An Ocean Infrastructure Strategy for U.S. Ocean Research in 2030

Committee

Eric J. Barron

Chair

Eric J. Barron is the director of the National Center for Atmospheric Research. Prior to this appointment, he was dean of the Jackson School of Geosciences at the University of Texas at Austin. Before joining the University of Texas he served as dean of the College of Earth and Mineral Sciences at Pennsylvania State University. Dr. Barron's research interests are climatology, numerical modeling, and Earth history. During his career, he has worked diligently to promote the intersection of the geological sciences with the atmospheric sciences and the field of earth system science. He has authored or coauthored more than 120 peer-reviewed papers in geology, oceanography, and climate. Dr. Barron chaired the Science Executive Committee for NASA's Earth Observing System and NASA's Earth Science and Applications Advisory Committee. He has also served as chair of the USGCRP Forum on Climate Modeling, the Allocation Panel for the Interagency Climate Simulation Laboratory, the U.S. National Committee for PAGES and the NSF Earth System History Panel. Dr. Barron has served on numerous NRC committees, and was a repeat member of the Board on Atmospheric Sciences, and has also served as chair and co-chair of the board. Dr. Barron is a fellow of GSA, AGU, AMS, and AAAS. In 2002, he was named a fellow of the National Institute for Environmental Science at Cambridge University. In 2003, he received the NASA Distinguished Public Service Medal. He received a B.S. in geology from Florida State University and a M.S. and Ph.D. in oceanography from the University of Miami.

James G. Bellingham

Member

James Bellingham is Chief Technologist at the Monterey Bay Aquarium Research Institute. His personal research interests revolve around the development and use of autonomous underwater vehicles (AUVs). He has spent considerable time at sea, leading more than 20 AUV expeditions in locations such as the Antarctic, North Atlantic, Mediterranean, South Pacific, and the Arctic. At present he is developing a new class of long-endurance AUVs and associated control methodologies for biological process experiments. Dr. Bellingham founded the Autonomous Underwater Vehicle Laboratory at MIT and co- founded Bluefin Robotics Corporation, a leading manufacturer of AUVs for the military, commercial, and scientific markets. Jim presently serves on a number of advisory groups, including the Naval Research Advisory Committee and the Ocean X PRIZE. He has previously served on Deep Submergence Science Committee, numerous NSF and ONR advisory groups, as well as several NRC committees related to oceanography and naval research. His honors and awards include the Lockheed Martin Award for Ocean Science and Engineering, WHOI Steinbach Visiting Scholar, and the Fourteenth MIT Robert Bruce Wallace Lecture. Dr. Bellingham earned his Ph.D. in physics from the Massachusetts Institute of Technology in 1988.

Emmanuel S. Boss

Member

Emmanuel S. Boss is an associate professor at the School of Marine Sciences, University of Maine. He is an aquatic physicist who uses and develop novel sensing techniques to study aquatic biogeochemistry. He has co-authored more than 50 peer-reviewed scientific papers and book chapters. Dr. Boss serves as co-chief-editor of Biogeosciences as well as a member and external advisor to several national and international scientific committees and programs. Dr. Boss received a B.S. in mathematics and physics with minor in atmospheric sciences and a M.S. in oceanography from Hebrew University in Jerusalem, Israel. He then went to the University of Washington to receive a Ph.D. in oceanography.

Edward A. Boyle

Member

Ed Boyle (NAS) is a professor of ocean geochemistry 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. Dr. Boyle obtained some of the first valid data for several trace metals in the ocean (a field that had been plagued for decades by sample contamination and analytical problems). For the past 25 years, he has been tracking the evolution of the anthropogenic Pb transient in the ocean, from its first perceptible rise in the middle of the 19th century (based on sediment and annually-banded coral records) through the decrease due to the phasing out of leaded gasoline. He has also worked on Pb and other anthropogenic trace metals in Greenland ice cores and estuaries. Dr. Boyle discovered that Fe in the deep southwest Pacific derives from distant hydrothermal vents. Additionally, he has shown that Cd in some species of benthic foraminifera tracks the Cd content of the bottom water they grow in, and has applied this finding to sediment cores to trace past changes in ocean deepwater chemistry which are influenced by changing ocean circulation patterns and changes in biogeochemical cycling within the ocean, including mechanisms that influence atmospheric carbon dioxide levels. He was the first to observe a predicted response of deep Atlantic Ocean chemistry to abrupt climate change during the Younger Dryas event 12,900 years ago. Dr. Boyle received a B.A. in chemistry from the University of California, San Diego and a Ph.D. from the MIT/WHOI Joint Program in Oceanography. In 2008, Dr. Boyle was elected as a member of the National Academy of Sciences.

Margo H. Edwards

Member

Margo Edwards is a Senior Research Scientist and former director of the Hawaii Mapping Research Group with the Hawaii Institute of Geophysics and Planetology at the University of Hawaii at Manoa. Her current scientific research focuses on using mapping skills to search for Disposed Military Munitions (DMM) south of Pearl Harbor Hawaii in water depths from 300-550m. Dr. Edwards is part of the Scientific Ice Expedition Science Advisory Committee, a collaborative project between the U.S. Navy and civilian scientists for geological and environmental research in the Arctic Ocean. She has served as the Chair of the UNOLS Arctic Icebreaker Coordinating Committee from 2004-2007 and on the NRC Committee on Designing an Arctic Observing Network. Dr. Edwards earned her Ph.D. in marine geology and geophysics from Columbia University in 1992. Dr. Edwards most recently served on the NRC Committee on Evolution of the National Oceanographic Research Fleet.

Rana A. Fine

Member

Rana Fine is a Professor of Marine and Atmospheric Chemistry at the University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS). Her current research objective is to better understand the role of the oceans in climate change, occurring on time scales of up to decades. She is interested in the physical processes that determine the oceans' capacity to take up atmospheric constituents such as carbon dioxide, especially through air-sea interactions and ocean mixing. She was the Elected President of the Ocean Sciences Section of the American Geophyscial Union from 1996-1998, and served on the WOCE Scientific Steering Committee. Dr. Fine is a former member of the Ocean Studies Board and has served on several NRC committees related to oceanography, and recently served on the OSB Evolution of the National Oceanographic Research Fleet Committee. She is presently chair of the UCAR Board of Trustees. She received her Ph.D. from the University of Miami in 1975.

Kenneth S. Johnson

Member

Kenneth S. Johnson is a senior scientist at the Monterey Bay Aquarium Research Institute. Dr. Johnson was previously affiliated with the Moss Landing Marine Laboratories at San Jose State University. His research interests are focused on the development of new analytical methods for chemicals in seawater and application of these tools to studies of chemical cycling throughout the ocean. These methods have been used in a variety of studies of metal cycling in the ocean, including copper and iron metal speciation and oxidation. He has also developed a variety of sensors and analyzers that operate in situ to depths of 4000 m, which have been used to study chemical species from deep-sea hydrothermal vent systems to nitrate in coastal ponds surrounded by intensive agricultural activities. He is a former chair of UNOLS, and has numerous publications which are accompanied by many honors in his field. Dr. Johnson has served on the NRC Committee on Reference Materials for Ocean Science, the Marine Chemistry Study Panel, and the Committee on Marine Environmental Monitoring. He received B.S. degrees in chemistry and oceanography from the University of Washington, in addition to a Ph.D. in oceanography from Oregon State University.

Deborah S. Kelley

Member

Deborah Kelley is a professor at the University of Washington’s School of Oceanography. She is a marine geologist interested in understanding how submarine volcanoes and hydrothermal processes support life in the absence of sunlight. She also has an interest in how the concentrations and compositions of volcanic gases change as magmas deep within the seafloor cool, and how these gases are transported to the seafloor. Field areas that her work is currently focusing on include the Endeavour Segment of the Juan de Fuca Ridge, the accretionary margin off of Vancouver Island, and the Lost City hydrothermal field at 30°N on the Mid-Atlantic Ridge. Dr. Kelley also develops sensors for interdisciplinary studies of hydrothermal vents. She is the chair of the UNOLS Deep Submergence Science Steering Committee, Co-Chair of the Replacement Oversight Committee for the new Alvin submersible, and has previously served on the RIDGE Executive committee. She is the Project Scientist for the Regional Scale Nodes component of the NSF Ocean Observatories Initiative. Dr. Kelley received both a B.S. and M.S. in geology from the University of Washington, and a Ph.D. in geology from Dalhousie University.

Hauke Kite-Powell

Member

Hauke Kite-Powell is a research specialist at the Marine Policy Center of the Woods Hole Oceanographic Institution. His research focuses on public and private sector management issues for marine resources and the economic activities that depend on them. His current research projects include the policy issues surrounding costs and benefits from improved ocean observing activities; use of ocean space for non-traditional activities, such as wind power; and the economics and management of marine aquaculture operations. Dr. Kite-Powell served on the NRC Committee on Assessment of Technical Issues in the Automated Nautical Chart System., and is currently serving on the Committee on Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drake's Estero, Pt. Reyes National Seashore, California. Dr. Kite-Powell earned his Ph.D. in ocean systems management from the Massachusetts Institute of Technology.

Steven E. Ramberg

Member

Steven Ramberg has over 30 years of experience in conducting and managing naval research and development. He joined Areté Associates in 2007 following a four-year appointment as the Director of the NATO Undersea Research Centre in LaSpezia, Italy, overseeing maritime, mostly undersea, research programs and advising NATO and its 26 member nations on research and technology strategies as well as coordination among national programs and transformation of NATO capabilities. He previously served at the Office of Naval Research starting in 1988 as a Program Manger in ocean engineering and other science and technology topics and then from 2001 to 2003 as Director and Chief Scientist. His tenure at ONR involved management of integrated programs in ocean, atmosphere and space science and technology for the U.S. Navy; oversight of Navy-owned research vessels in the academic fleet; and the inauguration of the National Ocean Partnership Program across 12 federal agencies. His earlier research at the Naval Research Laboratory addressed fluid dynamics of bluff bodies, nonlinear ocean waves, stratified wakes, turbulence near a free surface and related remote sensing topics. This research was published in over 60 unclassified papers during his tenure at NRL.

Daniel L. Rudnick

Member

Daniel L. Rudnick is currently a professor at Scripps Institution of Oceanography. Dr. Rudnick is an observational oceanographer whose research focuses on processes in the upper ocean. Of particular interest are fronts and eddies, air-sea interaction, the stirring and mixing of physical and biological tracers, and the effect of oceanic structure on acoustic propagation. He is keenly interested in observational instrumentation, having been involved in the use and/or development of moorings, towed and underway profilers, and autonomous underwater gliders, and has sailed on over 25 oceanographic cruises, over half as chief scientist. His work has led to over 40 peer-reviewed publications. Dr. Rudnick has served on various panels and committees for NSF, NOAA, and ONR, currently serves on the Ocean Studies Board and has recently chaired an NRC committee (Oceanography in 2025: A Workshop). He earned his Ph.D. in oceanography in 1987 from Scripps Institution of Oceanography, and his B.A. in physics at the University of California, San Diego.

Oscar M. Schofield

Member

Oscar Schofield is a professor at the Institute of Marine and Coastal Science at Rutgers University. His research interests include environmental regulation of primary productivity in aquatic ecosystems, physiological ecology of phytoplankton, hydrological optics, and integrated ocean observatories. He has been an active participant in the LEO-15 monitoring site at the Rutgers Coastal Ocean Observation Lab. He is involved with the Cyberinfrastructure component of the Ocean Observatories Initiative, the Integrated Ocean Observing System, and works with the State of New Jersey on monitoring coastal water quality. Dr. Schofield serves as a member of the American Society of Limnologists and Oceanographers, Phycological Society of America, Oceanography Society, and the American Geophysical Union. He is an author on over 100 peer-reviewed publications. He has been chief scientist for almost a dozen research expeditions in addition to numerous seasonal field expeditions and over 150 one- to two-day expeditions. Dr. Schofield has served on the NRC Committee on Implementation of a Seafloor Observatory Network for Oceanographic Research.

Mario Tamburri

Member

Mario Tamburri is a research associate professor at the Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science and the Executive Director of the Alliance for Coastal Technologies (ACT). His research interests include chemical ecology of aquatic organisms, non-native species, larval settlement and recruitment, and coastal sensor technologies. His current research projects include working with stakeholders in the ocean technology community to transition emerging technologies to operational use rapidly and effectively; maintain a dialogue among technology users, developers, and providers; identify technology needs and novel technologies; document technology performance and potential; and provide the Integrated Ocean Observing System with information required for the deployment of reliable and cost-effective networks. Dr. Tamburri received a B.S. from the University of California, Santa Barbara, a M.S. from University of Alabama, and a Ph.D. from the University of South Carolina in biology and marine science.

Peter H. Wiebe

Member

Peter Wiebe is a scientist emeritus at Woods Hole Oceanographic Institution. His research interests include the quantitative population ecology of zooplankton with emphasis on zooplankton small-scale distribution and abundance, organic matter transport into the deep-sea, the biology of Gulf Stream Rings, zooplankton associated with deep-sea hydrothermal vents, dynamics of populations on Georges Bank and on the continental shelf region of the Western Antarctic Peninsula, acoustical determination of zooplankton biomass, abundance, and size, and the census of holozooplankton biodiversity in the worlds oceans. He works with the Census of Marine Life and U.S. GLOBEC, is involved in instrumentation development to further studies of plankton, and has been a leader in the development and operation of a data management system for biological, physical, and chemical ocean data. He received a B.S. from North Arizona University in zoology and mathematics, and a Ph.D. from the University of California, San Diego in biological oceanography. Dr. Wiebe is a member of the American Association for the Advancement of Science (elected Fellow, May 1984), the American Society for Limnology and Oceanography, Phi Kappa Phi, and the American Geophysical Union. He has served the NRC as a member of the Committee on Undersea Vehicles and National Needs.

Dawn J. Wright

Member

Dawn J. Wright is a professor of geography in the Department of Geosciences at Oregon State University and holds an adjunct professorship in the College of Oceanic and Atmospheric Sciences. She has authored or co-authored more than 85 articles and 5 books on marine geographic information systems, hydrothermal activity and tectonics of mid-ocean ridges, and marine data modeling and cyberinfrastructure. Dr. Wright has participated in over 20 oceanographic research expeditions worldwide, including 10 legs of the Ocean Drilling Program and 3 dives in the Alvin submersible. Her research currently focuses on coastal/ocean cyberinfrastructure, geographic information science, benthic terrain and habitat characterization, and the processing and interpretation of high- resolution bathymetry and underwater videography/photography. Dr. Wright was a member of the NRC OSB/Board on Earth Sciences and Resources (BESR) Committee on National Needs in Coastal Mapping and Charting, and currently serves on the BESR Committee on Strategic Directions for the Geographical Sciences in the Next Decade, as well as the BESR Standing Committee on Geophysical and Environmental Data. She currently serves on the NRC Ocean Studies Board. Dr. Wright's awards include an NSF CAREER award, a Fulbright to Ireland, the Raymond C. Smith Distinguished Alumni Award from the University of California at Santa Barbara, and the Oregon State University Honors College Professor of the Year award. In 2007 she was named U.S. Professor of the Year for the state of Oregon by the Carnegie Foundation for the Advancement of Teaching and the Council for the Advancement and Support of Education. She earned an individual interdisciplinary Ph.D. in physical geography and marine geology from the University of California at Santa Barbara.