On behalf of the Consortium for Ocean Leadership, I appreciate the opportunity to discuss the FY14 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 97 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. Given that our nation suffered a record 99 disasters last year – nearly all of them caused by extreme weather, including Super Storm Sandy – we clearly need to sustain and improve our prediction capabilities to prepare for and mitigate the impacts of future extreme events. Consequently, we respectfully request $6.3 billion for the NSF Research and Related Accounts; $1.9 billion for Earth Sciences at NASA; and FY10 levels for extramural research and education programs at NOAA.

**NSF Basic Research**

Our nation’s economic, social and security prospects are reliant upon science and technology to innovate solutions and develop products and services for a rapidly changing world. However, federal funding of research in the physical sciences fell by 54% between 1970 and 1995. Furthermore, society increasingly expects and demands immediate satisfaction and results, which has led to a preference for applied research at the expense of basic research. While applied research is essential, particularly for mission agencies such as NOAA and NASA, basic research at NSF is paramount for ensuring our nation has the intellectual capacity to develop and deal with the next generation of technology needs and challenges. Consequently, we feel the erosion of funding for core basic research programs is short-sighted and is akin to a farmer selling his seed corn. We must find better places to achieve budget savings, as the economic future of our nation is directly related to our investment in basic research.

**Ocean and Coastal Observations**

Super Storm Sandy was the 11th billion-dollar weather-related disaster in 2012. Taking more than 100 lives and leaving more than $50 billion in property damages, Sandy’s impact on the local environment and communities will be felt for many years. As ocean waters warm and the Gulf Stream slows (due to additional freshwater influx from rapid glacial melt), we expect more significant flooding events along the heavily populated East Coast. The extent of this problem is difficult to accurately quantify as there is a desperate need for better understanding of glacial/ice sheet melt, ice/sea dynamics, and monitoring the extent of freshwater exiting the Arctic to decipher its impact on ocean circulation patterns. Furthermore, the key to better predicting the strength of hurricanes lies in determining the amount of heat in the subsurface ocean – which can only be detected by in-situ measurements. As we gain better prediction, modeling, mapping and computing capabilities, local resource managers require access to improved risk assessment information regarding the physical and socioeconomic vulnerabilities to sea-level rise, saltwater...
intrusion and extreme events to develop and protect resilient and sustainable infrastructure systems, such as roads, railways, drinking water/sewage systems and electrical grids. We greatly appreciate the commitment the Committee made this year to begin addressing these needs in the Hurricane Sandy Supplemental Appropriations Bill, and we hope additional support for research and operational ocean and coastal observing systems in NOAA, NASA and NSF can be achieved through the annual appropriations process.

**Arctic Science**
The Arctic Ocean is of great strategic importance to the nation as it contains tremendous natural resources, is a future trade route, and is a critical driver of the global climate system. The loss of Arctic sea ice will dramatically impact commerce and the national economy through increased access to the Arctic’s valuable living and nonliving resources as well as the opening of the Northwest Passage and Northern Sea Route for shipping. An enduring integrated Arctic observing system is essential to monitor air-sea-ice interactions and changing ecosystems and their impacts on marine life and human livelihoods. To succeed, we need to develop and utilize new, autonomous systems and platforms capable of working in harsh environments. The unforgiving Arctic environment also means there will be greater risks associated with oil and gas development; thus requiring research and modeling of oil in and under ice-covered waters as well as evaluating dispersants in Arctic conditions. The lack of natural biota to degrade oil, the presence of ice and the lack of at-sea and shoreline facilities equates to a tremendous challenge should an Arctic spill occur.

**Earth Observing Satellites**
According to a National Research Council report, the status of the U.S. Earth observing satellite systems “is at great risk.” We cannot afford to move forward with a blind eye given changing climate patterns, rising sea-levels and more frequent and intense storms threatening millions of citizens and billions of dollars in infrastructure. However, we desperately need to improve the efficiency and effectiveness of the design, procurement and operation of our Earth observing assets and ensure that technical requirements are managed in accordance with realistic budgets. We also need to develop the technology to support the next generation of satellite constellations that is less expensive and less risky. Finally, we should be aggressively pursuing opportunities to partner with other nations to share data so that we do not have to bear the full cost of these systems.

**Science Education**
The interdisciplinary nature of oceanography (physics, biology, geology, chemistry, engineering and computational science) requires dedicated training opportunities for the next generation of physical scientists. We believe that the mission agencies should continue to have a significant role in education and training as they are part of the scientific community and in the best position to anticipate the impending technical and scientific challenges facing the next generation of scientists. Furthermore, the passion for the field and subject matter in the mission agencies translates exceptionally well to environmental literacy programs, which are needed more now than ever given that half of U.S. adults do not know how long it takes for the Earth to revolve around the sun.
America is blessed to be a nation surrounded by ocean, which provides a tremendous amount of economic, security and social benefits to Americans living along our coasts as well as those in the interior. We are truly an ocean nation with more than 95% of the nation’s commerce traveling through American ports, more than $100 billion in annual seafood sales and 1.7 million jobs in coastal tourism and recreation. Furthermore, over $8 trillion worth of oil and gas reserves lay below the oceans, and above them are terawatts of untapped wind and hydrokinetic resources. Current and anticipated changes in ocean chemistry, productivity and sea level will have tremendous regional and national economic impacts. The academic research community is fully-equipped to help develop efficient and effective solutions to enhance our economy and maintain our status as the world’s leader in research and innovation.

Mr. Chairman and members of the Subcommittee, I encourage you to continue your long-standing bi-partisan support for science funding in the FY14 budget and into the future.