15

Weather and Climate in the FY 2015 Budget

Paul A.T. Higgins and Shalini Mohleji,
American Meteorological Society

HIGHLIGHTS

– The National Oceanic and Atmospheric Administration (NOAA) requests $462 million for the Office of Oceanic and Atmospheric Research (up 8.3 percent), $2.3 billion for the National Environmental Satellite, Data, and Information Service (up 7.9 percent), $1.1 billion for the National Weather Service (down 0.4 percent), and $519 million for the National Ocean Service (up 4.2 percent).

– The National Aeronautics and Space Administration (NASA) requests $1.8 billion in base funding for Earth Sciences (down 3.1 percent) plus $886 million from the Opportunity, Growth, and Security Initiative. Earth Sciences would receive $450 million for Earth Science Research (up 6.4 percent), $36 million for Applied Sciences (up 11.7 percent), $266 million for Earth System Science Pathfinder (up 50.6 percent), and $786 million for Earth Systematic Missions (down 3.7 percent).

– The National Science Foundation (NSF) request for weather and climate related-research is largely unchanged this year. $1.3 billion would go to Geosciences (up 0.1 percent), with Atmospheric and Geospace Sciences receiving $241 million (up 0.4 percent), Ocean Sciences receiving $357 million (unchanged) and Polar Programs $435 million (unchanged). NSF's Science, Engineering, and Education for Sustainability would receive $139 million (down 14.1 percent).

– The U.S. Global Change Research Program (USGCRP), which coordinates and integrates research over 13 Executive Branch departments and agencies, would receive $2.5 billion (up 0.5 percent).

Table 1. Weather and Climate-related R&D in the Federal Budget
(budget authority in millions of dollars)

	FY2013	FY2014	**FY2015**	Change FY 14-15	
	Actual	Estimate	**Budget**	Amount	Percent
National Oceanic & Atmos Admin*	4,748	5,323	**5,497**	174	3.3
Oceanic & Atmos Research	369	427	**462**	35	8.3
R&D	336	388	**425**	37	9.5
Nat. Env. Satellite, Data & Info Svc	1,865	2,083	**2,248**	165	7.9
R&D	25	26	**26**	0	0.0
National Weather Service	954	1,067	**1,063**	-4	-0.4
R&D	24	33	**19**	-14	-42.4
National Ocean Service	468	499	**519**	21	4.2
R&D	62	73	**75**	2	2.7
NASA	16,865	17,647	**17,460**	-187	-1.1
Earth Science	1,659	1,826	**1,770**	-56	-3.1
*Earth Science Research**	423	n/a	**450**	27	6.4
*Applied Sciences**	33	n/a	**36**	4	11.7
*Earth Systematic Missions**	816	n/a	**786**	-30	-3.7
*Earth System Science Pathfinder**	177	n/a	**266**	89	50.6
Opportunity, Growth, and Security Init	0	0	**886**	886	n/a
National Science Foundation					
Geosciences	1,274	1,303	**1,304**	1	0.1
Atmos & Geospace Sciences	245	250	**251**	1	0.4
Earth Sciences	174	178	**178**	0	0.0
Integr. & Collab. Edu & Research	85	84	**84**	0	0.0
Ocean Sciences	344	357	**357**	0	0.0
Polar Programs	426	435	**435**	0	0.0
Science, Eng, & Edu for Sustainability	184	162	**139**	-23	-14.1
Department of Energy					
Office of Science	4,681	5,066	**5,111**	45	0.9
Bio and Environmental Research	561	610	**628**	18	3.0
Department of the Interior	19,492	17,619	**18,343**	724	4.1
USGS	1,012	1,033	**1,074**	41	4.0
Climate Variability Science	55	54	**72**	18	34.1
Land Use Change	78	78	**77**	-1	-1.7
USDA					
Agricultural Research Service	1,049	1,154	**1,136**	-18	-1.6
Climate Change	0	0	**44**	44	n/a
Environmental Stewardship	175	201	**200**	-1	-0.5
Environmental Protection Agency	7,900	8,210	**7,900**	-310	-3.8
Science & Technology	743	759	**764**	5	0.7
Climate Change and Air Quality	238	251	**257**	6	2.4
USGCRP	2,379	2,489	**2,501**	12	0.5
National Science Foundation	316	313	**318**	5	1.6
Energy	209	217	**246**	29	13.4
Commerce (NOAA, NIST)	301	329	**348**	19	5.8
Agriculture	107	111	**88**	-23	-20.7
Interior (USGS)	55	54	**72**	18	33.3
Environmental Protection Agency	17	18	**20**	2	11.1
National Institutes of Health	10	8	**8**	0	0.0
NASA	1,355	1,431	**1,392**	-39	-2.7
Smithsonian	8	8	**8**	0	0.0
Transportation	1	1	**1**	0	0.0

*Budget figures are compared against FY 2013 levels.
Source: Agency budget justifications, budget supplements, and other agency communications. All figures rounded to the nearest million. Changes calculated from unrounded figures.

INTRODUCTION AND POLITICAL BACKGROUND

In recent years, the Administration and Republican leadership in Congress have frequently been at odds over weather and climate-related spending. Large differences continue this year.

The President's request for non-defense discretionary (NDD) spending would be roughly seven percent below FY 2010 levels (assuming a rate of inflation of 1.8% per year) even with the President's Opportunity, Growth, and Security Initiative (OGSI). As a result, investments in weather and climate research are below the peak funding levels of FY 2010. However, the President's request includes higher levels of investment in observations, science, and services relating to weather and climate than would have been possible under sequestration or the Bipartisan Budget Act (BBA) of 2013.

In contrast, Budget Committee Chairman Paul Ryan's proposal, which was passed by the Republican-led House of Representatives on April 10th without Democratic support, would cut NDD by $791 billion below full sequestration levels over the next ten years. By 2024, funding for NDD programs would be 22 percent below the levels called for by the Budget Control Act (BCA) of 2011 with full sequestration and more than 30 percent below the peak funding levels of 2010, adjusting for inflation. Therefore, weather and climate related investments would almost certainly decrease sharply under the Ryan budget given the competing claims on a significantly smaller NDD budget.

Weather and climate information helps society manage risks and realize opportunities associated with existing weather patterns and changes to the climate system (natural and human caused). Information with respect to weather and climate results primarily from scientific observations, modeling, and research. Weather and climate services help apply that information for societal benefit.

Weather and climate services typically include weather forecasts and warnings, flood and drought prediction and monitoring, natural hazard preparedness and response, public health monitoring, disease prevention and control, assessment and management of fire risk, and decision support for water resources, agriculture, transportation, and other key economic sectors. In some instances funding for services and research is difficult to distinguish.

Furthermore, weather and climate research spans multiple disciplines including atmospheric science, oceanography, hydrology, biology, and cryology. Understanding the societal impacts of weather and climate events also requires input from social sciences, including (but not limited to) economics, sociology, history, and political science. Policy choices must also consider ethical concerns, value judgments, philosophical views, and uneven distributional consequences. Given this level of interdisciplinary complexity, accurately and comprehensively describing the weather and climate-related R&D in the President's budget request is challenging and requires at least some subjective judgments.

PROGRAMS, DEPARTMENTS, AND AGENCIES

National Oceanic and Atmospheric Administration (NOAA). NOAA's total FY 2015 budget request is $5.5 billion (a 3.3 percent increase). The request includes $462 million (an 8.3 percent increase) for the Office of Oceanic and Atmospheric Research (OAR). Of this, $425 million is for research (a 9.5 percent increase). The National Environmental Satellite, Data, and Information Service (NESDIS) would receive $2.25 billion (a 7.9 percent increase) with $26 million designated for research (no change). The National Weather Service would receive $1.1 billion (a 0.4 percent decrease) with $19 million designated for research (a 42.4 percent decrease). The National Ocean Service (NOS) would receive $519 million (a 4.2 percent increase) with $75 million designated for research (a 2.7 percent increase).

National Aeronautics and Space Administration (NASA). NASA's total FY 2015 request, not including the OGSI, is $17.5 billion (a decrease of 1.1 percent). Earth Science would be funded at $1.8 billion (a 3.1 percent decrease), again not including the OGSI. NASA Earth Science funds weather and climate-related research through Earth Science Research (ESR) and Applied Sciences (AS), and satellite observations through Earth Systematic Missions (ESM) and Earth System Science Pathfinder (ESSP). Earth Science Research would receive $450 million (a 6.4 percent increase relative to 2013). Applied Sciences would receive $36 million (an 11.7 percent increase relative to 2013). ESM would receive $786 million (a 3.7 percent decrease relative to 2013) and ESSP would receive $266 million (a 50.6 percent increase relative to 2013). The OGSI would provide an additional $886 million spread across NASA.

NASA Earth Science Research funds competitive grants to the research community in six areas: (1) climate variability and change; (2)

atmospheric composition; (3) carbon cycle, ecosystems, and biogeochemistry; (4) water and energy cycles; (5) weather; and (6) the Earth surface and interior. Grants in these areas are primarily for research and analysis of NASA satellite data.

NASA satellites provide information relating to climate variability and change as well as existing weather patterns, including measurements of the atmosphere (e.g., composition, temperature, pollution, clouds, precipitation, and radiation); ocean (e.g., surface temperature, salinity, circulation, sea-surface height, and sea ice); and land surface (e.g., land cover and forest density). NASA has 17 satellite missions on orbit with five scheduled for launch in year ahead and nine additional missions scheduled before 2022.

National Science Foundation (NSF). NSF's total request for FY 2015 is $7.3 billion (a 1.2 percent increase). The request includes $318 million under the USGCRP framework (a 1.6 percent increase). The Geosciences Directorate would receive $1.3 billion (a 0.1 percent increase), with $241 million (a 0.4 percent increase) going to Atmospheric and Geospace Sciences. Earth Sciences would receive $178 million, Ocean Sciences would receive $357 million, and Polar Programs would receive $435 million (all unchanged). NSF's Science, Engineering, and Education for Sustainability (SEES) crosscutting program would receive $139 million (a 14.1 percent decrease) to promote capabilities and discoveries needed to inform societal actions related to environmental and economic sustainability (note that this includes some funding under Geosciences).

Department of Energy (DOE). DOE's total FY 2015 request is $27.9 billion (a 2.6 percent increase). DOE's request includes $5.1 billion for the Office of Science (a 0.9 percent increase). The Office of Science's Office of Biological and Environmental Research (BER), which supports basic research in atmospheric sciences, terrestrial ecosystems and climate modeling, would receive $628 million (a 3.0 percent increase).

Department of the Interior (DOI). DOI's total FY 2014 request is $18.3 billion (a 4.1 percent increase). The United States Geological Survey (USGS) would receive $1.1 billion (a 4.0 percent increase). Of this, $72 million (a 34.1 percent increase) would be for Climate Variability Science and $77.1 million (a 1.7 percent decrease) would be for Land Use Change.

The Department of Agriculture (USDA). USDA's Agricultural Research Service would receive $1.1 billion (a 1.6 percent decrease). This includes $44 million for a new cross-cutting USDA priority initiative on climate change and $200 million (a 0.5 percent decrease) for the Environmental Stewardship program, which focuses, in part, on climate change.

Environmental Protection Agency (EPA). EPA's total FY 2015 request is $7.9 billion (a 3.8 percent decrease). Of this total, $764 million would go toward Science and Technology. This includes $257 million (a 0.7 percent increase) for the Science and Technology (S&T) designated for EPA's goal of Addressing Climate Change and Improving Air Quality.

United States Global Change Research Program (USGCRP). The USGCRP coordinates climate research and its applications over 13 Executive Branch departments and agencies. The total requested budget for FY 2015 that falls within the scope of the USGCRP is $2.5 billion, which would be a $12 million (0.5 percent) increase over FY 2014. Note, however, that none of the budget figures in Table 1 are adjusted for inflation, which is currently about 1.7 percent per year. Therefore, USGCRP funding would decrease slightly. It is also important to note that funds counted within the USGCRP framework are allocated directly to the agencies and each agency has discretion in what it counts as being within the framework. Therefore, the number reported for USGCRP does not account for all climate-related research and year-to-year changes in USGCRP funding can reflect accounting changes rather than actual changes to agency requests.