On behalf of the Consortium for Ocean Leadership, I appreciate the opportunity to discuss the
FY15 federal science budget for the National Science Foundation (NSF), the National Oceanic
and Atmospheric Administration (NOAA) and the National Aeronautics and Space
Administration (NASA). Ocean Leadership represents 90 of the nation’s leading oceanographic
research and education institutions and also manages several ocean research and education
programs in the areas of scientific ocean drilling, ocean observing, oil spills, and ocean
partnerships. We respectfully request $7.5 billion for the NSF; $1.9 billion for Earth Sciences at
NASA; and $5.6 billion for NOAA.

As Congress prioritizes federal investments in the face of constrained budgets, it is important to
recognize and maintain support for basic research as a core federal responsibility. Increasing this
investment is a priority given the shift to a science and technology based economy whose
foundation is built on scientific advances, both within specific disciplines as well as across
disciplines. The U.S. dominance in S&T is being challenged by accelerated investment by other
nations, as evidenced by Battelle’s recent R&D Global Forecast, which states: “At the current
rates of growth and investment, China’s total funding of R&D is expected to surpass that of the
U.S. by about 2022.”

The Role of Ocean Science
Recent hypotheses suggest that the extreme weather events we have had this past year may be
attributable to a persistent shift in the jet stream due to a rapidly melting polar region as well as a
warmer North Pacific Ocean. If this is the case, ice storms in Mobile, Alabama or monsoon-like
rain events in Boulder, Colorado, may become more frequent, along with their significant
economic costs. Unfortunately, as the demand for more and better data and information to
understand ocean and atmospheric trends increases, we are instead losing our capabilities to
collect data at sea and from space to build more capable and accurate long-term forecasts. For
instance, the inability to service the buoys comprising the TAO Array (Tropical Atmosphere
Ocean project in the equatorial Pacific) has resulted in a degradation of the data return rate to just
40 percent capacity from an optimally operating system. This situation greatly reduces our
ability to accurately forecast El Niño and La Niña strengths and thus risks proper preparation to
deal with episodes of droughts and flooding.

1 Battelle and R&D Magazine, December 2013.
http://www.battelle.org/docs/tpp/2014_global_rd_funding_forecast.pdf?sfvrsn=4
2 El Niño monitoring system in failure mode, US budget woes cripple a key mooring array in the tropical
monitoring-system-in-failure-mode-1.14582
Given that the ocean absorbs, stores and transfers most of the heat (and a high percentage of the carbon) on our planet, the ability to understand, forecast and prepare for extreme weather events requires investments in basic research to better understand air-ice-sea interactions as well as observations of the physical environment from space, land and sea. Without this basic knowledge and prediction capabilities on regional and seasonal scales, we are essentially flying blind in terms of managing resources (e.g. agriculture, fisheries, fresh water) and protecting public health. There are many major natural threats facing our nation and significant challenges ahead in understanding, forecasting and mitigating them, all of which require significant financial resources. We believe that our appropriations requests would enable our nation to maintain the assets and capabilities necessary to better understand the physical, chemical, geological and biological changes to the natural environment and use this information to help Congress, state and local governments, businesses and private individuals make informed and fiscally responsible economic and national security, public health and safety, and resource management decisions.

**NSF Basic Research**
The National Science Foundation (NSF) is our top funding priority as it is the premier federal agency tasked with supporting basic research, which underpins all future scientific advances. As you know, NSF is the only federal agency with the mission of supporting basic research, and has been a primary force in providing support for discoveries that have driven our nation’s economy through innovation. Historically, Congress has appropriated top line numbers for the agency and has refrained from directing the course of the agency’s research agenda or setting science or infrastructure priorities for the agency. We hope that this policy will continue so the Foundation can continue to make decisions based on the highest quality peer reviewed science, rather than politics.

Given the tremendous recent impact that natural hazards have had on our nation’s economy and public welfare, we believe that investing in the geosciences is critical to advance our knowledge of the physical world, while social and behavioral sciences can improve our ability to understand and communicate key scientific findings and risks to the public and policymakers, who must deal with a rapidly changing planet. We hope that NSF can continue to fund the best minds in the nation through competitive research grants, while mission agencies such as NOAA and NASA can support applied research and observational requirements to ensure our nation has the intellectual capacity to develop and deal with the next generation of challenges. Thus, we request that Congress appropriate $140 million in additional funding for the “Research and Related Accounts” to at least match anticipated inflationary costs, but preferably above this level to maintain a positive trajectory enhancing NSF capacity to support its research mission.

**NOAA Research and Observations**
The National Oceanic and Atmospheric Administration (NOAA) requires timely, accurate, and sensitive observations of the planet to meet its many missions and mandates. Given the austere budget environment, we believe that NOAA can better accomplish its scientific requirements in a more effective way through partnerships with the extramural academic and industrial communities, rather than relying solely on their own internal scientific capability. The majority of scientific research expertise in areas such as climate, ocean acidification, ocean exploration,
instrument development, data dissemination and fisheries management resides in the academic and industrial sectors. A greater commitment to extramural competitive peer-review grant opportunities to answer the key questions necessary to assess trends, make forecasts, and manage resources in a changing environment would improve efficiency and extend NOAA’s access to the best minds in the nation.

We remain concerned about the nation’s earth observing satellite programs and the ability to maintain continuity of long-term data sets. We encourage NOAA to follow the NESDIS Independent Review Team’s (IRT) recommendations for procurement models for missions beyond J2 that will not only reduce costs but also mitigate against data gaps. Implementing all the missions as an integrated program could save the agency tens of millions of dollars. These savings could help address other needs, such as recapitalization of the oceanographic fleet to help service the TAO Array, or supporting a more robust ocean exploration program. Ultimately, we need the polar observing system to be more resilient and more capable, which requires a more integrated approach to weather and climate research, monitoring and modeling. Moving NOAA’s climate sensors to NASA without the resources to support their construction and operation defeats this purpose. Consequently, we hope you will continue your close oversight of the federal Earth observing programs to help ensure that satellite missions can be cost-efficient, reliable, and effective.

Of course, the ocean also impacts life beyond weather, climate and extreme events. The Deepwater Horizon oil spill was a tragedy with loss of life, economic impacts and long-term ecological implications for the Gulf region. The fact that it took so long to identify and track the location of the massive subsurface oil plume in the water column or forecast its trajectory highlights the significant shortcomings of the existing ocean and coastal observing systems. Consequently, we need to make sure that we are better prepared for the next spill, especially given offshore oil exploration in the Arctic and now proposed for the Atlantic coast. Ideally, there should be significant coordination between NOAA and the National Academies of Sciences (NAS) with regards to the use of criminal and civil settlement funds and fines. We have a unique opportunity to build a sustainable ocean and coastal observing system that will better enable the Gulf region to identify and prepare for future problems, such as oil spills, red tides, and hypoxic events, while also better managing their marine living resources. I hope this opportunity is not lost given the significant funds that will flow into the region.

We are disheartened by the Administration’s extremely low funding request for NOAA’s Education programs, including the elimination of the competitive program, which in the past has supported successful initiatives such as the National Ocean Sciences Bowl (NOSB). For the last sixteen years, NOSB has exposed 26,000 students to a field of study not commonly offered in high school, which enhances student understanding of all major areas of science, technology, engineering and mathematics. We greatly appreciate your historical support for education programs at the mission agencies, and we hope that the Administration will take a more transparent and deliberative planned approach to improving our nation’s STEM education programs in the future.
NASA Earth Science Research and Missions
We are very concerned with the Administration’s proposal to cut Earth Science funding at the National Aeronautics and Space Administration’s (NASA), particularly at a time when NASA is supporting several new Earth observing missions as well as providing unprecedented access to their archives of Earth data. NASA has been responsive to the 2007 “Decadal Survey,” but a flat budget, as well as increased mission responsibilities, has delayed many critical missions. While we support NASA taking on additional responsibilities for developing climate sensors from NOAA, we believe that this obligation should be accompanied with adequate financial resources. NASA has shown itself to be an effective partner with other agencies, such as with the USGS and their Landsat-8 mission, and with NOAA and the NPP-Suomi satellite. Moreover, its Venture class missions are providing flight opportunities for the next generation of scientists and engineers. We also support two NASA satellite missions, Surface Water Ocean Topography (SWOT) and Pre-Aerosol, Clouds, and ocean Ecosystem (PACE), which are particularly important to the oceans community and are tentatively scheduled for launch by 2020. NASA supports the only truly global view of the Earth, so it is critical to support its Earth science missions and research at a time when we see such unprecedented change to the physical environment of our planet.

Mr. Chairman and members of the Subcommittee, I greatly appreciate the opportunity to share our recommendations, and I encourage you to continue your long-standing bipartisan support for science funding in the FY15 budget and into the future.

Below is a list of the institutions that are represented by the Consortium for Ocean Leadership.

**Alabama**
- Dauphin Island Sea Lab

**Alaska**
- University of Alaska Fairbanks
- Alaska Ocean Observing System
- North Pacific Research Board

**California**
- Bodega Marine Lab
- Monterey Bay Aquarium Research Institute
- Moss Landing Marine Laboratory
- Naval Postgraduate School
- Stanford University
- University of California, Santa Barbara
- University of California, Santa Cruz
- University of California, San Diego (Scripps Institution of Oceanography)
- University of Southern California
- Aquarium of the Pacific
- Hubbs-SeaWorld Research Institute
- Romberg Tiburon Center for Environmental Studies
- Esri
- L-3 MariPro, Inc.
- Liquid Robotics, Inc.
- Teledyne RD Instruments

**Colorado**
- Cooperative Institute for Research in Environmental Sciences

**Connecticut**
- University of Connecticut
- Mystic Aquarium & Institute for Exploration

**Delaware**
- University of Delaware
- Mid-Atlantic Regional Association Coastal Ocean Observing System

**Florida**
- Florida State University
- Harbor Branch Oceanographic Institute at FAU
- University of Florida
- University of Miami
• University of South Florida
• Earth2Ocean, Inc.
• Florida Institute of Oceanography
• Nova Southeastern University

Georgia
• Skidaway Institute of Oceanography of the University of Georgia
• Savannah State University

Hawaii
• University of Hawaii

Illinois
• John G. Shedd Aquarium

Louisiana
• Louisiana Universities Marine Consortium
• Louisiana State University

Maine
• Bigelow Laboratory for Ocean Sciences
• University of Maine
• The IOOS Association

Maryland
• University of Maryland Center for Environmental Science
• Johns Hopkins University
• Marine Technology Society
• National Aquarium

Massachusetts
• Massachusetts Institute of Technology
• University of Massachusetts, Dartmouth
• University of Massachusetts, Lowell
• Woods Hole Oceanographic Institution
• Battelle

Michigan
• University of Michigan

Mississippi
• Mississippi State University
• University of Mississippi
• University of Southern Mississippi

Nebraska
• University of Nebraska, Lincoln

New Hampshire
• University of New Hampshire

New Jersey
• Rutgers University

New York
• Columbia University (LDEO)
• Stony Brook University

North Carolina
• Duke University Marine Laboratory
• East Carolina University
• University of North Carolina, Chapel Hill
• University of North Carolina, Wilmington
• North Carolina State University

Oregon
• Oregon State University

Pennsylvania
• Pennsylvania State University

Rhode Island
• University of Rhode Island

South Carolina
• Belle W. Baruch Institute for Marine and Coastal Sciences
• South Carolina Sea Grant Consortium

Texas
• Harte Research Institute
• Texas A&M University
• University of Texas, Austin
• Fugro
• Sonardyne, Inc.

Virginia
• College of William and Mary (VIMS)
• Old Dominion University
• CNA
• Institute for Global Environmental Strategies
• U.S. Arctic Research Commission
• CARIS, USA
• SAIC

Washington
• University of Washington
• Sea-Bird Scientific

Washington, DC
• Southeastern Universities Research Association

Wisconsin
• University of Wisconsin-Milwaukee Great Lakes WATER Institute

Australia
• Institute for Marine and Antarctic Studies (IMAS) at the University of Tasmania

Bermuda
• Bermuda Institute of Ocean Sciences (BIOS)

Canada
• Dalhousie University
• University of Victoria