

**TESTIMONY OF
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**BEFORE THE
COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION
SUBCOMMITTEE ON GLOBAL CLIMATE CHANGE AND IMPACTS
UNITED STATES SENATE**

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Good morning, Senator Vitter, Senator Lautenberg and members of the Subcommittee. I am James R. Mahoney, Assistant Secretary of Commerce and Deputy Administrator of the National Oceanic and Atmospheric Administration (NOAA). I am also appearing today in my capacity as Director of the federal interagency Climate Change Science Program (CCSP). I am very pleased to have this opportunity to describe the progress of the Administration's climate science program as well as the NOAA Climate Program and its contribution to CCSP.

U.S. Climate Change Science Program

President George W. Bush recognizes climate change to be an important issue for the United States to address. On May 11, 2001, the Administration commissioned the National Academies¹ – National Research Council (NRC) to examine the state of our knowledge and understanding of climate change science. Based on the resulting NRC report and the Administration's ongoing climate science planning activity, President Bush created a new cabinet-level management committee (the Committee on Climate Change Science and Technology Integration) in February 2002, to supervise the approximately \$5 billion annual investment in climate change science and technology. The President's direction resulted in the creation of the U.S. Climate Change Science Program (CCSP), combining the existing U.S. Global Change Research Program (USGCRP) and the Climate Change Research Initiative (CCRI), as well as the creation of the Climate Change Technology Program (CCTP). President Bush furthered these efforts at the recent G8 Summit in Scotland, where the U.S. committed to grow economies, aid development and improve the environment through technological innovation to achieve the combined goals of addressing climate change, reducing harmful air pollution and improving energy security.

The Climate Change Science Program integrates federal research on global change and climate change, as sponsored by thirteen federal agencies (the National Science Foundation (NSF), the Department of Commerce, the Department of Energy (DOE), the Environmental Protection Agency (EPA), the National Aeronautics and Space Administration (NASA), the Department of State, the Department of Interior, the

¹ Formerly known as the National Academy of Sciences.

Department of Agriculture, Health and Human Services, the Department of Transportation, the Department of Defense, U.S. Agency for International Development, and the Smithsonian Institution), and with liaisons in the Office of Science and Technology Policy, the Council on Environmental Quality, the National Economic Council and the Office of Management and Budget.

We know that the surface of the Earth is warmer, and that an increase in greenhouse gases caused by humans is contributing to the problem. Research conducted through CCSP is deepening our understanding of the interplay of natural and human-caused forces. CCSP is charged with investigating natural and human-induced changes in the Earth's global environmental system; monitoring important climate parameters; predicting global change; and providing a sound scientific basis for national and international decision-making.

Since CCSP was created, the program has successfully integrated a wide range of research, climate science priorities and budgets of the thirteen CCSP agencies. With an approximately \$2 billion annual expenditure, CCSP has taken on the most challenging questions in climate science and is developing products to convey the most advanced state of knowledge to be used by federal, state and local decision makers, resource managers, the science community, the media, and the general public. We have identified several methods to address these challenges. I briefly describe the steps we have already taken, the scientific advances we have achieved, and our future directions.

Inventory of Research Programs: A comprehensive interagency inventory of climate and global change research programs was initiated in May 2002 and has been updated annually since then. This essential stocktaking exercise (the first conducted in several years) enhanced coordination, efficiency, and effectiveness of the entire research effort. All CCSP agencies participated in this inventory.

CCSP Strategic Plan: In July 2003, CCSP released its *Strategic Plan for the U.S. Climate Change Science Program*, the first comprehensive update of a national plan for climate and global change research since the original U.S. Global Change Research Program strategy was issued at the inception of the program in 1990.

We took several steps to ensure that the Plan received extensive public input and scientific review. The Administration released a *CCSP Discussion Draft Strategic Plan* for public review in November 2002. The *Discussion Draft* outlined a comprehensive, collaborative approach for developing a deeper understanding of climate change and its potential impacts. It was guided by the priority information needs identified by scientists and stakeholders, both nationally and internationally.

External comments, obtained through several mechanisms, played an important role in revising the draft plan. First, CCSP held a workshop in December 2002 that was attended by 1,300 scientists and other participants, including individuals from 47 states and 36 nations. This workshop was designed to facilitate extensive discussion and comments on the draft plan. In addition, written comments on the *Discussion Draft* were

submitted during a public review period, and amounted to nearly 900 pages of input. Last, CCSP commissioned a special committee of the NRC to review the plan. The NRC conveyed its comments and recommendations on the *Discussion Draft* in a February 2003 report.

After consideration of the extensive external input and internal interagency review process, the (revised) *Strategic Plan for the U.S. Climate Change Science Program* was released in July 2003. In February 2004, the NRC review committee issued a second public report, *Implementing Climate and Global Change Research: A Review of the Final U.S. Climate Change Science Program Strategic Plan*. This NRC report expressed the committee's conclusions on the content, objectivity, quality, and comprehensiveness of the updated Strategic Plan, on the process used to produce the Plan, and on the proposed process for developing subsequent findings to be reported by the CCSP. The following quote is taken from the Executive Summary of the 2004 NRC report:

“The Strategic Plan for the U.S. Climate Change Science Program articulates a guiding vision, is appropriately ambitious, and is broad in scope. It encompasses activities related to areas of long-standing importance, together with new or enhanced cross-disciplinary efforts. It appropriately plans for close integration with the complementary Climate Change Technology Program. The CCSP has responded constructively to the National Academies review and other community input in revising the strategic plan. In fact, the approaches taken by the CCSP to receive and respond to comments from a large and broad group of scientists and stakeholders, including a two-stage independent review of the plan, set a high standard for government research programs. As a result, the revised strategic plan is much improved over its November 2002 draft, and now includes the elements of a strategic management framework that could permit it to effectively guide research on climate and associated global changes over the next decades. Advancing science on all fronts identified by the program will be of vital importance to the nation.”

We have frequently noted that the CCSP Strategic Plan is a living document and we look forward to continued dialogue with Congress, the NRC, the scientific community, and the public throughout the implementation of the Plan, as the science evolves and priorities change over time.

Annual Program Report, *Our Changing Planet*: *Our Changing Planet* is an annual report of the CCSP. This program report is issued as a Supplement to the President's Fiscal Year budgets and submitted to Congress pursuant to a requirement of the 1990 Global Change Research Act. The document is intended to provide summaries and related budget data of ongoing CCSP-supported climate change work.

CCSP Assessment Information to Support Decision-Making: The CCSP Strategic Plan identified three broad types of deliverables to be produced in support of enhanced policy development and decision-making by national and regional government officials, resource managers, planners, and the scientific community.

- 1) Synthesis and Assessment Products: Twenty-one Synthesis and Assessment Products are identified in the Strategic Plan. These reports are designed to address a full range of scientific questions and evaluate options for responses that are of greatest relevance to decision and policy makers and planners. These products are intended to provide the best possible state of scientific information, developed by a diverse group of climate experts, for the decision community. In response to an April 14, 2005 Government Accountability Office (GAO) report, Congressional inquiries, and our own internal assessment, on July 15 we presented to this Committee and other interested Members, a revision of the schedule and scope of the Synthesis and Assessment Products. We look forward to further dialogue with you on these important issues.
- 2) Adaptive management and planning for resources and infrastructure: “Adaptive management decisions” are operational decisions, principally for managing infrastructure (e.g., waste water treatment systems), natural and managed resources (e.g., water supply, agriculture), and societal response mechanisms (e.g., health alerts). They typically occur within existing frameworks (e.g., legal, institutional, economic), usually recurring on annual or shorter time scales. “Planning” focuses on these and additional sectors (e.g., urban or regional planning), typically involving development of infrastructure and institutions with long lifetimes (several decades or more), and with decision processes over long timescales (years to decades). CCSP research results, data products, forecasts, and model results are already being applied to adaptive management and planning in a number of regional and sectoral case studies. Specific examples include climate observations and projections for crop management, water quality management, and urban planning, as well as integrated products illustrating snowpack, precipitation, streamflow, and the potential for drought conditions.
- 3) Support for policy making: As described in the Strategic Plan, CCSP is focusing on two objectives in the area of support for policy makers: (1) developing scientific syntheses and analytical frameworks to support integrated evaluations, and (2) initially conducting a limited number of case studies with evaluation of the lessons learned, to guide future analyses. Integrated analysis of climate change is essential for bringing together research from many contributing disciplines and applying it to gain comparative insight into policy-related questions. Full integration of information including research on human activities, greenhouse gas and aerosol emissions, land-use and land-cover change, cycling of carbon and other nutrients, climatic responses, and impacts on people, the economy, and resources is necessary for analyses of many important questions about the potential economic and environmental implications of changing greenhouse gas concentrations and various technology portfolios. Specific examples of this type of work under CCSP include the DOE Integrated Assessment of Climate Change Research Program that sponsors research to develop comprehensive benefit/cost models for use in assessing the implications of potential climate change policies. NOAA, EPA, and NSF sponsor additional studies to improve aspects of such models and to allow for the application of the models to address particular questions.

Scientific Advancements: CCSP has supported a highly integrated array of Earth system observations as well as a broad set of new scientific information. A large bibliography of new peer-reviewed scientific studies reflecting the advances in climate change detection, attribution, and projection, described below, will be reported in the upcoming edition of *Our Changing Planet*, and these studies will be reflected in the relevant CCSP Synthesis and Assessment Products.

Detection: CCSP-sponsored observational and scientific studies have more completely characterized the nature of observed increase in surface temperatures, and have significantly advanced our understanding of observed variability in ocean salinity and heat content. CCSP research has also investigated changes in the global distributions of snowfall and snowpack and natural fluctuations in ocean circulation that influence the transport of heat and energy around the globe.

Building on the CCSP observations and monitoring strategy identified in its Strategic Plan, the U.S. government has taken several steps towards establishing a comprehensive, coordinated, and sustained Earth observation system since hosting the inaugural Earth Observation Summit in June 2003. CCSP agencies have provided leadership, definition, and support for the Earth Observation meetings and are closely integrating the U.S. observation and data management programs with the international programs launched by this effort. At the most recent meeting, the Earth Observation Summit III in Brussels, a ten-year Implementation Plan for the Global Earth Observation System of Systems (GEOSS) was adopted, and the 60-member intergovernmental Group on Earth Observations was established to begin implementation of the 2-, 6-, and 10- year targets identified in the plan. The U.S. contribution to GEOSS is the Integrated Earth Observation System (IEOS). In April 2005, the U.S. Government Committee on Environment and Natural Resources (CENR) released the *Strategic Plan for the U.S. Integrated Earth Observation System* that addresses the policy, technical, fiscal, and societal benefit components of this integrated system, and established the U.S. Group on Earth Observation (USGEO), a subcommittee of the National Science and Technology Council Committee on Environment and Natural Resources.

Attribution: CCSP research also works to establish and understand the most likely causes for climate change, with special emphasis on distinguishing between natural variability and human-induced effects. Recent advances in attribution research include the use of additional variables in climate models (e.g., salinity, runoff, and regional-scale attribution) to obtain more insight on the origin of the climate signals and trends, as well as expansion of climate models to include improved representation of aerosols (airborne fine particles) and variability in solar energy output. These climate models, which have been produced for CCSP, include improved representations of physical processes and increased resolution to effort to enhance our climate modeling capabilities.

Projection: Through climate projections, CCSP attempts to present scientifically justifiable illustrations of the future climate and its potential impacts upon key elements

of the Earth system. We are working in conjunction with the Climate Change Technology Program (CCTP) to update greenhouse gas emissions scenarios that incorporate improved socio-economic data and consider expanded use of emerging technological options. These scenarios are being used with a new generation of climate models to develop improved climate projections for consideration by decision-makers.

Expanded CCSP/NRC Advisory Contract: CCSP has recently expanded its contract with the NRC to incorporate important new elements of NRC advice to the program. The enhanced NRC advisory assignment involves three areas:

- 1) Overall NRC advice on the CCSP research program on a continuing basis over the next three years, involving an NRC committee with wide areas of expertise;
- 2) A comparative evaluation of relevant previous climate change assessments conducted around the world, to provide background information for the assessments being prepared by CCSP in compliance with the GCRA; and
- 3) Designated support from two existing committees of the NRC that are well positioned to support CCSP with expertise in areas central to CCSP's core responsibilities, the Climate Research Committee and the Committee on the Human Dimensions of Global Change.

The Administration has endorsed the scope of the expanded contract to ensure that CCSP receives independent and credible scientific advice, as CCSP continues to implement its Strategic Plan.

Climate Change Science Program Workshop: *Climate Science in Support of Decision-Making:* CCSP will hold a public workshop November 14-16, 2005, in Arlington, VA. The CCSP Workshop will address the capability of climate science to inform decision-making and will serve as a forum to address the progress and future plans regarding CCSP's three decision-support deliverables as described above. The Workshop will provide an opportunity for scientists and user communities to discuss needs and future application of scientific information on climate variability and change, as well as discussion on expected outcomes of CCSP's research and assessment activities that are necessary for sound resource management, adaptive planning and policy.

NOAA Climate Program

NOAA is responsible for developing and making accessible climate information products and services for near-term issues such as drought management and long-term issues such as potential effects of climate change on managed and natural ecosystems. As a mission agency, NOAA has a direct responsibility to provide climate information, products, and services that enable us to understand and respond to changing climate conditions.

The NOAA Climate Program goals are aligned with the CCSP goals outlined in the CCSP Strategic Plan. Climate is one of NOAA's four mission goals; it is designed to

produce two outcomes. First, a predictive understanding of the global climate system on time scales of weeks to decades with quantified uncertainties sufficient for making informed and reasoned decisions; and second, a climate-literate public effectively incorporating NOAA's climate products into their plans and decisions. These outcomes are achieved through the following programs that are described in our FY 2006 Budget:

- **The Climate and Global Change (CGC)** program goal is to establish a national information service based on reliable assessments and quantitative predictions of changing global climate in partnership with the university community. CGC will help NOAA provide high-quality predictions and assessments to the public and private sectors, other Federal and state agencies, and the international community. The near-term objective is to provide reliable predictions of global climate changes, both natural and human-induced, and their associated human effects on time scales ranging from seasons to that of a century or more. The Climate and Global Change Program is an important part of CCSP. Activities include atmospheric composition, carbon cycle, physical climate research, analysis of the climate record, climate predictions on time scales of seasonal, interannual, and decadal, and regional integrated sciences and assessments.
- **The Climate Observations and Services (COS)** program supports the development of the information and insights needed to help reduce impacts to the Nation from climate variations and change. We do this by monitoring the Earth's climate system, delivering data, developing predictions and impact assessments, and continuing performance-enhancing research. This is an integrated, multi-line organization activity within NOAA and involves the Office of Oceanic and Atmospheric Research, National Environmental Satellite, Data, and Information Service, and the National Weather Service. The program involves an important transition of research observing and data systems into operational systems and products. NOAA activities supporting the Climate Change Research Initiative (CCRI) are also administered under the Climate Observations and Services program. Activities under this program include atmospheric and ocean observations, data assimilation and data management, transition of the Tropical Atmospheric Ocean (TAO) buoy array from research to operations, and assessments of climate change and variability (*i.e.*, Stratospheric Ozone, Intergovernmental Panel on Climate Change, and CCSP Synthesis and Assessment Products). NOAA is leading the production of seven of the 21 CCSP Synthesis and Assessment Products called for in the CCSP Strategic Plan, and is contributing to eleven others.
- **The Arctic Research Program (ARP)** is coordinated with other U.S. government agencies through the Study of Environmental Arctic Change (SEARCH) program. The specific role of the ARP is long-term climate observations and analysis of Arctic climate data. ARP continues to focus on key aspects of the Arctic climate system. The information provided will improve forecasts of temperature, precipitation, and storms across Alaska and the mainland United States. This information will also support improvements in forecasting and planning for energy needs, growth seasons,

hazardous storm seasons and water resources, as well as provide for better management of Alaskan and Arctic resources.

- **Partnership Programs** cover a wide range of activities with a multitude of external research partners. These partnerships extend to other parts of NOAA; other Federal, state, and local government entities; international government programs; universities; and industry.

Recent Highlights of the NOAA Climate Program

NOAA is Detecting and Forecasting El Niño Conditions: NOAA's Tropical Atmosphere Ocean (TAO) array provided the observational backbone for detecting and forecasting evolving El Niño conditions in 2004. TAO array buoys, along with complementary buoys maintained by Japan in the western Pacific, are used to track the evolution of subsurface ocean warming that typically precedes the full-blown development of El Niño. In 2004, the buoys detected a weakening of the trade winds and warming surface ocean temperatures. These data, which are available to operational weather forecasting centers and climate researchers around the world, led to NOAA's recent declaration of a weak El Niño currently forming in the tropical Pacific.

NOAA Leads Implementation of a National Integrated Drought Information System (NIDIS): In a letter to the President on August 30, 2004, the Western Governor's Association recommended a team led by NOAA begin implementation of the National Integrated Drought Information System (NIDIS). NOAA is coordinating with stakeholders, states, and federal agencies to implement NIDIS. NIDIS goals include fostering and supporting research, creating an early drought warning system, providing interactive delivery systems, providing a framework for interacting with and educating decision makers and the public, and developing an understanding of the impacts and data needs at the local level.

NOAA Implemented International Climate/Air Quality Field Study: NOAA is helping to lead and implement a multi-agency air quality and climate study performed under the auspices of the International Consortium for Atmospheric Research on Transport and Transformation (ICARTT), which was initiated in New England in summer of 2004 (New England Air Quality - Intercontinental Transport and Chemical Transformation Study). Colleagues from five nations are engaged in the endeavor, which extended from the western U.S. to continental Europe. This research is addressing significant information gaps and delivering sound science that will improve the understanding of the long-distance transport processes that influence the air pollution levels that impact the population centers such as the New England region.

NOAA Contributes to Increased Understanding of Regional Weather and Climate Patterns: NOAA successfully completed the North American Monsoon Experiment (NAME) 2004 field campaign in collaboration with other U.S., Mexican and Central American agencies and academic institutions. NAME 2004 provided an unprecedented collection of detailed atmospheric, oceanic, and land-surface observations in the core

region of the North American Monsoon over northwest Mexico, southwest U.S., and adjacent oceanic regions. It documented the evolution of the monsoon convection and precipitation and helped to outline the key physical processes that must be parameterized for improved simulations and predictions with climate models.

NOAA Implements an Operational Critical Climate Forecast System: In August 2004, a global ocean and atmosphere coupled Climate Forecast System (CFS) became operational at the National Centers for Environmental Prediction of the National Weather Service. The Climate Forecast System is a fully coupled model representing the interactions between the Earth's oceans and atmosphere. These interactions are critical for determining climate on seasonal time scales. This implementation is a recent example of a successful transition of research into operations through long-term, ongoing collaborative efforts by NOAA scientists, other Federal Agencies (NASA, NSF), and the university research community.

NOAA Supports Development of Urban Climate Planning Website: NOAA has supported the development of the Climate Change Information Resource for the New York Metropolitan Area (CCIR-NY), a website (<http://ccir.ciesin.columbia.edu/nyc>) that includes information tools developed for decision-makers and those interested in planning for climate in an urban environment. Users of CCIR-NY include city, municipal, and county planners; natural resource managers; transportation managers; water managers; waste managers; educators and citizens. In addition to providing basic information about climate in the NYC area, the website serves as a forum for users to share expertise and information related to climate change and variability in the NY metropolitan area. The website is serving as an international model for the development of similar web tools in Tokyo and London.

NOAA Contributes to Operational Seasonal Wildland Fire Outlooks: In FY 2003, NOAA helped to support the first operational annual nationwide fire assessment workshop, bringing together climatologists, predictive service meteorologists, fire analysts, and wildland fire managers from state and federal agencies across 11 geographic area coordination centers. The result was to begin production of climate-informed, regional- and national-scale seasonal fire potential outlooks for the United States. A sustained commitment from NOAA and the Department of Commerce has resulted in the development of innovative methods for combining scientific expertise with regional and local knowledge to produce unique, stakeholder-driven decision support products. Through the National Interagency Fire Center, it is now possible for managers to access interactive geographic and national-level fire outlook maps over daily to seasonal time frames. As NOAA expands its vision of providing operational climate services, this approach will serve as a model for additional climate applications, such as drought outlooks, air-quality predictions, improved land-use planning, and crop-yield forecasts.

NOAA Deploys Ocean Climate Observing Systems: NOAA is working with international partners to establish and maintain a sustained Global Ocean Observing System (GOOS, a program of the International Oceanographic Commission) necessary

for long-term monitoring of the climate system and improved climate projections. NOAA provides a major U.S. contribution to the global component of the U.S. Integrated Ocean Observing System (IOOS), integral to the U.S. Integrated Earth Observing System (IEOS) and the Global Earth Observation System of Systems (GEOSS). NOAA's contribution to the observing system consists of various buoy networks, profiling floats (Argo), tide gauges, surface drifting buoys, tropical moored buoys, ocean reference stations) and ship observations (ships of opportunity, routine oceanographic surveys, air-sea flux studies). GOOS will be 51% complete by the end of FY 2005.

NOAA Advances Seasonal-to-Interannual Prediction Capabilities: Due to our advanced observing systems (TOGA/TAO and satellites) as well as over ten years of research and operational innovation, NOAA has recently developed the capability to make skillful U.S. winter forecasts associated with strong El Niño or La Niña conditions. We also have improved the accuracy of our forecasts of the level of Atlantic and Gulf seasonal hurricane activity. Major challenges remain for warm season prediction, especially of precipitation, as well as cold season prediction in the absence of a strong El Niño or La Niña. To meet these challenges, we are expanding observations to the Indian Ocean with international partners; developing predictions of the southwest monsoon over North America; and transferring information to resource managers to prepare for extreme weather events, fisheries impacts, and management of water resources.

NOAA Provides Weather and Climate Products to the FEWS Network: The International Weather and Climate Monitoring Project at NOAA's Climate Prediction Center is an extension of an earlier USAID Famine Early Warning System (FEWS) program that originally covered only Sub-Saharan Africa. The project has now grown to encompass all of Africa, Afghanistan, Central America and the Caribbean, the Mekong River Basin, and much of southern Asia. Work is underway to create a global weather and climate monitoring program to address any international region where humanitarian support is needed. The goal of the program is to provide weather and climate related information to users within USAID as well as international partner organizations, such that a greater level of humanitarian assistance may be offered. The goal is only accomplished through constant interaction with our partner groups such as the USGS, NASA, USAID, private sector contractors and local African organizations. A more thorough and accurate analysis of conditions is possible via these collaborations.

NOAA Supports RANET: The RADio and InterNET for the Communication of Hydro-Meteorological Information for Rural Development (RANET) program is an international collaboration with based funding from USAID and NOAA to make weather and seasonal information available to remote populations in developing countries in Africa, Asia, and the Pacific. To achieve its mission, the program works to improve the basic communication and dissemination capacities of National Hydro-Meteorological Services (NHMSs) and related national agencies. The RANET program addresses its core objectives by applying technologies that can bridge and extend existing dissemination networks, by providing technical training, developing and using unique applications of technology, and nurturing an overall community-based dialogue on issues related to weather and the environment. As a testament to RANET's sustainable design, several of

the recipient national meteorological services have dedicated personnel and resources to their own RANET efforts. In keeping with recent language from the G8 action plan on climate and energy, RANET exemplifies strategies that seek to further scientific capacity in pursuit of larger social, environmental, and economic objectives in ways that are truly consistent with local and regional realities.

NOAA Climate Program Budget for FY 2006

The NOAA Climate Program is requesting \$239.9 million in FY 2006, reflecting a net increase of \$19.6M over the FY 2006 base level. This increase includes \$10.6M for the high priority Climate Change Research Initiative (CCRI); \$7.4M to reactivate activities requested under Climate Observations and Services (COS) in the FY 2005 President's Budget; and \$1.6M to restore funding requested in FY 2005 for other ongoing climate activities.

This increase responds to the long-term observational requirements of climate predictions and assessments. Funding to reactivate COS activities will ensure continuation of climate observing networks, such as the highly regarded Climate Reference Network (CRN) and NOAA's Baseline Observatories. NOAA will be able to ensure critical monitoring of long-term trends in important climate variables and to improve forecasting capabilities and applications development over timescales from weeks to seasons.

These programs serve as a foundation for NOAA's participation in CCSP by funding important research and key observations and thereby reducing uncertainties in climate change science. These increases also support the objective in the Department of Commerce Strategic Plan to "Advance understanding and predict changes in the Earth's environment to meet America's economic, social, and environmental needs." In addition, these increases will support the research and production of CCSP Synthesis and Assessment Products.

NOAA will continue building and maintaining a global ocean observing system; initiate a new five-year effort to better understand of how aerosols influence climate by their interaction with clouds; expand the Tropical Atmospheric Ocean (TAO) buoy array into the Indian Ocean; conduct new studies to better explain the causes for observed climate variability and change; and continue expanding and refining regional integrated research and outreach.

Thank you, Mr. Chairman and members of the committee. I look forward to the opportunity to respond to any questions you may have.