co-authored Groundwater Discharge to the Western Antarctic Coastal Ocean in Polar Research in 2019 related to the impact of ice sheets on biogeochemical cycles of marine systems.

Ted Maksym

Member

Dr. Ted Maksym is an Associate Scientist with Tenure at the Woods Hole Oceanographic Institution. He studies sea ice properties and variability, and its interactions with the climate, ocean, ice-shelves and ecosystems. His work involves a combination of field measurements, satellite remote sensing, and modeling to understand the changing ice cover. He has been at the forefront of the use and development of novel technology to address these problems, including autonomous vehicles and drifting platforms. Dr. Maksym has participated in over a dozen research icebreaker expeditions to both the Arctic and Antarctic, including on seven different icebreakers from four countries, and several Arctic ice camps. His current research interests include the development and implementation of autonomous tools that can explore the Antarctic without the need for expensive logistics. He received a Bachelor's of Science and Engineering from Queen's University in Canada in 1992, and a PhD in Geophysics from the University of Alaska, Fairbanks, in 2001. He was a participant in the National Academies' workshop on Antarctic Sea Ice Variability in the Southern Climate-Ocean System. Dr. Maksym coauthored the article Delivering Sustained, Coordinated and Integrated Observations of the Southern Ocean for Global Impact in *Frontiers of Marine Science* in 2019 related to priorities for future observational technologies. Dr. Maksym was a co-signatory for the article Solve Antarctica's Sea-Ice Puzzle as a comment in *Nature* in 2017 that is related to the capabilities necessary to explain the recent variability in Antarctic sea ice.

Jill Mikucki

Member

Dr. Jill Mikucki is an Associate Professor of Microbiology at the University of Tennessee, Knoxville. She is a polar microbial ecologist who studies ice-covered Antarctic ecosystems. Her research interests include the ecophysiology of microbial extremophiles, microbial interactions and microbial community structure, function and activity across environmental gradients. Her work is highly collaborative and employs a diversity of tools, from remote sensing to isotope geochemistry and culture and molecular microbiology. She has participated in numerous Antarctic field projects including the sampling of Subglacial Lake Whillans and Blood Falls. She received her PhD. in Antarctic Microbial Ecology from Montana State University in 2005, her M.S. from Portland State University, and her B.A. from the University of North Carolina, Wilmington.

Dr. Mikucki is currently a compensated member of New Zealand's Antarctic Science Platform's Independent Science Panel. Dr. Mikucki has served as an uncompensated member (2010-2019) and chair (2020-2022) of the NSF Science Advisory Board to the U.S. Ice Drilling Program (IDP) Office, and co-chair of its Subglacial Access Working Group (SAWG) in 2011. She presented science priorities on behalf of the IDP and SAWG at the Scientific Committee on Antarctic Research (SCAR) First International Ross Sea Region Collaboration and Coordination Workshop in Korea in 2019. Dr. Mikucki has also co-authored several white papers on research priorities for subglacial access and long-range science plan as part of these advisory boards.

Weisen Shen

Member

Dr. Weisen Shen is an Assistant Professor of Geophysics at the Department of Geosciences, Stony Brook University. His research interests are seismic tomography and the seismic, thermal, and compositional structure of the earth's lithosphere. Dr. Shen has published on topics ranging from the geothermal heat flux of the continent to the uplift history of the Transantarctic Mountains. Dr. Shen has participated in fieldtrips to the Ross Ice Shelf and the South Pole to collect seismic data for Ross Ice Shelf and POLENET projects. He is recipient of the Antarctica Service Medal from NSF and the Keitti Aki Early Career Scientist award from AGU. Dr. Shen obtained his PhD of geophysics degree at the Department of Physics, University of Colorado Boulder in 2014, and he was a postdoc research associate at the Department of Earth and Planetary Sciences, Washington University in St Louis between 2015 and 2018.

Andrew F. Thompson

Member

Dr. Andrew Thompson is Professor of Environmental Science and Engineering at the California Institute of Technology and incoming Director of the Linde Center for Global Environmental Science. He is a physical oceanographer focusing on ocean circulation and mixing. He is especially interested in processes that link the ocean to other components of the climate system in polar regions, including the atmosphere, cryosphere and marine ecosystems. His research group combines analysis of observations collected by satellite, ship-based and autonomous platforms with the design of high-resolution processed-based numerical simulations. He has over ten years of experience deploying and piloting ocean gliders in the Southern Ocean. Thompson was awarded AGU's Ocean Science Early Career Award and was named a Packard Fellow for Science and Engineering. He earned his Ph.D. from the Scripps Institution of Oceanography in 2006, his masters degrees from the University of Cambridge in applied mathematics in 2001 and 2002, and his bachelor's degree from Dartmouth College in 2000.

Dr. Thompson was a signatory on a letter sent to the National Science Board, the Director of the National Science Foundation, the White House Office of Science and Technology Policy and other science policy leaders regarding the design of the new U.S. Antarctic polar research vessel. This letter documented what the signatories believed were several key components that were missing from the preliminary vessel design.