

**Testimony Regarding Fiscal Year 2013 Funding for
Federal Science and Technology Programs
Submitted 16 March 2012 to the
Subcommittee on Commerce, Justice, Science and Related Agencies
Committee on Appropriations, United States House of Representatives**
by
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On behalf of the University Corporation for Atmospheric Research (UCAR), I submit this written testimony to the House Appropriations Subcommittee on Commerce, Justice, Science and Related Agencies for the Committee record. UCAR is a consortium of over 100 research institutions, including 77 doctoral-degree granting universities, which manages and operates the National Center for Atmospheric Research (NCAR) on behalf of the National Science Foundation. **I urge the Subcommittee to support the following levels of science funding in the Fiscal Year 2013 Commerce, Justice, Science and Related Agencies Appropriations Act**

- **National Science Foundation (NSF)** – At least \$7.373 billion, including \$106.6 million for the Nation Center for Atmospheric Research within the Geosciences Directorate.
- **National Aeronautics and Space Administration (NASA)** – \$5.073 billion for Science, and within this mission directorate, \$1.785 billion for Earth Science, including \$440.1 million for Earth Science Research, and \$647.0 million for Heliophysics.
- **National Oceanic and Atmospheric Administration (NOAA)** – \$5.008 billion, including \$413.8 million for the Office of Oceanic and Atmospheric Research (OAR), \$212.7 million for the OAR Climate Research line, and \$991.9 million for the National Weather Service (NWS).

Countless economic studies over the years have demonstrated the link between federally-funded scientific R&D and economic vitality, industry and job growth, productivity, competitiveness, and innovation. Our nation is facing significant economic challenge at the same time as foreign investments in research and technology development are surging. Preserving and strengthening our nation's scientific talent and investments in scientific research is both prudent and necessary. Even in this difficult economic environment, we must maintain a balance of basic research elements including the scientific workforce; data collection, analysis and storage; computing; and facilities. As I describe below, I am concerned that the President's Budget Request for FY13 represents some imbalance within the science agencies.

Basic federally-supported atmospheric sciences research is becoming more critical to the well-being of U.S. citizens and the overall health of the nation. A trend of escalating weather- and climate-related disasters per annum, and associated escalating costs in lives and dollars, is now emerging. According to experts in the federal government and reinsurance industry, 2011 will prove to be the most costly year on record for weather and climate related disasters in this country, with the estimated total economic damage now exceeding \$45 billion. Recent early tornado activity that devastated areas of the southeast portends another serious coping challenge in 2012. These are just a few reasons supporting the need for ongoing and sustained investment in the scientific activities at NSF, NASA and NOAA. I appreciate the opportunity to comment in more detail on the budget requests for these agencies.

National Science Foundation (NSF)

I urge you to support the President's FY13 request of \$7.373 billion for NSF. NSF's mission is to support basic research which is the basis for two key drivers of our economy -- technology development and innovation. Increasing the NSF budget leads to discoveries that keep this country economically competitive, develop new avenues for job creation, and contribute to national security. According to the NSF budget request, "In a given year, NSF awards reach nearly 1,900 colleges, universities, and other public and private institutions in 50 states, the District of Columbia, and Puerto Rico. In FY 2013, NSF support is expected to reach approximately 285,000 researchers, postdoctoral fellows, trainees, teachers, and students." As illustrated by these numbers, NSF is indispensable to the health and resiliency of our nation's scientific R&D enterprise.

National Center for Atmospheric Research. NSF's Geosciences Directorate (GEO) supports a broad and diverse academic field that contributes to our understanding of long term weather, extreme weather, dynamics of water resources, effects of the Sun on the Earth, effects of space weather on global communications, interactions of the Earth's systems, energy resources, geologic hazards, and all aspects of the global oceans. UCAR endorses the President's FY13 request of \$906.4 million for NSF's GEO Directorate.

However, I do have concerns within the GEO budget request that I would like to address, namely the proposed budget for the National Center for Atmospheric Research (NCAR). In recent years, NSF has created constructive, cross-cutting initiatives meant to address issues of importance to the nation, such as sustainability. I do not question the merit of these efforts, nor of the programs that have come about through the cross-Foundation investments in sustainability science. However, investment in these sweeping activities have unfortunately come at the expense of established NSF programs and centers, many which complement the new initiatives, even when the overall NSF budget has been growing. Given federal budget pressures, this promises to undercut some of the basic, critical programs that NSF provides the nation, including NCAR, an NSF Federally Funded Research and Development Center (FFRDC) that expands the capacity of the nation's academic community to understand weather, the composition of the atmosphere, Sun-Earth interactions, space weather, and the interactions between oceans and atmosphere.

Further, while NSF, GEO, and the Division of Atmospheric and Geospace Sciences (AGS) in which NCAR resides, all show increases in the budget request for 2013, primarily to fund ongoing growth in the sustainability research portfolio, NCAR's proposed budget is decreased by 6.4 percent compared to the FY 2012 estimate. The budget request language states, "This level of support protects the operation of the NCAR/Wyoming Supercomputer Center (NWSC), completed on time and within budget, and maintains support for other key community research infrastructure operated by NCAR." However, NCAR encompasses an integrated and well leveraged combination of both science and facilities. Continuing full support for this infrastructure, including the added costs of operating the NWSC, while absorbing a cut to the NCAR budget of over \$6 million, will place NCAR's basic science research programs, some of the best in the world, in jeopardy. Cutting the laboratory would be counterproductive to the

potential productivity of the NWSC, given the computing center's reliance on NCAR modeling and scientific expertise. With a balanced NCAR portfolio of science and facilities, NWSC operations will advance many fold critical weather and climate research contributions to address the societal needs of our nation

We estimate that real cuts, when all expenses are tallied, would amount to decreases to NCAR's scientific research on the order of 11 to 13 percent. Simply to maintain programs and infrastructure, NCAR would need an increase over the FY12 appropriated amount. **I urge the Committee to support funding of \$106.6 million for the National Center for Atmospheric Research within GEO's Division of Atmospheric and Geospace Sciences, and further, to direct the agency to maintain ongoing support for NCAR at sustainable levels in future budgets, including the financing of the NWSC operating costs, without reducing the NCAR base funding as an offset.**

National Aeronautics and Space Administration (NASA) – Science Mission Directorate

The research supported and data collected by NASA's Science Mission Directorate are essential to atmospheric sciences research and global Earth observations. Through the use of space observatories, satellites, and other probes, NASA helps us achieve a deeper understanding of Earth, including answers to how the Earth's long-term weather patterns may be changing. **I urge the Subcommittee to fund the Science Mission Directorate at \$5.073 billion, the amount appropriated in FY12 and a level of funding that would help to keep on track future missions that are now threatened with delay.**

Earth Science. Despite the unfortunate loss of the Glory satellite mission in early 2011, the last year was relatively successful with the launch of three key Earth Science missions: Aquarius, Juno, and GRAIL. The new Pathfinder Venture Class program remains on track with both selected missions and future competitions. The Orbiting Carbon Observatory 2 (OCO-2) is moving forward with an expected 2013 launch date. Given the promise of these observatories, I am pleased that the President's budget request proposes to increase funding for these and other Earth System Science Pathfinder missions in FY 2013.

The National Academy of Sciences decadal survey, *Earth and Science Applications from Space: National Imperatives for the Next Decade and Beyond*, released in 2007, continues to provide a critical set of recommendations of the most compelling needs in future Earth observations. Ice, Cloud and Land Elevation Satellite-2 (ICESat-2) and Soil Moisture Active-Passive (SMAP) are Tier 1 (top priority) decadal survey missions funded within the Earth Systematic Missions line office. Expected to launch in 2016 and 2014, respectively, the FY13 request keeps these important missions on schedule. However, other important missions recommended by the decadal survey are threatened with delays that jeopardize their future. Given the importance of these measurements to scientists, state and city planners, first responders, and governors, the nation must not allow any further delay in the deployment of these resources needed for our states and localities to wisely and appropriately adapt in the decades to come. **I urge you to fund the President's request of \$1.785 billion for Earth Science in FY13.**

While the FY 2013 Budget Request provides funding to keep many important Earth Science missions on track, it also proposes a \$6.5 million cut to **Earth Science Research** that is critical to translating missions into discoveries and new knowledge. At least 90 percent of the funds of this program are competitively awarded to investigators in academia, the private sector, laboratories, and other academic centers to utilize NASA data to further our understanding of Earth processes. A \$6.5 million cut portends the loss of ongoing research projects and critical grant money for atmospheric scientists at national universities and NCAR. **I urge you to restore funding for Earth Science Research to \$440.1 million, the amount appropriated in FY 2012.**

Heliophysics. With all of human civilization located in the extended atmosphere of the Sun, heliophysics, a sister field to the atmospheric sciences, is a critical discipline for understanding Sun/Earth connections. This research allows us to analyze the connections between the Sun, solar wind, and planetary space environments. NASA's Heliophysics division enables NCAR to serve the solar-terrestrial physics community through delivery of community models for the upper atmosphere, instrumentation for space and balloon flights, and solar and upper-atmospheric data from space and balloon missions. We are pleased to see that Heliophysics missions in development remain on track and that research within this division receives a slight increase. **I urge you to fund Heliophysics at the requested \$647.0 million.**

National Oceanic and Atmospheric Administration (NOAA)

All Americans benefit from the life-saving warnings produced by the National Weather Service (NWS), whether its forecasts for tornadoes, hurricanes, flooding, blizzards, ice storms, or heavy snow. What many Americans do not understand is the research behind producing accurate forecasts. Satellite and ground observations collect data around the clock on real-time conditions. Computer models are run continuously to produce projections and predictions as weather systems develop. Research collaborations with the nation's leading universities and the private sector produce improved data analysis, enhanced forecasting capabilities, and technology development. Free and open access to forecasts and weather data enable broadcast meteorologists and others to reach citizens, local governments, and resource managers with critical information.

The sum of the parts, when all are supported appropriately in a balanced manner, adds up to saved lives, protected property, enhanced homeland security, and benefits to the economy. Yet NOAA's budget is one of the least balanced of the scientific agencies. NOAA is roughly a \$5 billion agency, with nearly \$2 billion dedicated to satellite programs. While the data and observations that stem from NOAA's satellite systems are absolutely critical, for the reasons already stated, the UCAR community continues to be concerned with NOAA's investment in satellite programs that, because of longstanding cost overruns and mismanagement, have placed a squeeze on other parts of the agency, particularly the research accounts. NOAA is taking steps to improve this issue, but the outlook for NOAA's budget over the next several years is bleak since resources will continue to be poured into programs like the Joint Polar-orbiting Satellite System (JPSS). These satellite observing systems, all located within NOAA's National Environmental Satellite, Data, and Information Service (NESDIS), will produce data that are absolutely essential to the nation's weather, space weather, and climate forecasting capabilities. But they cause an imbalance to NOAA's budget that threatens to torque NOAA's mission and

products. **I urge you to support the requested FY13 amount of \$5.008 billion for NOAA, but to consider increasing that amount to restore the balance to NOAA programs that will make it possible for the agency to provide the best scientific and operational products.**

Office of Oceanic and Atmospheric Research (OAR). In FY11, the appropriated amount for OAR was \$416.6 million. For FY13, the President requests a total of \$403.4 million, taking the office back almost to the 2009 level. While it may appear that OAR receives a healthy 7.7 percent proposed increase for FY13, FY12 cuts were much deeper than this increase. **I urge you to fund OAR at the requested \$413.8 million (ORF and PAC combined), recognizing that additional investment is needed to restore recent funding cuts to OAR that have resulted in the termination and downsizing of many important NOAA research programs.**

One example of such FY12 cuts at OAR is the **Climate Competitive Research, Sustained Observations, and Regional Information** program, which funds extramural research that leverages NOAA programs and provides some of the needed program balance to its portfolio. States rely upon the climate, weather and water outlooks developed under this program to develop seasonal and yearly management plans for water, agriculture, energy and fisheries. In addition to these critical regional outlooks, this account funds global ocean observing programs essential for accurate weather forecasting and satellite calibration and validation, which are required to reap full use of the billions invested in satellite observations. **I urge you to fund OAR's Climate Research portfolio at the requested \$212.7 million, and to fund the President's request of \$146.3 million for Climate Competitive Research, Sustained Observations, and Regional Information.**

National Weather Service (NWS). As noted earlier, NWS is a 24/7 operation, and is this nation's sole authoritative source for issuing warnings and forecasts related to weather, severe weather, and long term weather trends. To continue providing these critical services to the country, NWS must have as much information about weather conditions as possible. The less information, the less accurate the forecast will be. Yet, the FY13 request seems to cut multiple data gathering programs. One important example is the **NOAA Profiler Network**, a network of observing instruments scheduled to cover the country, but discontinued except for three units in Alaska. This system could have provided essential information about the development of severe storms – a service that, in the wake of recent tornado disasters, seems a good investment. Again, the loss of data gathering capabilities creates a serious imbalance to NWS activity.

Within NWS, we are extremely pleased with the progress being made by the **Hurricane Forecast Improvement Program (HFIP)** that promises great improvement in the reliability of hurricane forecasts. HFIP computing resources have been proposed for cuts in FY13. Given the great promise of HFIP to save lives and property, I ask that that computing resource be restored. **I urge you to fund NWS at the requested level of \$991.9 million (ORF and PAC combined) and to consider a higher level so that restoration of essential observing and computing facilities may be achieved.**

Thank you for your service to our nation's scientific enterprise and for the opportunity to express these views on behalf of the geosciences community.