

**Testimony Regarding the FY09 Budget Request
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Subcommittee on Science, State, Justice, and Commerce, and Related Agencies
Committee on Appropriations, U.S. House of Representatives

I submit this written testimony for the record of the U.S. House of Representatives Committee on Appropriations, Subcommittee on Science, State, Justice and Commerce, and Related Agencies. My name is Richard Anthes and I am the President of the University Corporation for Atmospheric Research (UCAR). UCAR is a 71-university member consortium that manages and operates the National Center for Atmospheric Research (NCAR) and additional programs that support and extend the country's scientific research and education capabilities.

I am also immediate past President of the American Meteorological Society and was co-chairman with Dr. Berrien Moore of the first ever National Research Council "decadal survey" that established priorities in Earth observations from space for NASA, NOAA and USGS. Our Committee's vision is represented by the following declaration:

"Understanding the complex, changing planet on which we live, how it supports life, and how human activities affect its ability to do so in the future is one of the greatest intellectual challenges facing humanity. It is also one of the most important challenges for society as it seeks to achieve prosperity, health, and sustainability."

As detailed in the committee's final report, *Earth Science and Applications from Space*, and as we are reminded on almost a daily basis, the world faces significant and profound environmental challenges: shortages of clean and accessible freshwater, degradation of terrestrial and aquatic ecosystems, global air pollution, declines in fisheries, devastating floods and droughts, and above all the accelerating pace of substantial changes in climate. These changes are not isolated; they interact with each other and with natural variability in complex manners that affect local, regional, and global scales in unpredictable ways. Addressing these societal challenges requires that we confront key scientific questions related to ice sheets and sea level change; large-scale and persistent shifts in precipitation, droughts, and water availability; transcontinental air pollution; and impacts of climate change on ecosystems, human health, and occurrence of extreme events such as hurricanes.

Yet at a time when the need has never been greater, we are faced with decreasing investments in real terms for NSF, NASA and NOAA, which are key agencies that are needed to provide the necessary observations, science, prediction models, and information that policy- and decision-makers want and need to respond effectively to imminent short-term threats from weather hazards and to plan and prepare for the long-term future of the United States as we move into an uncharted climate. It is essential to meet both the short- and long-term challenges that the nation support Earth sciences and applications in NSF, NASA and NOAA. **I support the FY09 request of \$6.84 billion for NSF at a minimum, \$4.583 billion for NASA's Science Mission Directorate, and \$4.5 billion for NOAA overall.**

The atmospheric and Earth sciences community is concerned about the final outcome for basic research in many areas of the FY08 Consolidated Appropriations Act. We appreciate the difficult choices Appropriators were forced to make regarding FY08 appropriations, but the negative consequences of not investing now in science that contributes to our economy, standard of living, and safety and security, will only multiply in the future as global competitors invest on a broader scale than ever before. We appreciate Congress' support for the enactment last year of the America COMPETES Act and urge the Appropriations Committee to follow through with FY09 funding for NSF, NASA, and NOAA that reflects the concern demonstrated in that legislation for the health of this country's scientific programs.

National Science Foundation (NSF)

While we have lost a year with nearly flat NSF funding for FY08, this critical science agency can get back on track to planned accelerated research levels by receiving appropriated funds at the level of the authorized amount of \$7.32 billion in the America COMPETES ACT. This would provide a return on investment that would benefit citizens in additional research funded for the short and long term health of the country. ***I urge the Members to support the President's overall FY09 request of at least \$6.84 billion for the National Science Foundation and, within NSF, the request of \$5.59 billion at least for Research and Related Activities (R&RA), the heart of NSF's scientific enterprise.***

Geosciences Directorate (GEO). In this most critical moment for the health of our planet and the future of life as we know it, the geosciences contribute knowledge that is absolutely necessary to understanding climate, weather, the dynamics of water resources, solar effects on Earth, space weather, the interactions of Earth's systems, energy resources, geologic hazards, and all aspects of the global oceans. The economic effects are substantial, with estimates of the component of the U.S. economy exposed to risks associated with weather and climate variability alone reaching \$3 trillion annually. While we support the increase for NSF's GEO Directorate in the FY09 budget request, we urge the Committee to once again reiterate, as it did last year, that all disciplines of science, including the geosciences, should be considered integral to the American Competitiveness Initiative and urge even stronger increases to include GEO on the "doubling track." ***I urge the Members to support the President's FY09 request of \$848.67 million, at a minimum, for the Geosciences Directorate, and within GEO, to provide the President's request of \$240.8 million at least for the Atmospheric Sciences Division which provides resources for the atmospheric sciences community that are critical to the physical safety of our citizens, our economic health, and global issues of national security such as***

severe weather hazards, climate change, the security of our communications infrastructure, and the environmental health of the planet.

Office of Cyberinfrastructure (OCI). As stated in the FY09 request, OCI “supports research, development, acquisition and operation of advanced shared and connecting infrastructure that enables otherwise unrealizable advances in 21st century science and engineering research and education.” The modeling of the Earth’s atmosphere is one of these “otherwise unrealizable advances.” ***I urge the Members to support the FY09 request of \$220.08 million, an 18.8 percent increase over FY08 that recognizes cyberinfrastructure’s key role in this nation’s scientific global competitiveness.***

National Aeronautics and Space Administration (NASA)

NASA’s Science Mission Directorate (SMD) has a central role in understanding our planet, that is realized especially through the Earth Science account. Yet despite increasing policy-driven demand for information and analysis the funding in this area is not keeping up with needed support for observing systems and research. I appreciate the Administration’s focus on Earth Science in the FY09 request, particularly in the context of the cuts that other areas have received in this account. But NASA’s overall role in this country’s scientific endeavor is so strategic and central to our well being that SMD should be one of this nation’s highest priorities. ***I urge the Members to increase the Science Mission Directorate funding levels to at least \$4.583 billion, \$142 million above the FY09 request and sufficient to keep pace with 3 percent inflation.***

With climate change accelerating more rapidly than expected, there are few NASA responsibilities more important than monitoring the Earth’s environment. Within NASA’s SMD account, Earth Science does relatively well with a 6.8 percent increase. Even so, the Earth Science funding request of \$1.367 billion will fall short of the recommendations of the National Research Council (NRC) report, *Earth and Science Applications from Space: National Imperatives for the Next Decade and Beyond*, otherwise known as the Decadal Survey. **Out year funding, as planned now, absolutely falls short.** It is encouraging to see the Decadal Survey being used as a benchmark for the order and timing of missions. However, falling behind schedule increases the risk of losing continuity in important observational data, which presents serious calibration issues even if replacement sensors are eventually launched. ***I urge the Members to plan for needed future investments to get back on track to implement the Decadal Survey recommendations. The FY09 request includes out-year funding of approximately \$1.3 billion annually, versus the Decadal Survey estimated funding requirement of over \$2 billion annually.***

NASA’s SMD programs that are in progress and others that are yet to be implemented will enable us to mitigate some of the property damage and prevent some of the deaths caused by severe weather and help us to mitigate, understand, and cope with the inevitable effects of natural and human-induced climate change. SMD “space weather” programs, part of the Living with a Star Program, will also protect space vehicles, astronauts, and satellites from the devastating radiation of solar storms. These programs are critical to the health of our economy, to the health of the Earth, and to our national security. Once again, ***I urge the Members to protect the vibrant NASA science accounts and missions, current and planned, that make possible the study of our own planet and the environment that sustains life on Earth.***

National Oceanic and Atmospheric Administration (NOAA)

As stated in the Friends of NOAA Coalition letter of 12 March 2008, "Assuming an annual inflationary rate of 3 percent, and using FY05 as a baseline, the agency's budget would need to be \$4.4 billion in FY09 just to remain level in constant dollars." It is obviously impossible for NOAA to keep up with expanding responsibilities while its budget effectively shrinks. The atmospheric sciences community appreciates the Administration's request of \$4.1 billion for FY09, but this increase of 5.5 percent over FY08 will primarily augment the satellite programs while others are diminished. The America COMPETES Act, signed into law last August, states that NOAA "shall be a full participant in any interagency effort to promote innovation and economic competitiveness through near-term and long-term basic scientific research and development and the promotion of science, technology, engineering, and mathematics education consistent with the agency mission, including authorized activities." NOAA has the potential to make much greater contributions, but the agency is struggling. There simply must be a better balance between NOAA's infrastructure, operations, and research funding, as well as effective management and organizational structure at all levels, for this agency to accomplish its mission.

I urge the Members to support an appropriation of at least \$4.5 billion for NOAA in FY09 – a level recommended by the Senate for the past three fiscal years and endorsed by the multi-sector Friends of NOAA Coalition and Weather Coalition -- and to do so while maintaining vital support for other portions of the Subcommittee's research and development portfolio.

While this amount is not sufficient to meet all of NOAA's current obligations well, it would at least begin to alleviate the pressures that have built up over many years and set a more realistic (although still inadequate) base on which to organize and mobilize this agency to meet current and future obligations that are of sufficient importance to the health of this nation that they warrant the Committee's full attention.

Office of Oceanic and Atmospheric Research (OAR). Within OAR's Competitive Research Program request of \$134.7 million, a small increase will support several climate and weather data related activities of great importance to the country and enable OAR to work more effectively with, and leverage from, the enormous base of expertise in the academic community. Within OAR Weather and Air Quality Research, the potentially substantial role of Unmanned Aircraft Systems in filling very serious observational gaps will be examined, and hurricane forecast improvement will be pursued. The FY09 request moves the US Weather Research Program from the National Weather Service back to OAR. This chronically underfunded program will fund THORpex, a multi-year international field experiment to improve two to ten-day forecasts, as well as experimental hurricane forecasting work. ***I urge the Members to support the FY09 request of \$372.2 million (Operations, Research and Facilities -- ORF) for the Office of Oceanic and Atmospheric Research.***

National Weather Service (NWS). Within NWS, we fully support the FY09 requested program change highlights including support for weather data buoys to enhance hurricane and severe storm observations, the effort to develop enhanced fire weather modeling capability, and additional water vapor sensors that contribute to improved weather aviation services within the Integrated Upper Air Observing System. ***I urge the Members to support the FY09 request of \$930.7 million for the NWS.***

National Environmental Satellite, Data and Information Service (NESDIS). NESDIS receives an absolutely necessary increase for the geostationary satellite series, GOES-R. Any further delay or decrease in funding will cause additional program costs as well as interruption to the overall continuity of GOES comprehensive data coverage including atmospheric, oceanic, climatic, and solar observations. This would cause severe problems for the nation's weather forecasts and warnings, climatologic analysis and prediction, ecosystems management, and safe and efficient public and private transportation. The FY09 request cuts funding for the tri-agency National Polar-orbiting Operational Environmental Satellite (NPOESS) program, which we understand is a result of restructuring. We are extremely concerned about out-year funding for this critical program, but are pleased with the reinstatement of the development of two NPOESS climate sensors that were previously de-manifested, the Clouds and the Earth's Radiant Energy System (CERES) sensor and the Total Solar Irradiance Sensor (TSIS).

Of additional concern is the nearly flat funding for NESDIS Data Centers. If the country is truly committed to renewing *and capitalizing on* its investment in Earth-observing systems, it must also invest in accessing, archiving and assessing the data gathered from these systems. The weather and climate community is concerned also that the President's request fails to begin initial planning for the CLARREO and GPSRO missions, as recommended in the NRC Decadal Survey. CLARREO and GPSRO provide critical measurements of Earth's and the sun's radiation, which are critical for climate, and temperature, water vapor, and electron density profiles for weather, climate, and space weather.

I urge the Members to consider the NESDIS Procurement, Acquisition and Construction (PAC) account FY09 request level of \$1.24 billion to be the base level for this line office; to examine the erosion of funding for the NESDIS Data Centers and appropriate for them an inflationary increase; to press the agency to begin planning for the CLARREO and GPSRO missions; and to continue to pursue solutions to this nation's critical Earth observing program, the infrastructural satellite component of which is going to cause NOAA's core programs to be undercut severely if additional resources or restructuring are not provided.

National Ocean Service (NOS). Ocean data are of great importance to the work of the atmospheric sciences community. Of particular interest are the efforts within NOS to manage hydrographic datasets more effectively and efficiently (Ping to Chart Infrastructure Streamlining), as well as the implementation *as it was originally conceived*, of the Integrated Ocean Observing System (IOOS). There is great concern that years of report recommendations have not been heeded and that the original concept of a "system of systems" providing information on the current and future state of the oceans, informed by competitive research grants to provide the technologies and understanding required to build and improve a scientifically sound system, has been abandoned. ***I urge the Members to support data gathering efforts within the National Ocean Service, but to ensure that a competitive grants program be fully funded for the Integrated Ocean Observing System so that this valuable program may be appropriately structured to meet its societal goals.***

I sincerely thank the members of the Committee for your stewardship of the nation's scientific enterprise and your understanding that the future strength of the nation depends on the investments we make in science and technology today.