

THE FEDERAL WEATHER ENTERPRISE

*Fiscal Year 2018
Budget and
Coordination
Report*

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The Federal Weather Enterprise: Fiscal Year 2018 Budget and Coordination Report

FEDERAL COORDINATOR FOR METEOROLOGICAL
SERVICES AND SUPPORTING RESEARCH
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Preface

This is the first edition of The Federal Weather Enterprise Budget and Coordination Report, a streamlined version of the annual Federal Plan for Meteorological Services and Supporting Research that has been published in the fall for the past few decades. Over the past year, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) led an interagency Joint Action Group in an evaluation process to determine ways to make the Federal Plan more effective in supporting coordination among agencies with meteorological concerns, as well as more effective in delivering the required budget information to those agencies, to the Office of Management and Budget, and to other interested users. At the direction of the Federal Committee for Meteorological Services and Supporting Research (FCMSSR), and under the guidance of the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR), that Joint Action Group has worked since August 2016 to develop this new format which has been approved by the FCMSSR and ICMSSR.

Section 1 of this report provides agency budget summaries. This condensed version of budget descriptions and tables presented in previous Federal Plans aims to provide the information required by Public Law 87-843, Section 304, in a more useful format. Table 1 displays funding for meteorological services and supporting research in the FY2018 President's Budget Request, plus the enacted funding for the two previous fiscal years. Table 2 displays interagency transfers related to meteorological issues. The budget tables are accompanied by brief descriptions of each agency's budget, including highlights on selected elements of their respective programs.

Section 2 describes the coordinating mechanisms at work within the Federal Weather Enterprise, with selected descriptions of accomplishments over the past year. While these groups are largely administered and monitored by OFCM, they are composed of, and typically led by, representatives from across the various agencies of the Federal Weather Enterprise.

We anticipate that Section 2 will be further modified beginning with the next (FY19) edition. We are now in the late stages of developing a Strategic Plan for Federal Weather Enterprise Coordination. Once that Plan is approved by the FCMSSR, we will include, in Section 2 of this Report, our annual updates on progress toward meeting the goals and objectives of the Strategic Plan.

A final significant change to note is the timing of publication for this Report. While this year has been our transition year, we will aim to publish this Report annually in the spring, as soon as possible after the President's Budget Request is released. A spring publication date is intended to make this report useful to leadership engaged in budget determinations over the summer and fall.

I extend my thanks to our agency partners and their staffs for their dedicated efforts in contributing both to the development of this document and in the daily coordination of complex federal meteorological issues.

William Schulz

Federal Coordinator for Meteorological Services and Supporting Research

Purpose

This annual report summarizes the funding assigned to the Federal Weather Enterprise (FWE), which comprises the programs and activities of those departments and agencies involved in meteorological services and/or supporting meteorological research. The report provides a 'horizontal' look at the meteorological funding requested in the current President's Budget Request and the funding enacted over the previous two fiscal years. This funding summary satisfies the requirements of PL 87-843 section 304. In addition to the funding summary, this report describes the federal weather coordination structure, demonstrating the ongoing collaboration of the FWE members in addressing inter-agency meteorological issues.

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Agency Funding for Meteorological Services and Supporting Research: Resource Information and Agency Program Updates

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The narratives and tables in this section summarize selected budgetary information for the Federal government for fiscal years (FY) 2016 through 2018. The funds shown are used to provide meteorological services and associated supporting research, which includes research and development with service improvements as their direct objectives. Fiscal data are current as of the end of May 2017 and are subject to later changes. The data for FY 2018 derive from the President's Budget Request for FY 2018 and thus do not have legislative approval and do not constitute a commitment by the United States Government. The data for FY 2017 (the current fiscal year) and FY 2016 (the past fiscal year) represent enacted (congressionally approved) funding amounts. The budget data are submitted by each agency or entity and prepared by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) in compliance with Section 304 of Public Law 87-843, in which Congress directed that an annual horizontal budget, across Federal departments and agencies, be prepared for meteorological programs conducted by the Federal agencies.

Department of Agriculture

The Department of Agriculture's (USDA) budget request for meteorological operations and supporting research FY 2018 is \$85.1 million, a 13.7% increase from the FY 2017 enacted funding level. The increase is largely due to a nearly 21% requested funding increase by the National Institute of Food and Agriculture (NIFA) for its research and development programs. This increase in systems research offsets a modest decline in the cost of operations across the Department.

- USDA has requested \$64.5 million for research and development programs, an increase of about \$10.3 million from 2017, the bulk from the aforementioned request from NIFA. NIFA funding

commonly supports weather and climate research initiatives, including drought and water quality issues facing our Nation's producers. No change is expected for the Agricultural Research Service (ARS), the USDA's principal in-house scientific research agency. ARS conducts research on how to cope with annual variations of weather on crop and animal production, ecosystem services, and the environmental and economic sustainability of agricultural enterprises.

- The FY 2018 amount requested by USDA for meteorological operations is \$20.6 million, virtually unchanged from the funding level in FY 2017. Operational activities include specialized weather observing networks such as the SNOTEL (SNOW pack TELEmetry) network operated by the Natural Resources Conservation Service (NRCS) Snow Survey and Water Supply Forecasting program (SSWSF) and the Remote Automated Weather Stations (RAWS) network managed by the Forest Service. The SNOTEL and RAWS networks provide cooperative data for NOAA's river forecast activities, irrigation water supply estimates, and Bureau of Land Management operations. The SSWSF program, managed by the NRCS National Water and Climate Center, provides western states and Alaska with information on future water supplies. The Forest Service uses meteorological data and interpretation skills data for decision making regarding wildland fire management. The meteorological staff of the Office of the Chief Economist's World Agricultural Outlook Board (OCE/WAOB) routinely collects global weather data and agricultural information to assess the impact of growing season weather conditions on crops and livestock production prospects, keeping USDA commodity analysts, the Chief Economist, and the Secretary of Agriculture and top staff well informed of weather impacts on crops and livestock worldwide. The Risk Management Agency (RMA) provides administration and oversight of programs authorized under the Federal Crop Insurance Act.

RMA's Strategic Data Acquisition and Analyses (SDAA) unit works with Oregon State University's Parameter-Elevation Regressions on Independent Slopes Model (PRISM) Climate Group to develop and utilize spatial climate data sets to detect potential waste, fraud and abuse in the Federal crop insurance program and to assist underwriting in developing crop suitability mapping.

Reference: 2018 USDA Budget Congressional Justifications
USDA Budget Explanatory Notes for Committee on Appropriations

2018 President's Budget Office of the Chief Economist
<https://www.obpa.usda.gov/06oceexnotes2018.pdf>

Department of Commerce/ National Oceanic and Atmospheric Administration

National Weather Service

The National Weather Service (NWS) funding request for the FY 2018 President's Budget totals \$1.1 billion. This is a 5.7% funding decrease from the FY 2017 enacted budget. NWS provides weather, water, and climate forecasts and warnings for the United States, its territories, adjacent waters, and ocean areas for the protection of life and property and the enhancement of the national economy, 24 hours every day. NWS is the sole, official and authoritative U.S. voice for issuing warnings during life-threatening weather situations. In FY 2018, NWS will prioritize functions that provide the observational infrastructure, capabilities, and staff to produce timely and accurate weather forecasts and warnings. In a tight fiscal climate in FY 2018, NWS continues its progress towards building a Weather-Ready Nation.

Significant requested increases and decreases in funding over the FY 2017 program include the following:

Surface Observations. NOAA requests a decrease of \$11.5 million for a total of \$35.4 million to reduce the scope and operations of the National Mesonet program. This network of non-NOAA automated weather stations primarily measure temperature, wind, precipitation, and humidity in the lower atmosphere several times an hour, which is used to provide accurate and timely forecasts and warnings of high impact, local-scale weather events that can quickly threaten lives and property. This request maintains support for the National Mesonet program but reduces the geographic scope from all 50 states to prioritize those most susceptible to tornadoes and severe weather, and limits the observations to surface meteorological observations and lightning data.

Marine Observations. NOAA requests a decrease of \$14.5 million for a total of \$31.4 million to reduce the scope and operations of marine observation platforms.

Advanced Weather Interactive Processing System (AWIPS) Cyclical Refreshment. NOAA requests an increase of \$5.1 million for a total of \$39.1 million to fully fund the cyclical refreshment of Advanced Weather Interactive Processing System (AWIPS) Information Technology (IT) hardware. AWIPS integrates and displays meteorological, hydrological, satellite, and radar data at NWS field offices. AWIPS enables increasingly accurate weather predictions and dispenses time-sensitive, highly reliable warnings and advisories. This request provides the funding levels required for minimal AWIPS IT cyclical replacement including servers, workstations, monitors, and printers.

Enhance the Resilience and Reliability of Integrated Dissemination Program Applications. NOAA requests an increase of \$4 million for a total of \$18.6 million to fund upgrades and enhancements to operational applications on the Integrated Dissemination Program (IDP) systems in College Park, MD and Boulder, CO. The IDP systems provide scalable, robust, secure, and commonly shared IT infrastructure to ensure resilience and reliability during critical weather events. The requested funding will help integrate targeted mission-critical applications into the dissemination infrastructure providing a higher level of redundancy and reliability than what exists currently for our partners and customers.

Reduce Integrated Modeling, Next Generation Global Prediction System (NGGPS). NOAA requests a decrease of \$5.0 million for a total of \$9.5 million to slow down the development of the NGGPS including reducing support to the unified data assimilation development; eliminating support to the development of the Unified Global Coupled System; reducing support to the collaborative research activities for the Hurricane Forecast Improvement Project (HFIP); reducing support to NOAA's testbeds including the Development Test Center, Global Modeling Test Bed, and Joint Center for Satellite Data Assimilation; and slowing the effort to transition new physics into the global forecast system and hurricane forecast system. NOAA also will reduce the development of the NOAA Environmental Modeling System (NEMS) infrastructure by 20 percent. NEMS streamlines the interaction of analysis, forecast, and post-processing systems within NCEP.

References: NOAA FY2018 Congressional Justification

http://www.corporateservices.noaa.gov/nbo/fy18_bluebook/FY18-NOAA-CJ.pdf

NWS Overview: page NWS-1

Surface Observations: page NWS-25

Marine Observations: page NWS-25

Advanced Weather Interactive Processing System (AWIPS)

Cyclical Refreshment: page NWS-28

Enhance the Resilience and Reliability of Integrated Dissemination Program Applications: page NWS-44

Reduce Integrated Modeling, Next Generation Global Prediction System (NGGPS): page NWS-55

National Environmental Satellite, Data, and Information Services

The National Environmental Satellite, Data, and Information Services (NESDIS) funding request for the FY 2018 President's Budget totals \$1.8 billion. This is a 17.6% decrease from the FY 2017 enacted budget. NESDIS will support key initiatives committed to providing real-time operations and data services as well as working toward developing the next generation of satellites to continue meeting its primary mission essential functions without incurring gaps in coverage.

NESDIS is responsible for managing all aspects of remotely gathered environmental data. This includes procurement, launch, operation, product development, and product distribution of the nation's civil operational environmental satellites and corresponding data. In addition, NESDIS manages the NOAA environmental data collections, provides routine assessments that provide relevant weather, climate, and environmental information (e.g. precipitation, temperatures, temperature extremes, sea surface temperature), and disseminates data and information to meet the needs of users in commerce, industry, agriculture, science, and engineering, as well as federal, state, and local governments.

Significant requested increases and decreases in funding over the FY 2017 enacted budget include the following:

GOES-R. NESDIS requests a planned decrease of \$234.3 million for a total of \$518.5 million to sustain the continuity of the GOES-R Series geostationary observing platforms, including instruments, satellite, and launch vehicle activities for GOES-S, -T, and -U, as well as check out of the ground system. This is a planned reduction for the GOES-R Series program, as the program has passed the peak years of its development cycle. GOES-R, now GOES-16, successfully launched on November 19, 2016.

Joint Polar Satellite System (JPSS). NOAA requests a planned decrease of \$11.5 million for a total of \$775.8 million for the JPSS Program. These funds will operate the Suomi National Polar Partnership satellite (Suomi NPP) and JPSS-1; continue development and build of the instruments and spacecraft for JPSS-2; continue operations, maintenance and sustainment of the ground system for JPSS; and prepare the JPSS ground system for JPSS-2 and begin replacement of IBM/Lenovo hardware. JPSS-1 is tentatively scheduled to launch on November 10, 2017.

Polar Follow On (PFO). NOAA requests a decrease of \$148.9 million for a total of \$180.0 million to continue development of the PFO/JPSS-3 and -4 missions to maintain synergies with JPSS-2 while initiating a re-plan of the PFO program. NOAA will update its constellation and observing system reliability and mission risk assessments with this new budget, while seeking cost efficiencies and greater utilization of relevant partner Earth observation data.

Projects, Planning and Analysis (PPA). NOAA requests an increase of \$12.0 million for a total of \$37.2 million to allow NOAA to support the launch of the NOAA suite of U.S. instruments - Advanced Microwave Sounding Unit - A (AMSU A), Advanced Very High Resolution Radiometer (AVHRR), and Space Environment Monitor (SEM) - on the European Metop-C satellite (scheduled to launch in October 2018). Data from Metop-C, operating in one of the three polar orbits, is critical to maintaining the quality of Numerical Weather Prediction (NWP) models.

References: NOAA FY 2018 Congressional Justification

http://www.corporateservices.noaa.gov/nbo/fy18_bluebook/FY18-NOAA-CJ.pdf

NESDIS Overview: page NESDIS-1

GOES-R Series: page NESDIS-58

JPSS: page NESDIS-62

PFO: page NESDIS-66

PPA: page NESDIS-81

Office of Oceanic and Atmospheric Research

The Office of Oceanic and Atmospheric Research (OAR) request for funding related to meteorological supporting research in the FY 2018 President's Budget totals \$142.5 million. This is an 18.5% decrease over the FY 2017 enacted budget. OAR will continue to provide the nation with critical environmental information to support informed decision-making and promote healthy, productive, and resilient ecosystems, communities, and economies. OAR will continue research focused on improving our under-

standing and forecasting capabilities for atmospheric events that endanger lives and property and research focused on establishing a greater understanding of, and ability to predict, climate variability and change, and to enhance society's ability to plan and respond. OAR also will conduct innovative research for the development of the next generation of products and services.

Climate Labs and Cooperative Institutes. NOAA requests a net decrease of \$ 3.6 million for a total of \$ 57.7 million to support research activities that will help to gain a comprehensive understanding of the physical, chemical, and dynamical processes that shape our climate. NOAA will continue to support the world-class climate science that takes place at NOAA, such as improving our understanding and prediction of droughts, hurricanes, and the next growing season while developing tools to manage resources and improve community resilience and preparedness throughout the nation, but will terminate arctic research and reduce extramural funding for climate related activities.

Weather and Air Chemistry Research (W&ACR).

This sub-activity includes Laboratories and Cooperative Institutes (CIs) and Weather and Air Chemistry Research Programs. NOAA requests a net decrease of \$ 34.2 million for a total of \$ 84.9 million. This level of funding would maintain priority weather research, which leads to near-term, affordable, and attainable advances in weather forecasting and computer and modeling capabilities to deliver substantial improvements in weather forecasting.

References: NOAA FY2018 Congressional Justification
http://www.corporateservices.noaa.gov/nbo/fy18_bluebook/FY18-NOAA-CJ.pdf

OAR Overview: page OAR-1

Climate Research: page OAR-8

Weather Research: page OAR-22

National Ocean Service

The National Ocean Service (NOS) request for funding related to meteorological supporting research in the FY 2018 President's Budget totals \$32.0 million. This is a slight change from the FY 2017 enacted budget. These funds allow for continued operation of the National Water Level Observation Network (NWLON), the Physical Oceanographic Real-Time System (PORTS®) program, the data quality control program known as the Continuous Operational Real-time Monitoring System (CORMS), and the Ocean Systems Test and Evaluation Program (OSTEP), which is a development program for bringing

new sensor technology into operations. Both the NWLON and PORTS® programs include subsets of operational water level stations with meteorological sensors installed for various partners and users, including the NWS. NOS will continue to provide meteorological observations that are critical to navigation activities and the safety of life and property.

References: NOAA FY2018 Congressional Justification
http://www.corporateservices.noaa.gov/nbo/fy18_bluebook/FY18-NOAA-CJ.pdf

NOS Overview: page NOS – 1

Navigation Services: page NOS – 4

Ocean and Coastal Observations (NWLON, NCOP, Modeling, PORTS): pages NOS – 5-7

Office of Marine and Aviation Operations

The FY 2018 President's Budget requests \$37.8 million for the Office of Marine and Aviation Operations (OMAO) in funding to support meteorological operations and research activities. This is a 5.3% increase over the FY 2017 enacted budget. OMAO supports meteorological operations and research activities by collection of related data from the aircraft and ship fleet. The fleet supports NOAA's science, service, and stewardship mission. The fleet operates throughout the United States and around the world; on and over open oceans, mountains, coastal wetlands, and the Arctic. NOAA's fleet fulfills multiple missions in support of NOAA's programs providing capable, mission-ready platforms and professional crews that survey snowpack levels for flood prediction, improve hurricane prediction models, assess air quality, survey coastal erosion, investigate oil spills and conduct oceanographic research and weather forecasts. In FY 2018, OMAO will continue to support meteorological observations through Aircraft Operations and is requesting an additional \$2.0 million for increased lease and other operating costs associated with the recent relocation to Lakeland Linder Regional Airport. OMAO's airplane and ships also help local decision makers respond to real-time meteorological events, including hurricane reconnaissance and research.

References: NOAA FY2018 Congressional Justification
http://www.corporateservices.noaa.gov/nbo/fy18_bluebook/FY18-NOAA-CJ.pdf

OMAO Overview: page OMAO-1

Marine Operations and Maintenance: page OMAO-3

Aviation Operations and Aircraft Services: page OMAO-8

Department of Defense

U.S. Air Force

The U.S. Air Force request for meteorological pro-

gram support FY 2018 is \$152 million. Air Force resources for meteorological support fall into three categories: general operations and maintenance, procurement, and research, development, test & evaluation. This does not include all meteorological activities conducted within the Air Force.

Operations

Operational resources are dedicated to providing dedicated, tailored weather support to U.S. Air Force/U.S. Army forces and platforms performing contingency and non-contingency operations around the globe.

Programs with Research to Operations Efforts

As part of the Air Force Strategic Weather Modernization Plan, the USAF continues investing in modernized environmental prediction and commercial-off-the-shelf technologies that enhance automation and save resources. The USAF plans to invest in the following efforts:

Weather Data Analysis (WDA). WDA provides a net-centric infrastructure that assimilates worldwide sources of atmospheric and space weather data and produces decision-quality information for warfighters across multiple security enclaves. This information is provided through both machine-to-machine and machine-to-human capabilities. Research, development, test and evaluation activities will enhance the capability to ingest, process, store, access, and disseminate meteorological data via upgrades to the web services architecture to expand the Open Geospatial Consortium services and upgrade the large-scale data processing to accommodate new environmental satellite and numerical weather modeling data.

Numerical Weather Modeling (NWM). NWM includes numerical weather prediction models; cloud analysis and forecasting models; land surface characterization models; aerosol, atmospheric constituent, and point analysis models/applications; and both global and mesoscale ensembles.

References: U.S. Air Force FY2018 Congressional Justification
<http://www.saffm.hq.af.mil/Budget/Air-Force-Presidents-Budget-FY18/>

OPERATION AND MAINTENANCE, AIR FORCE VOLUME I
Page 142, Air Ops, AFWFS Page 198, Combat Related Ops statement on AFW Program
Page 209, (SAG: 12A)

OPERATION AND MAINTENANCE, AIR FORCE VOLUME II
Page 135 and 136, Depot maintenance
Other Procurement, Air Force - Vol 1
Page 141-150, (Weather Service)

Research, Development, Test & Evaluation, Air Force Vol-III
Part 2
Vol 3b -129-139

U.S. Army

The U.S. Army (USA) estimates a \$24.3 million request for FY 2018. This request for meteorological activities support consists of \$7.6 million for operational support and \$16.6 million for research and development, an overall decrease of 10% from the FY 2017 enacted budget. The decrease is due to no acquisitions for FY 2018 and a reduction in research and development funding.

Operations

The U.S. Army funds meteorological support for developmental and operational tests and evaluations at ranges across CONUS, Alaska and Panama to provide essential information to acquisition decision makers and commanders. The Army also funds systems that provide highly accurate meteorological data for missile defense tests and for operational employment of Field Artillery weapon systems. In its civil operational activities, the U.S. Army Corps of Engineers (COE) funds an extensive network of land-based gages collecting hydrologic and meteorological data used in support of COE major water projects, flood control, navigation, hydroelectric power, irrigation, water supply, and water quality. Within the Army's Training and Doctrine Command, funds are provided to conduct meteorological education and training at several Centers of Excellence.

Research and Development

The U.S. Army funds laboratories to conduct basic and applied research in atmospheric science and technology with a focus on atmospheric sensing, modeling, and dynamics. The Army also provides funding to conduct research, development, and engineering services to solve the challenging problems in military engineering, geospatial sciences, water resources, and environmental sciences.

<https://www.asafm.army.mil/offices/bu/content.aspx?what=BudgetMaterials>

Army Procurement - Procurement Justification Book: Other Procurement Army (OPA) 2 - Communications & Electronics; p255, p361, p402.

Operation and Maintenance - Volume 1 Justification Book: Army Budget Activity 01: Operating Forces Activity Group 13: Land Forces Readiness Support Detail by Sub-activity Group 131: Base Operations Support; p172.

Research, Development, Test and Evaluation (RDTE) - Budget Activity 1 (RDTE): RDT&E Project Justification: FY 2018 Army; p71.

Research, Development, Test and Evaluation (RDTE) - Budget

Activity 2 (RDTE): RDT&E Project Justification: FY 2018 Army; p252, p284, p290.

Research, Development, Test and Evaluation (RDTE) - Budget Activity 3 (RDTE): RDT&E Project Justification: FY 2018 Army; p224.

U.S. Navy

The U.S. Navy FY 2018 budget request for meteorological programs is \$124.4 million, made up of \$97.3 million for operations and \$27.1 million to support enabling research. These numbers reflect a combined increase over the FY 2017 enacted budget of 6.5%.

Naval Oceanography Program (NOP)

The Chief of Naval Operations, through the Oceanographer of the Navy, sponsors operational Navy Meteorology and Oceanography (METOC) services and related research and development. In August 2012, the Oceanographer of the Navy acquired responsibility for funding the Navy's meteorology and oceanography Operations & Maintenance (O&M,N) funding from the Chief of Naval Operations (N43). In August 2014, the Chief of Naval Operations established the Information Dominance Type Command. Resource Sponsor (OPNAV), Operational Commander (CNMOC), and TYCOM (IDFOR) work together to field new capabilities.

Significant requested increases and decreases in funding over the FY 2017 Annualized Continuing Resolution (not the FY17 Omnibus) program include the following:

Air/Ocean Equipment Engineering The FY18 request of \$3.78M reflects a \$.093M decrease from the FY17 enacted. These equipment ingest, store, process, distribute, and display conditions of the physical environment needed to optimize employment and performance of naval warfare systems. These capabilities make the warfighter and planner more aware of the operational impacts of the meteorological and oceanographic factors within the air and ocean environments.

Change summary explanation: Decrease in FY18 funding for Fleet METOC equipment is a result of a realignment from RDT&E to OPN BLI 4226 Littoral Battlespace-Autonomous Unmanned Vehicle, Submarine Variant (LBS-AUV(S)).

Air/Ocean Tactical Applications The FY18 request of \$48.36M reflects a decrease \$0.18M from FY17 enacted. This program develops more accurate worldwide forecasts of METOC conditions with increased temporal and spatial resolution. Improved

representation of smaller scale phenomena will be fielded for the littoral regions and modern data base management systems will be developed for both the Navy Fleet Numerical Meteorology and Oceanography Center (FNMOC) at Monterey CA and the Naval Oceanographic Office (NAVO) at the Stennis Space Center, MS.

Change summary explanation: A portion of the Air/Ocean Tactical Applications program management was moved from SPAWARSSYSCOM (BSO 39) to the Office of Naval Research (ONR) beginning in FY17. Additionally, the Program Executive Officer for Command, Control, Communications, Computers, and Intelligence (PEO C4I) was authorized to act as the Milestone Decision Authority for the Primary Oceanographic Prediction System (POPS), the Oceanographic Information System (OIS), and the United States Naval Observatory (USNO) Network.

Navy Meteorology and Ocean Sensors Space

METOC Sensors Space funding increases from (projected) \$2.79M in FY17 to \$2.98M FY18. METOC Space RDT&E funds activities to exploit environmental satellite sensor data for the enhancement of Navy Oceanographic and Atmospheric modelling capability. OPN funds infrastructure enhancements to the Navy Oceanographic and Atmospheric modelling forecasting commands (FNMOC and NAVOCEANO) for High Speed Computer upgrades and adjustments needed to receive, store, ingest, and process new and expanded satellite sensor data streams.

References: NAVY METOC FY 2018 Congressional Justification <http://www.secnav.navy.mil/fmc/fmb/Pages/Fiscal-Year-2018.aspx>

OM&N - Exhibit OP-5 IC5C Activity Group: Combat Operations Support Sub activity:

Op Meteorology and Oceanography pages 174-180

OPN - Exhibit P-40 BSA 2 P-1 Line Item 8126 Title: Environmental Support Equipment

Navy pages 4 and 7 of 11 P-1 Line #154

RDT&E Air/Ocean Equipment Engineering PE 0604218N appears in Volume 3 page 93

RDT&E Air/Ocean Tactical Applications PE 0603207N appears in Volume 2 page 1

RDT&E Navy Meteorological and Ocean Sensors-Space PE 0305160N appears on volume 5 page 821

Department of Homeland Security

Federal Emergency Management Agency

The FY 2018 requested funding for FEMA's meteorological operations and supporting research programs is \$1.92 M, no change from the FY 2017 enacted budget. The majority of this funding, \$1.17 M, supports National Hurricane Program HURREVAC

operations and maintenance of decision support tools used by federal, state, local, and tribal governments, along with technology modernization.

FEMA's Response Directorate administers the National Hurricane Program (NHP), which provides technical assistance supporting deliberate hurricane response/evacuation planning and operational decision making during an event. Under an Inter-agency Agreement between FEMA and the National Weather Service's National Hurricane Center (NWS/NHC), the NHC develops and applies its SLOSH (Sea, Lake, and Overland Surges from Hurricanes) storm surge model to provide planning and operational products to support storm surge risk analysis. Development of these products includes model runs and simulations, as well as inundation mapping. The operational products are used to support state and local evacuation decisions and are used at all levels of government to prepare for the potential impacts and required response. The planning products are used as the basis for the hazard analysis and evacuation zone development work done as part of the Hurricane Evacuation Studies (HESs) process. Planning products are also used to assess the potential storm surge risk for an approaching hurricane prior to the availability of the operational products.

As part of the NHP, FEMA also develops, operates, maintains and distributes the HURREVAC decision-support software tool. HURREVAC combines real-time NHC forecast data with evacuation clearance times from the HESs to guide emergency managers as to when decisions on hurricane evacuations would need to be made to ensure evacuation is completed before the arrival of hazardous conditions. The software is also widely used as a situational awareness and briefing tool and as a common operating platform to view official NHC hurricane forecast and risk information. Currently the NHP is working with NHC and other program partners on the development of the next generation platform for emergency manager hurricane decision support, which will aim to increase accessibility and capability.

FEMA's Recovery Directorate provides the necessary funding for NOAA's National Centers for Environmental Information (NCEI) to improve, maintain, and update its Snow Climatology Database (SCDB) and allows for more stations to participate in climatological and near-real time snowfall datasets and comparisons. These activities are necessary to support FEMA's emergency and major disaster declaration process and assistance to state, local, and tribal governments related to snow events.

References: DHS Congressional Budget Justification FY 2018 <https://www.dhs.gov/publication/congressional-budget-justification-fy-2018>

FEMA Operating Expenses

https://www.dhs.gov/sites/default/files/publications/CFO/17_0524_Federal_Emergency_Management_Agency.pdf

U.S. Coast Guard

All of the U.S. Coast Guard's (USCG) funding for meteorological programs is for operations support. For FY 2018, the requested funding level is an estimated \$30.2 million, a slight (0.3%) increase from the FY 2017 enacted estimate. The Coast Guard does not have a specific program and budget for meteorology—all meteorological activities are accomplished as part of general operations. The USCG does not track meteorological costs at an organizational level, so the funding level is an estimate. The Coast Guard's activities include the collection and dissemination of meteorological and iceberg warning information for the benefit of the marine community. The Coast Guard also collects coastal and marine observations from its shore stations and cutters and transmits these observations daily to the Navy's Fleet Numerical Meteorology and Oceanography Center and NOAA's National Weather Service. These observations are used by both the Navy and NOAA in generating weather forecasts.

The Coast Guard also disseminates a variety of weather forecast products and warnings to the marine community via radio transmissions. Coast Guard shore stations often serve as sites for NWS automated coastal weather stations, and the National Data Buoy Center provides logistics support in deploying and maintaining NOAA offshore weather buoys from Coast Guard cutters. The International Ice Patrol conducts iceberg surveillance operations and provides warnings to mariners on the presence of icebergs in the North Atlantic shipping lanes. Coast Guard efforts in meteorological operations and services have not changed significantly during recent years

References: USCG Operating Expenses are found in the USCG Attachment [\[https://www.dhs.gov/sites/default/files/publications/CFO/17_0524_U.S._Coast_Guard.pdf\]](https://www.dhs.gov/sites/default/files/publications/CFO/17_0524_U.S._Coast_Guard.pdf) of the DHS Congressional Budget Justification FY 2018 [\[https://www.dhs.gov/publication/congressional-budget-justification-fy-2018\]](https://www.dhs.gov/publication/congressional-budget-justification-fy-2018).

Department of the Interior

Bureau of Land Management

The Bureau of Land Management (BLM) requested funding for meteorological activities for FY 2018 is \$4.3 million, which is a 7% decrease from enacted

funding in FY 2017. The BLM funds two principal programs related to meteorological services and supporting research —the soil, water, and air (SWA) program and the fire weather activities of the Office of Fire and Aviation (OFA).

References: BLM FY2018 Budget Justification

https://www.doi.gov/sites/doi.gov/files/uploads/fy2018_blm_budget_justification.pdf

SWA Overview: page VII-33

References: DOI Wildland Fire Management FY2018 Budget Justification

https://www.doi.gov/sites/doi.gov/files/uploads/fy2018_blm_budget_justification.pdf

Preparedness Program, predictive services: page 26

National Park Service

The National Park Service (NPS) budget request for meteorological operations and research for FY 2018 is an approximate \$2.9 million, approximately a 10% reduction in this area from FY 2017 enacted funding. The NPS FY 2017 enacted budget was approximately \$3.2 million. The NPS expends about \$0.9 million on atmospheric research with a focus on measurements of all forms of atmospheric reactive nitrogen and on aerosol science. The goal of this research is to identify the sources of air pollution that are affecting park ecosystems and visibility and to quantify their impacts. The NPS also expends approximately \$2.3 million in routine air quality, visibility, and meteorological monitoring networks.

References: DOI National Park Service FY2018 Budget Justification

https://www.doi.gov/sites/doi.gov/files/uploads/fy2018_nps_budget_justification.pdf

Note: The NPS budget request and enacted funding is not this granular - Natural Resource Management is the lowest level in the authorized budget. The allocations estimated here are based on internal assessment of needs and are not explicitly indicated by Congress. The FY 2018 estimate is based on the overall reduction for Natural Resource Management in the President's budget request.

U.S. Geological Survey

The U.S. Geological Survey (USGS) requested funding for FY 2018 is an estimated \$30.00 million, a 15.5% decrease from the FY 2017 enacted. This reflects funding requirements for the Water Mission Area and the elimination of the Geomagnetism Program.

Hydrometeorological Data Collection and Distribution and Post-wildfire debris flow warning operations. The FY2018 request for this mission area

is an estimated \$30.00 million. The USGS Water Mission Area collects streamflow, precipitation, water quality, ground-water level, and other water resources and climatological data as part of a national network and for a number of projects concerning rainfall-run-off, water quality, and hydrologic processes. A number of federal, state, and local agencies contribute to the costs of collection and distribution of these data.

USGS water related programs and associated budget line items were reorganized in 2015 and 2016 and the hydrometeorological related research was reorganized correspondingly. The water programs now involved include the Groundwater and Streamflow Information Program (GWSIP) and the Water Availability and Use Science Program (WAUSP).

- The GWSIP FY18 request is an estimated \$29.5 million (reduced \$3.98 million from FY17 enacted funding). GWSIP items that support hydrometeorological research include the USGS streamgage network (down \$742 k).
- The WAUSP request is an estimated \$.50 million (reduced \$12.20 million from FY17 enacted). The WAUSP reductions eliminate much of the USGS research related to evapotranspiration from irrigated lands.

Geomagnetism Program. The FY 2018 budget request for the USGS Geomagnetism Program is \$0, a decrease of \$1.88 million from the FY 2017 Annualized Continuing Resolution (CR) funding level. This eliminates the Geomagnetism Program, an element of the U.S. National Space Weather Program. Terminating this program will reduce the accuracy of NOAA and U.S. Air Force forecasting of the magnitude and impact of geomagnetic storms. In addition to eliminating the data provided to partner Federal agencies, the elimination of the program will also reduce the availability of geomagnetic information to the oil drilling services industry, geophysical surveying industry, several international agencies, and electrical transmission utilities.

References: FY 2018 Department of Interior Budget Justifications – U.S. Geological Survey

https://www.doi.gov/sites/doi.gov/files/uploads/fy2018_usgs_budget_justification.pdf

pages J 1-17 Water Resources

pages I 23-24 Geomagnetism Program

Department of Transportation

Federal Aviation Administration (FAA)

For FY 2018, the FAA is requesting a total of \$313 million for Aviation Weather related Operations

Support, Major Systems Acquisition and Recurring Research and Development Cost, an approximate 23.7% increase from FY 2017 actual funding received. The actual funding for these Aviation Weather programs in FY 2017 was \$253 million. The changes incorporate:

- An increase in reported numbers for Operations Support from an actually received \$199 million in FY17 to a requested \$254 million in FY18.
- An increase in reported numbers for Major Systems Acquisitions (NWP and ASOS/ASWON) from an actually received \$38 million in FY17 to a requested \$46 million in FY18.
- A decrease in reported numbers for recurring Research and Development Costs from an actually received \$16 million in FY17 to a requested \$13 million in FY18 (Weather Programs).

The funding changes reflect major initiatives in the Aviation Weather programs to support the Next Generation (NextGen) National Air Transportation System. These changes will bring enhancements, including the dissemination of weather products and decision-making information.

For FY18, the FAA will continue to research and make progress in the weather area to support NextGen weather requirements. Research projects may include weather sensor/radar investment, weather needs in the flight deck and refresh of the weather infrastructure.

U.S. Code Title 49 Section 44720 (49 U.S.C. 44720) designates the FAA as the Meteorological Authority for domestic and international aviation weather services of the United States. In this capacity, the FAA provides requirements for the administration of aviation weather services to the National Weather Service (NWS). The FAA is responsible for ensuring compliance with these services and with maintaining International Civil Aviation Organization (ICAO) Standards and Recommended Practices as specified in Annex 3-Meteorological Service for International Air Navigation.

References: FAA FY2018 Budget Estimates were drawn from the US DOT FAA FY-2019 OST Budget Submission

Page 68 (188) - Facilities and Equipment; Detailed Justification for 2A15 - NextGen Weather Processors (NWP)

Page 112 (232) - Facilities and Equipment; Detailed Justification for 2C01A - Aviation Surface Observation System (ASOS/ASWON)

Page 48 (373) - Research, Engineering & Development; Detailed Justification for A11.j - Weather Programs

*Note: The weather Operations numbers source is the documentation from the Operations Review Board (ORB) process within ATO. Unlike F&E and RE&D, the official reporting out of

budget figures is at the aggregate service unit level. The specific program budget amount is not publicly shared.

Federal Highway Administration

The current transportation authorization, the Fixing America's Surface Transportation (FAST) Act, allocates funds for Research, Technology and Education. This authorization includes core Highway Research and Development as well as Intelligent Transportation Systems (ITS). Of this, for both FY 2017 and FY 2018, the Road Weather Management Program (RWMP) was budgeted at \$1.5 million. All of RWMP's funding is for applied research, with an increased emphasis on knowledge and technology transfer to assist operating agencies in the deployment of the research products. RWMP research activities involve the development, test and evaluation of decision support systems that integrate high-resolution road weather and connected vehicle data to enable transportation system owners and operators to make more effective and efficient management decisions. Such decisions save lives, time and money for both the operating agencies and the traveling public. Work is also underway to explore the challenges and opportunities of automated vehicles operating under adverse weather conditions.

Reference: FHWA FY 2018 Budget Estimates <https://www.transportation.gov/sites/dot.gov/files/docs/mission/budget/281146/fhwa-fy-2018-cj-budget.pdf>

Section IV Research, Development and Technology

Page IV-3 Core Highway Research and Development Programs

Page IV-7 Intelligent Transportation Systems

Environmental Protection Agency

The anticipated funding level in FY 2018 for directed meteorological research is about \$3.2 million, a 50% decrease from FY 2017 enacted funding. All of the Environmental Protection Agency's (EPA) funding of meteorological and air quality programs is for supporting basic and applied research.

Continued but reduced attention is being paid to the effects of airborne toxins, ozone, and fine particulate matter on human health, and the impact of air pollution on human health and sensitive ecosystems. Research on the effect of climate change on air quality has been eliminated in the proposed FY 2018 budget. The funding for the national research grants program, which supports graduate fellowships and scientific grants that focus on environmental science and engineering, is proposed for elimination in FY 2018.

The EPA continues its development and evaluation of

air quality models for air pollutants on all temporal and spatial scales as mandated by the Clean Air Act as amended in 1990. Research at reduced levels compared to previous years will focus on urban, meso-scale, regional, and multimedia models, which will be used to develop air pollution control policies, human and ecosystem exposure assessments, and air quality forecasts. There will be increased emphasis placed on meteorological research into global-to-regional-to-urban-local formation and intercontinental transport of air contaminants in support of the revisions to the National Ambient Air Quality Standards and ecosystem protection strategies. Increased efficiency of computation and interpretation of model results are being made possible by means of supercomputing and scientific visualization techniques.

Reference: EPA FY2018 Congressional Justification
<https://www.epa.gov/sites/production/files/2017-05/documents/fy-2018-congressional-justification.pdf>
 Page 11: Research

Note: Based on historical records (pre-FY17), a proportion of the Air, Climate, and Energy research program is estimated to apply to meteorological services and supporting research. Year-to-year changes in these budget values reflect annual variations in the total ACE/AE budget. Note that the FY18 PBR has restructured the research program from ACE to AE.

National Aeronautics and Space Administration

The National Aeronautics and Space Administration's (NASA) estimated budget request for meteorological operations and research for FY 2018 is \$622 million. This request is a decrease of approximately 3 percent from the FY 2017 appropriated budget of \$641 million. The budget figures reported are based on relevant missions and programs in the Earth Science Division and Heliophysics Division within the Science Mission Directorate (SMD), and in the Human Exploration and Operations Mission Directorate (HEOMD). Across the directorates, NASA estimates the extent to which each mission and program contributes and relates to meteorological operations and research activities. Only missions and programs relevant to meteorological operations and research are included as part of this report, with select missions and programs highlighted below.

- **Earth Science Research:** Projected FY18 budget of \$30 million. Earth Science Research addresses complex, interdisciplinary Earth science problems in pursuit of a comprehensive understanding of the Earth system. This strategy involves six interdisciplinary and interrelated science focus areas, one of which is specifically dedicated to weather research. Projected FY18 budget of \$12 million, down from \$14 million in FY17, will provide

continued support to Research and Analysis (R&A) projects, including competed research investigations as well as airborne field campaigns such as the Clouds, Aerosol, and Monsoon Processes Philippines Experiment (CAMP2Ex). In addition, continued support in the amount of \$6 million is planned for weather related Interdisciplinary Science (IDS) projects and \$5 million for the Global Modeling and Assimilation Office (GMAO) focusing on the development of a global atmospheric model and data assimilation system.

- **Earth System Missions (ESM):** Projected FY18 budget of \$151 million. ESM includes a broad range of multi-disciplinary science investigations aimed at understanding the Earth system and its response to natural and human-induced forces and changes. For the Global Precipitation Mission (GPM), a senior review was conducted in the spring of 2017. Projected FY18 budget of \$16 million will support the continuing operation of GPM and producing a long term GPM Integrated Multi-satellite Retrievals for GPM (IMERG) data record in 2018. Projected FY18 budget of \$73 million, an increase of \$24 million from FY17, is planned for Surface Water and Ocean Topography (SWOT) mission to enter the implementation phase. In FY17, SWOT completed the critical design for the Ka-band Radar Interferometer (KaRIn) instrument and conducted the KaRIn critical design review (CDR) as well as the critical design of the integrated payload module and Payload CDR. In addition, NASA selected the launch vehicle for SWOT. In FY18, the SWOT project will complete the mission CDR. The Aqua satellite underwent senior review in 2017. Projected budget of \$2 million in FY18 will allow the project to collect valuable data about the atmosphere, oceans, land, and ice. The Radiation Budget Instrument (RBI) was identified for termination in FY18 President's Budget Request which represents a reduction of \$42 million from the FY17 level.

- **Earth System Science Pathfinder (ESSP):** Projected FY18 budget of \$38 million. ESSP provides frequent, competitively selected Earth science research opportunities, including space missions and remote sensing instruments for space-based missions of opportunity or extended duration airborne science missions. ESSP also supports the conduct of science research using data from these missions. In FY17, NASA supported development of two instruments selected as part of the third Earth Venture Instrument competition: the Multi-Angle Imager for Aerosols (MAIA) will provide observations of small atmospheric aerosols (at \$14 million in

FY17) while the Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) will track development of tropical cyclones (\$7 million). Projected FY2018 budget of \$19 million for MAIA and \$6 million for TROPICS will support further development efforts leading to an anticipated launch in late FY18.

- ***Earth Science Multi-Mission Operations (MMO)***: Projected FY18 budget of \$20 million. MMO acquires, processes, preserves, and distributes observational data from operating spacecraft to support Earth Science research, primarily through the Earth Observing System Data and Information System (EOSDIS) and its discipline-specific Distributed Active Archive Centers (DAACs). In FY17, EOSDIS DAACs supported several newly launched missions, including Lightning Imaging Sensor (LIS), Stratospheric Aerosols and Gas Experiment-III (SAGE-III), and Total and Spectral solar Irradiance Sensor-1 (TSIS-1), instruments deployed to the International Space Station, as well as the Cyclone Global Navigation Satellite System (CYGNSS) and Tropospheric Emissions Monitoring Pollution (TEMPO) satellite missions. In FY18, EOSDIS will also support the Ice, Cloud, and land Elevation Satellite-2 (ICESat-2), Gravity Recovery and Climate Experiment (GRACE) Follow-on, and ECOSystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS), as well as preparing capabilities for the NASA-ISRO Synthetic Aperture Radar (NISAR) and Surface Water Ocean Topography (SWOT) missions currently in development.

- ***Heliophysics Space Weather***: Projected FY18 budget of \$380 million. NASA supports space weather research through the Heliophysics Division. One of the division's objectives is to understand the Sun and its interactions with the Earth and the solar system, including space weather. As part of this, the Living with a Star (LWS) Parker Solar Probe mission will trace the flow of energy and understand the heating of the solar corona, the Sun's outer atmosphere, and explore what accelerates the solar wind by flying through the solar corona in the region where these processes happen. Instrument development and integration with the spacecraft observatory were funded at a level of \$233 million in FY17. Projected budget of \$242 million will support further environmental and mechanical testing planned for FY18 as well as launch and early orbit mission operations. Another LWS mission, Solar Orbiter is a collaborative mission with European

Space Agency (ESA). The mission, including contributed NASA instruments, will perform a close-up study of our Sun and inner heliosphere using a combination of in-situ and remote-sensing instruments. In FY17, \$80 million supported development of the NASA instruments that were provided to ESA for integration with the spacecraft observatory. Projected budget of \$59 million in FY18 will include support of additional spacecraft testing and preparations for launch. A projected FY18 budget of \$13 million will support mission operations for the Van Allen Probes mission as it continues its investigation of the Earth's radiation belts. FY18 budget request also includes a projected budget of \$29 million in additional investment within the Living With a Star Science program; this includes funds to accelerate space weather research efforts in support of the Administration's multi-agency Space Weather Action Plan.

References: NASA FY2018 Congressional Justification https://www.nasa.gov/sites/default/files/atoms/files/fy_2018_budget_estimates.pdf.

Earth Science Research: pages ES-2, 6-9

Earth Systematic Missions: pages ES-14, 15, 27, 50, 60, 63

Earth System Science Pathfinder: pages ES-67, 71, 73

Earth Science Multi-Mission Operations (MMO): page ES-84

Heliophysics Space Weather: pages Helio-15, 16, 22, 29, 30

Nuclear Regulatory Commission

The Nuclear Regulatory Commission's (NRC's) funding request for meteorological activities in the FY 2018 President's budget request totals \$1.1 million. This is a 21% increase from the FY 2017 enacted funding. This funding supports NRC's total planned contract expenditures for meteorological operations and supporting research to continue in the following areas:

- ***Research on Application of Point Precipitation Frequency Estimates to Watershed-Scale Flood Modeling***. The objective of this project is to develop guidance on the application of NOAA point precipitation estimates to watersheds (i.e. conversion of point estimates to areal estimates). This work is motivated by the Probabilistic Flood Hazard Assessment (PFHA) User Need.
- ***Maintain MACCS atmospheric transport model and integrate an alternate model, HYSPLIT, into the MACCS consequence analysis code***. The MELCOR Accident Consequence Code System (MACCS) atmospheric transport and dispersion (ATD) model uses a Gaussian plume segment model for probabilistic consequence assessment (PCA) due to its flexibility, computational efficiency, and

modest data needs. In FY18, the NOAA HYSPLIT model is being integrated with MACCS to offer both puff and particle dispersion model which will accept a wide variety of high quality publicly available meteorological data and provide graphical capabilities. Additional FY18 efforts include general code maintenance to support the ATD models and the WinMACCS GUI. These models are used to support regulatory applications involving health effects and environmental analyses. The resources also support participation in and activities with the ICMSR and FCMSR.

- **Radiation Protection Dispersion Computer Code Maintenance.** These resources are used to maintain and develop the NRC's Radiation Protection computer codes. FY18 efforts include ensuring compatibility with Windows 7, Section 508, verification and validation of the codes, and applicable Quality Assurance/Quality Control standards.
- **External Hazards Center of Expertise.** Within the NRC, the External Hazards Center of Expertise (EHCOE) assumes the duty of performing safety reviews for nuclear power plant siting, design, construction, and operation. This responsibility includes reviewing safety features of combined license (COL), early site permit (ESP), and design certification (DC) applications for new nuclear power plants and reviewing license amendment requests (LARs) for currently operating reactors. EHCOE was established on October 1, 2016 in order to consolidate specific external hazards backgrounds under one office, including the meteorologists and will streamline assignments and projects pertaining to these select backgrounds to one area of the agency. In FY18, the NRC will be responsible for the review of approximately one DC Renewal application, two ESP applications and three DC applications, including concurrent environmental reviews for the ESP applications. There are also various LARs scheduled for review in FY18.
- **Hydrometeorology and Water Resource Services.** NRC staff, in the EHCOE, reviews licensees' site-specific probable maximum precipitation (PMP) analyses that have been submitted in preference over generalized PMP estimates typically provided in NOAA's Hydrometeorological Reports (HMRs). As part of the review effort for these site-specific PMP evaluations, the NRC is engaging with other Federal agencies and subject matter experts in this particular field. The NRC continues to observe and determine how these studies relate to the existing HMRs and what acceptance criteria should be applied to

determine the adequacy of this methodology, from both a meteorological and hydrological perspective. Reference: USNRC FY 2018 Congressional Budget Justification <https://www.nrc.gov/docs/ML1713/ML17137A246.pdf>
New Reactors/Major Activities: page 31

Department of Energy

The Department of Energy (DOE) requested funding for meteorological activities in FY 2018 is an estimated \$88 million a 61.3% decrease from enacted funding in FY 2017. DOE conducts meteorological services and supporting research and related activities within several DOE entities: in National Nuclear Security Administration (NNSA) for Emergency and Space Weather operations (completed in FY2017), in the Office of Energy Efficiency and Renewable Energy (EERE) for the Wind Forecasting Improvement Project in Complex Terrain (WFIP 2), and in the Office of Science/Biological and Environmental Research (BER).

References: DOE FY2018 Budget Justification <https://www.energy.gov/cfo/downloads/fy-2018-budget-justification>

Vol 1: National Nuclear Security Administration

Vol 4: Science

Vol 3: Energy Efficiency and Renewable Energy

Office of Science/Biological and Environmental Research (BER)

The Office Science/BER FY 2018 request for funding is \$88 million. The Office of Science supports research involving atmospheric and ecological sciences as well as research on integrative earth system modeling. The BER Earth and Environmental Systems Sciences (EESS) activity (formerly the Climate and Environmental Sciences activity) focuses on a predictive, systems-level understanding of the fundamental science associated with a systems level understanding of the predictability of atmospheric, ecological, climate, and earth system dynamics, variability, and change. As a basic science funding organization within the DOE Office of Science, EESS activity does not provide climate services to federal, state, or local agencies nor does it conduct research for the purpose of improved operations or climate services. Through its support for basic research, BER contributes to the fundamental understanding of Earth system models and dynamics.

National Nuclear Security Administration (NNSA)

Office of Emergency Operations. The DOE/NNSA request for funding related to coordinating and

supporting operational meteorological programs at Defense Nuclear Facilities (DNF) in the FY 2018 President's budget request is \$400K compared to FY 2017 enacted funding of \$350K, a 14.3% increase. Requested FY 2018 funds would allow NNSA to continue funding the DOE Meteorological Coordinating Council (DMCC) activities, provide meteorological expertise, and support Consequence Assessment Modeling tools in support of the NNSA Emergency Management and Response Enterprise. Funding for operational meteorological programs at DOE/NNSA Defense Nuclear Facilities is being researched and will be included in next year's report.

Space Weather Services. The DOE/NNSA budget request for FY18 does not include a request for funding related to space weather services. Previously reported activities in this area have been completed and are discontinued.

Office of Energy Efficiency and Renewable Energy (EERE)

Wind Forecasting Improvement Project in Complex Terrain (WFIP 2). The DOE/EERE request for funding related to meteorological supporting research for FY 2018 is \$444k compared to \$400k enacted in FY2017, a 10% increase. Requested FY 2018 funds would allow DOE-EERE to continue to fund the analysis from the Wind Forecasting Improvement Project in Complex Terrain (WFIP 2). WFIP 2 is focused on improving the physical understanding of atmospheric processes in complex terrain impacting wind industry forecasts and incorporating the new understanding into foundational weather forecasting models.

Department of State

In the FY 2018 President's budget request and Congressional Budget Justification, the Department of State (DOS) did not include an explicit request for funding related to meteorological services and supporting research. Previously reported programs have been discontinued.

Smithsonian Institution

Global Volcanism Program (GVP). The Smithsonian Institution requested funding for meteorology-related activities in FY 2018 is \$15K to support the Natural History Museum, Global Volcanism Program. This funding level is comparable to FY2017 levels. The GVP collects, catalogs, and disseminates information on over 1,500 volcanoes active in the last 10,000 years, using a small staff working regular busi-

ness hours Monday to Friday in the Natural History Museum in Washington, D.C.

National Science Foundation

The National Science Foundation (NSF) request for funding related to meteorological supporting research in the FY 2018 President's budget request is \$120.7 million, a 10% decrease from FY 2017 enacted funding levels. Requested FY 2018 funds would allow NSF to continue to fund research related to basic meteorology, climate, and space weather. NSF proposal requests are community-driven, which allows funding to move to emerging areas of interest. In addition, the funding would ensure that facilities, both observational and computational, are made available for community use. NSF awards grants to single investigators or small collaborative groups working on specific topics, as well as larger interdisciplinary groups and the National Center for Atmospheric Research.

- NSF funds research on processes related to physical and mesoscale meteorology at a projected level of \$54.6 million in FY18. This level of funding will allow NSF to support basic research on observational systems, analysis techniques and understanding of phenomena that will help to improve weather forecasts and public safety. Recent major investments include the study of the initiation and upscale growth of convection into organized systems and the characteristics of boundary layer flow over terrain. NSF has also started a program called PREEVENTS (Prediction of and Resilience against Extreme Events) which has high relevance to basic meteorological processes.
- NSF funds basic climate research, modeling, and process studies at a projected level of \$46.1 million in FY18. NSF invests in the Community Earth System Model (CESM), a fully-coupled global climate model that provides state-of-the-art simulations of the Earth's past, present, and future climate states. NSF also funds the supporting infrastructure for climate studies by making computing resources required to perform data-intensive simulations available for community use. As a basic science funding agency, NSF does not directly provide climate services to federal, state, and local agencies, but through its funding of basic science research, NSF contributes to the fundamental understanding of the climate system which is required for the provision of climate services.

NSF funds supporting research on Space Weather at a projected level of \$20.0 million in FY18. NSF supports the National Space Weather Strategy and National Space Weather Action Plan in pursuing the

program's objective to perform the research and technology transfer needed to improve the specification and forecasts of space weather events that can cause disruption and failure of space-borne and ground-based technological systems and that can endanger human health. Space weather relevant research efforts include the development of large-scale space weather forecast models, construction and operation of advanced ground-based instruments and networks for the observation of space weather parameters, and the development and demonstration of innovative and creative small space weather satellites.

References: NSF FY2018 Budget Request to Congress

References: NSF FY2018 Budget Request to Congress

<https://www.nsf.gov/about/budget/fy2018/pdf/fy2018budget.pdf>

[Geosciences Section – GEO-6](#)

(pdf Tab 4-4, page 134)

Budget Tables

Table 1. Meteorological Services and Supporting Research by agency -- funding levels (not actual spending) for three consecutive fiscal years:

- Enacted Budget for Fiscal Year 2016
- Enacted Budget for Fiscal Year 2017
- President's Budget Request for Fiscal Year 2018

Table 2. Funds transferred (or planned) during Fiscal Year 2017 for meteorological services and supporting research activities:

- Only transfers near or exceeding a \$1 million dollar threshold are included.

TABLE 1 - Meteorological Services and Supporting Research*, in millions

Agency	Total		
	FY16	FY17	FY18
Agriculture	82	75	85
Commerce/NOAA (Subtotal)	3704	3567	3086
NWS	1124	1122	1058
NESDIS	2351	2202	1815
OAR	163	175	143
NOS	32	32	32
OMAO	34	36	38
Defense (Subtotal)	303	248	301
Air Force	152	104	152
Navy	127	117	124
Army***	24	27	24
Homeland Security (Subtotal)	30	32	32
FEMA		2	2
USCG	30	30	30
Interior/BLM (Subtotal)	70	43	37
BLM	5	5	4
NPS	3	3	3
USGS	62	36	30
Transportation (Subtotal)	370	255	315
FAA	368	253	313
FHWA	2	2	2
EPA	7	6	3
NASA	651	641	622
NRC	2	1	1
DOE (Subtotal)	244	229	88
Science BER	238	229	88
NNSA	3	0**	0**
EERE/WFIP	3	0**	0**
DOS	3	0	0
Smithsonian	1	0**	0**
NSF	134	134	121
TOTAL	5601	5231	4690

*The FY 2016 and 2017 funding reflect Congressionally appropriated funds; the FY 2018 funding reflects the amount requested in the President's FY 2018 budget

**contributions less than \$500K rounded to 0

***from inputs reported by unit program managers

AGENCY FUNDING

TABLE 2 - Interagency Fund Transfers for Meteorological Operations and Supporting Research for FY2017, Estimated or Planned

Transferred			
From:	To:	Amount (M)	Purpose
DOC/NOAA			
NESDIS	NASA	1582.72	JPSS program management, systems engineering, mission assurance services. Performance measure baseline validation reviews, and procurement and development for PFO. McMurdo ground station use. NOAA Satellite Observing System Architecture study. DSCOVR sustaining engineering support. GOES-R Series spacecraft, instruments and launch vehicles.
NESDIS	DOD	2.90	GOES-R technical and satellite support for satellite development programs
NESDIS	NTIA	2.30	Satellite Ground Services assistance with acquisition of a Radio Frequency Interference Monitoring System
NWS	NASA	2.56	Occupancy services provided by Stennis Space Center
DOD			
Air Force	DOC/NOAA/NWS	7.88	DAPE, DOMSAT, JPSS, MDCRS, NEXRAD (NWS PME/DPEM)
Air Force	NASA	0.95	Land Information System work
Navy	NSF	4.00	Very Long Baseline Array (VLBA) operation
Army/ATEC	NCAR	2.44	4DWX Model Support
USACE	DOI/USGS	2.07	Hydro-meteorological collection
DOT			
FAA Weather	DOC/NOAA/NWS	17.00	IAA-Center Weather Service Unit
FAA Weather	DOC/NOAA/NWS	11.00	IAA-ASOS/ALDARS

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Federal Coordination and Planning for Meteorological Services and Supporting Research

2

The mission of the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) is to foster the effective use of Federal meteorological resources by encouraging and facilitating the systematic coordination of weather services and supporting research across the Federal Weather Enterprise.

The OFCM operates with policy guidance from the Federal Committee for Meteorological Services and Supporting Research (FCMSSR). The principal work in coordinating meteorological activities and in the preparation and maintenance of OFCM reports, plans, and other documents is accomplished by the OFCM staff with the advice and assistance of the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and 18 program councils, committees, working groups, and joint action groups. The individuals who serve on these coordination entities are Federal agency representatives.

Brief History of the Federal Coordination Process

Congress directed in Section 304 of Public Law 87-843 (the Appropriations Act for State, Justice, Commerce, and Related Agencies) that the Bureau of the Budget prepare an annual horizontal budget for all meteorological programs in the Federal agencies. The Bureau of the Budget (now the Office of Management and Budget, OMB) issued a set of ground rules to be followed in the coordination process. The Bureau tasked the Department of Commerce (DOC) to establish the coordinating mechanism in concert with the other Federal agencies. It also reaffirmed the concept of having a central agency—the DOC—responsible for providing common meteorological facilities and services and clarified the responsibilities of other agencies for providing meteorological services specific to their mandated missions.

The implementation of these directives by DOC led to the creation of the OFCM and the appointment of the first Federal Coordinator for Meteorological Services and Supporting Research (the Federal Coordinator). FCMSSR was established in 1964 to provide policy-level agency representation and guidance to the Federal Coordinator in addressing agency priorities, requirements, and issues related to services, operations, and supporting research.

FCMSSR comprises representatives of the 15 Federal agencies that engage in meteorological activities or supporting research, have a major need for meteorological services, or set policy and direction for such services and research. These 15 agencies are the Departments of Agriculture (USDA), Commerce (DOC), Defense (DOD), Energy (DOE), Homeland Security (DHS), the Interior (DOI), State (DOS), and Transportation (DOT); the Environmental Protection Agency (EPA), National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), National Transportation Safety Board (NTSB), Nuclear Regulatory Commission (NRC); OMB and the Office of Science and Technology Policy (OSTP). The Under Secretary of Commerce for Oceans and Atmosphere, who is also the Administrator of the National Oceanic and Atmospheric Administration (NOAA), serves as the FCMSSR Chairperson.

OFCM Coordinating Infrastructure

The OFCM coordinating infrastructure diagram (Figure 1) shows the current committees, working groups (WGs), and joint action groups (JAGs) through which OFCM carries out its mission. FCMSSR is shown at the top of the diagram as the policy guidance advisor to its subordinate elements and the Federal Coordinator.

Program councils are executive bodies that coordinate

the acquisition and management of cross-agency systems or important, broad initiatives. Working groups are intended to serve enduring coordination functions. Joint action groups are temporary elements established to address specific, short-term objectives.

The program councils, committees, working groups, and joint action groups operate at the executive, management, and subject matter expert levels to provide

1. A forum for reporting activities, challenges, and achievements;
2. A mechanism for coordinating change and solving problems;
3. A method for collecting, documenting, and consolidating agency requirements and inventories;
4. A body for coordinating cross-agency system development;
5. A vehicle for collaborating with other groups internal and external to the coordinating infrastructure; and
6. A mechanism for preparing studies, agreements, standards, protocols, reports, and national plans.

Using these multiagency groups, OFCM pursues

the following objectives as the means to achieve its mission:

- Coordinating the exchange of information, plans, and concerns among the FWE agencies, to help the Nation get the most effective use from the \$5.3 billion collectively spent annually by the partner agencies.
- Providing a strategic view of interagency Federal weather efforts to support decisions at executive leadership levels of partner agencies.
- Producing and maintaining foundational meteorological documents including Federal Meteorological Handbooks and the National Hurricane Operations Plan.

Coordination Activities for Fiscal Year 2017

Federal coordination activities during FY 2017 and plans for FY 2018 are described here, organized by program/mission area and ICMSR standing committee. The highlights begin with program/mission area followed by the ICMSR standing committees, working groups, and joint action groups.

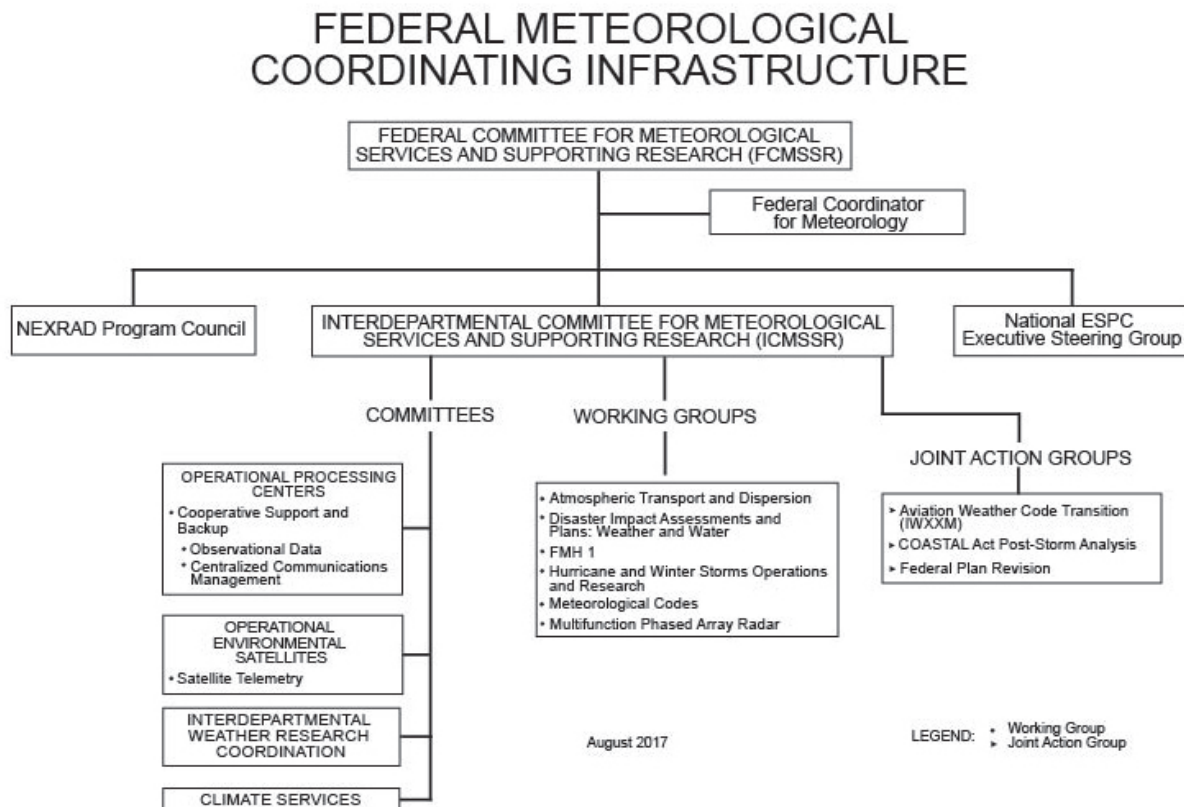


Figure 1: The Federal Coordinating Infrastructure.

Programs and Mission Areas

During the OFCM leadership transition in 2015, the OFCM conducted a thorough mission review of the Federal Meteorological Coordinating Infrastructure. A clear message was received by the participating agencies that the infrastructure should be streamlined. Toward that end the functions of the existing Program Councils were absorbed by the ICMSSR. Since that time, the NEXRAD Program Council was reactivated at the request of the agencies.

Aviation Weather

The OFCM participates in a variety of Next Generation Air Transportation System (NextGen) Interagency Planning Office (IPO) activities, including the NextGen Weather Advisor meetings and NextGen Executive Weather Panel (NEWP) meetings. The OFCM is also involved in other efforts that dovetail with aviation weather concerns, including supporting the Friends and Partners of Aviation Weather (FPAW), (the OFCM participated in a panel discussion on interagency cooperation at the FPAW summer meeting on July 13, 2017) and groups dealing with wind turbine radar interference, the Spectrum Efficient National Surveillance Radar, and meteorological codes and observing practices.

Earth System Prediction Capability

The National Earth System Prediction Capability (ESPC) is a consortium of NOAA, DOD, NASA, DOE and NSF, focused on improving collaboration on the development and implementation of global numerical prediction from intermediate to extended time scales. The National ESPC advocates for and supports the development of the basic architectural foundations such as common model architectures, data and archive standards, computational efficiency and standardized forecast skill metrics. The OFCM serves as executive secretary for the ESPC Executive Steering Group, which meets three times a year to track progress and provide guidance.

Next Generation Weather Radar Program Council

The Next Generation Weather Radar (NEXRAD) Program Council (NPC), made up of senior leaders from the National Weather Service, the Federal Aviation Administration, and the U.S. Air Force, convenes several times a year to address issues related to the future of the WSR-88D radars. Specific issues under consideration are manpower requirements

at the joint Radar Operations Center and possible changes to radar ownership.

Space Weather

The OFCM provides Executive Secretary services for the OSTP Space Weather Operations, Readiness, and Mitigation (SWORM) Task Force and its six subordinate Working Groups as well as collaborating with OSTP in managing the National Space Weather Program (NSWP) and executing space weather elements of the Space Weather Action Plan.

The Space Weather Enterprise Forum Working Group (WG/SWEF) was expanded to include participation from the commercial and academic space weather community to form the nucleus of the National Space Weather “Partnership” (NSWP). The NSWP conducted the 2017 SWEF with support from USAF and the Secure World Foundation at the National Transportation Safety Board (NTSB) Conference Center in Washington, DC on June 27, 2017. A record 270 people registered for the event.

OFM staff also published the definitive history of the NSWP in the peer-reviewed American Geophysical Union Space Weather Journal. Citation: Bonadonna, M., L. Lanzerotti, and J. Stailey (2016), The National Space Weather Program: Two decades of interagency partnership and accomplishments, *Space Weather*, 15, doi:10.1002/2016SW001523.

Committees

Federal Committee for Meteorological Services and Supporting Research

The Federal Committee for Meteorological Services and Supporting Research (FCMSSR) provides a formal mechanism for interagency coordination on implementing national policy relating to, and developing plans and procedures for, cooperative Federal agency efforts in the development, acquisition, continuous operability, and increased effectiveness of meteorological services for the Nation. FCMSSR is the highest level coordinating body in the OFCM infrastructure. This committee meets twice each year. Meetings in 2017 addressed, inter alia, changes to the Federal Plan for Meteorological Services and Supporting Research, the Weather and Forecasting Innovation Act of 2017, and the Spectrum Efficient National Surveillance Radar program.

Interdepartmental Committee for Meteorological Services and Supporting Research

The Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) supports the FCMSR and guides the activities of the OFCM and the committees, working groups, and joint action groups in the OFCM coordinating infrastructure. ICMSSR meets quarterly. ICMSSR agendas often parallel FCMSR agendas, but may include topics raised by subordinate groups or the OFCM, as well as detailed presentations on items of interest.

Committee for Climate Services

Since restarting the Committee for Climate Services, two meetings were held (November 2016 and March 2017) in Silver Spring, Maryland. The committee elected co-chairs from the National Weather Service and the U.S. Department of Agriculture and began drafting a Terms of Reference. Members have also begun the process of providing a list of services they provide and describing why they are important. The committee has a close working relationship with the U.S. Global Climate Research Program (USGCRP).

Committee for Operational Environmental Satellites

The Committee for Operational Environmental Satellites (COES) conducted four meetings in FY2017. It continued to document key issues facing agency use of operational environmental satellite systems. It reviewed USAF plans for meeting space-based environmental monitoring gaps and follow-on capabilities to succeed the Defense Meteorological Satellite Program. It also reviewed the status of NOAA and NASA environmental satellite missions, products, and services. In addition, COES discussed ongoing efforts on commercial weather data programs managed by NOAA, NASA, and the USAF.

Committee for Operational Processing Centers

The Committee for Operational Processing Centers (COPC) consists of representatives from NOAA's NWS/National Centers for Environmental Prediction and NESDIS/Office of Satellite and Product Operations, USAF/55th Weather Wing, the Navy's Fleet Numerical Meteorology and Oceanography Center and Naval Oceanographic Office. The committee collaborates on issues regarding numerical weather and ocean prediction modeling efforts, data resources, and atmospheric, oceanographic, and satellite data products.

COPC Working Group for Cooperative Support and Backup

The Working Group for Cooperative Support and Backup (WG/CSAB) serves as the executive agent for the COPC. The principal focus of the WG/CSAB is to coordinate and document the cooperative support and outage mitigation requirements related to the data collection and processing, and the development and dissemination of centralized meteorological, oceanographic, and satellite products among the National Operational Processing Centers (OPCs). Key activities included:

- Coordination of the data exchange of Himawari-8 data, Meteosat-8 for Indian Ocean Data Coverage, and GOES-16
- Implementation of two significant changes in NOAA's data distribution systems: NESDIS' Product Dissemination and Access enterprise system and NWS Telecommunications Gateways, two fully functioning data centers in Boulder, CO and College Park, MD, respectively.

COPC Working Group for Centralized Communications Management

The Working Group for Centralized Communications Management coordinates communications issues among the OPCs, monitors the effectiveness of those communications, and performs capacity planning and forward projection of capability needs. Key activities include:

- Monitoring and refining the newly established alternate connection between the DOD and NOAA OPCs.
- Working toward the long term development of data exchange through the DISA mandated NIPRNet Federated Gateway (NFG) /Mission Partner Gateway (MPG).

COPC Working Group for Observational Data

The Working Group for Observational Data (WG/OD) facilitates the acquisition (collection), processing, exchange, and management of observational data and metadata among the OPCs, the World Meteorological Organization (WMO), and other related data centers.

The working group satisfied a number of interagency satellite data exchange requests, continued to seek new satellite and ocean data sources and products, and continued the development of a new guidelines and procedures for the interagency management of conventional data. Key activities included:

- Testing of the Critical Infrastructure Protection satellite data services system.
- Data access and preparation for Jason-2, Sentinel-3A, and GOES-16 (R) satellites.
- Correcting critical metadata errors resulting from the transition from Traditional Alphanumeric Character (TAC) format to the Binary Universal Form for the Representation of meteorological information (BUFR).
- Implementation of the WMO Observing Systems Capability Analysis and Review tool (OSCAR/surface) metadata management system.
- Operational test and evaluation of high resolution radiosonde data software being installed across the United States.

Interdepartmental Weather Research Coordination Committee

The Interdepartmental Weather Research Coordination Committee (IWRCC) was realigned last year from an independent body associated with the National Science Foundation to a committee under ICMSSR within the FWE coordination structure. The IWRCC aims to promote and help coordinate basic and applied federal meteorological research activities in order to best leverage ongoing national and international science efforts. IWRCC activities this year included completing the administrative requirements of realignment, and establishing a working group to address the ongoing national and international efforts in high impact weather, seasonal to sub-seasonal prediction, and polar prediction.

Working Groups and Joint Action Groups

Working Group for Atmospheric Transport and Dispersion

The Working Group for Atmospheric Transport and Dispersion (WG/ATD) helped OFCM plan a special session at the 21st annual George Mason University (GMU) Atmospheric Transport and Dispersion Modeling Conference on June 13, 2017. The session provided the opportunity for Federal agencies to update the community on ATD operations and research activities within the FWE. Presentations were made by subject matter experts from the NASA Joint Center for Earth Systems Technology; NWS Office of Observations and the Analyze, Forecast and Support Office; the NOAA Office of Oceanic and Atmospheric Research Air Resources Laboratory; the DOE Brookhaven National Laboratory; the U.S. Army Research Laboratory; and the U.S. Naval

Research Laboratory.

Working Group for Disaster Impact Assessments and Plans: Weather and Water Data

The Working Group for Disaster Impact Assessments and Plans: Weather and Water Data (WG/DIAP) coordinates the interagency acquisition, dissemination, and exchange of weather and water data, especially highly perishable data, for weather and water related environmental disasters. These data are used for the assessment of impacts to national resources and infrastructure, for scientific and engineering research, and to supplement emergency response operations when feasible. Primary responsibilities include the oversight and management of the National Plan for Disaster Impact Assessments: Weather and Water Data (NPDIA) and promotion of cooperation among the participating agencies regarding disaster impact assessment responses to events causing significant impact to national resources and infrastructure. Key activities include:

- Completed the restructure of the NPDIA to simplify management of the plan.
- Renewed the annual agreement between OFCM and the U.S. Air Force for reimbursable funding to support Civil Air Patrol missions such as Alaska glacial lake damming assessments, tornado damage photos and video, and severe flooding imagery.
- Coordinated post-storm data acquisition surveys in response to significant tornado outbreaks and glacier dammed lake assessments.
- Coordinated impact zone, data collection responses to land-falling tropical storms.

Joint Action Group for the COASTAL Act Post-Storm Analysis

The Joint Action Group for the COASTAL Act Post-Storm Analysis (JAG/CAPSA) was formed to coordinate implementation of some aspects of the Consumer Option for an Alternative System to Allocate Losses (COASTAL) Act, passed by Congress in June 2012. In conjunction with NOAA, the JAG developed the COASTAL Act Capabilities Development Plan, which provides for the collection of the required observational data to support post-storm assessments.

During FY 2017, OFCM convened a JAG/CAPSA meeting for participating agencies to provide updates on the status of their efforts. It was agreed the JAG should meet annually and request ICMSSR approval to be re-established as a standing Working Group

under WG/DIAP.

Working Group for Federal Meteorological Handbook Number 1

The Working Group for Federal Meteorological Handbook Number 1 (WG/FMH-1) maintains the guidance for surface weather observing and reporting. The group recently completed a significant update to the handbook, which was provided to agencies for implementation in June 2017 and will become effective on November 30, 2017. Work is now underway on the next update.

Working Group for Hurricane and Winter Storms Operations and Research (WG/HWSOR)

This working group is being restructured to separate the hurricane and winter storm operations functions. The result will be the Working Group for Winter Storm Operations, which will be responsible for maintaining the National Winter Storm Operations Plan, and the Working Group for Hurricane Operations and Research, which will perform a variety of functions related to tropical cyclones including the role of the Working Group for Tropical Cyclone Research. The WG/HWSOR reviewed the 2016 National Hurricane Operations Plan (NHOP) and updated it for the 2017 season. This new version was published on May 1, 2017.

The WG/HWSOR takes advantage of the community gathering at the Tropical Cyclone Operations and Research Forum/Interdepartmental Hurricane Conference (TCORF/IHC) to conduct much of its work, but meets as needed at other times to address issues that cannot be resolved at the TCORF/IHC. The 2017 TCORF/71st IHC, held March 14-16 2017 at the Rosenstiel School for Marine and Atmospheric Science on Key Biscayne, Florida, was attended by about 140 professionals. The 2018 TCORF/72st IHC will be held March 13-15 2018 at Florida International University in Miami.

Working Group for Meteorological Codes

The working group assisted in the formulation of U.S. proposals and commented on the non-U.S. proposals presented at the annual meeting of the WMO Interprogramme Expert Team on Codes Maintenance (IPET-CM). Key takeaways from the IPET-CM meeting included updated guidance for the transition to WMO WIGOS station ID numbers, availability of high-resolution radiosonde data, and the status of ICAO Amendment 78.

Working Group for Multifunction Phased Array Radar

The interagency aspects of the Multifunction Phased Array Radar (MPAR) initiative have been subsumed by the Spectrum Efficient National Surveillance Radar (SENSR) program. Research and development on the application of phased array radar to observing weather continues. The work includes a variety of studies at the National Severe Storms Laboratory (NSSL) and other laboratories, and the Advanced Technology Demonstrator, a 4-meter aperture dual pole phased array radar to be installed next year at NSSL. The MPAR Working Group keeps the agencies updated periodically on MPAR R&D.

Joint Action Group for Federal Meteorological Handbook Policy

The Joint Action Group for Federal Meteorology Handbook Policy (JAG/FMH-P) was recently activated to review the need for the handbooks, what form they should take, whether they should be considered guidance or directive, and how they should be published.

Joint Action Group for the Federal Plan Revision

By direction from FCMSSR and guidance from OMB, the Joint Action Group for the Federal Plan Revision (JAG/FPR) drafted a proposal to replace the annual Federal Plan for Meteorological Services and Supporting Research (the Fed Plan), including a timeline for implementation. The new approach will include a 4-year Strategic Plan for Meteorological Coordination, which comprises concise statements of federal meteorological coordination policy guidance and strategic coordination objectives. In addition, starting with this transitional report for FY 2018, an annual report will be prepared immediately following the submission of the President's budget request. The new annual report will provide a horizontal view of federal spending on meteorological services and supporting research and an update on FWE progress toward the objectives in the strategic plan. As of this date, the strategic plan is awaiting FCMSSR approval. The FY 2018 Annual Report (this document) is a transitional report; the first full report will be submitted for FY 2019.

Joint Action Group for Aviation Code Transition

The Joint Action Group for Aviation Weather Code Transition (JAG/IWXXM) brings to together stakeholder agencies to coordinate the transition

from current Traditional Alphanumeric Character (TAC) code formats to ICAO's Extensible Markup Language (xml)-based formats. Products to be transitioned by 2020 include METAR/SPECI, TAF, SIGMET, AIRMET, Volcanic Ash Advisories, and Tropical Cyclone Advisories. The JAG is reviewing policy regarding the need for separate US schema and developing a transition plan to be complete by the end of calendar year 2017.

OFCM External Involvement

American Meteorological Society (AMS)

OFCM supports AMS activities by participating in AMS conferences and workshops, and serves on committees, groups, and teams as appropriate. OFCM co-moderated a panel discussion at the annual AMS meeting in January 2017 on Observing the Environment from the Ground Up, a review of the AMS Conference that OFCM co-hosted with AMS in March 2016. Also at the annual meeting, OFCM presented a paper at a session on radar research and development. OFCM staff serves on the AMS Committee for Nationwide Network of Networks and the AMS Water Resources Committee.

Interagency Coordinating Committee for Airborne Geosciences Research and Applications

The United States Interagency Coordinating Committee for Airborne Geosciences Research and Applications (ICCAGRA) was formed in the late 1990s to improve cooperation, foster awareness, and facilitate communication among the partner agencies within the U.S. government. Membership consists of most of the Federal agencies participating in the FWE. These agencies oversee numerous and varied manned and unmanned aircraft dedicated to geosciences research. ICCAGRA recently has been involved in overseeing standardization of instrument interfaces and data formats within the United States to improve access across the different agencies. OFCM participates as a member of ICCAGRA and has raised its profile by facilitating an overview presentation to ICMSSR.

National Academies of Sciences, Engineering, and Medicine's Board on Atmospheric Sciences and Climate

The OFCM continues its mutually beneficial interactions with the National Academies of Sciences Engineering, and Medicine (the National Academies). The Federal Coordinator participates in the National

Academies' Board on Atmospheric Sciences and Climate (BASC) strategic planning workshops and attends regularly scheduled BASC meetings. In addition, the OFCM provided program updates to the National Academies' Space Science Board (SSB) and its Committee on Space and Solar Physics (CSSP). The OFCM anticipates that the CSSP will continue to invite the NSWP members and the Executive Secretary to participate in its semiannual meetings.

Office of Science and Technology Policy (OSTP)

OFCM provides Executive Secretary support for the Space Weather Operations, Readiness, and Mitigation (SWORM) Task Force and all six of its subordinate Working Groups.

OFCM also participates in the US Group for Earth Observations (USGEO) managed through OSTP. In 2017, OFCM provided a subject matter expert for the triennial Earth Observing Assessment (EOA), supported development of the 2017 National Plan for Civil Earth Observations, and provided space weather content for the 14th Global Earth Observation Plenary Conference.

2017 Activities Review

January

- *American Meteorological Society Annual Meeting

February

- Interagency Weather Research Coordination Committee

March

- Climate Services Committee
- Tropical Cyclone Operations and Research Forum/71st IHC
- Committee for Operational Environmental Satellites
- Interdepartmental Committee for Meteorological Services and Supporting Research

April

- Federal Committee for Meteorological Services and Supporting Research

May

- Committee for Operational Processing Centers
- *AMS Washington Forum
- *Space Weather Workshop
- NEXRAD Program Council

June

- GMU Atmospheric Transport and Dispersion Conference Special Session on Federal Agency Activities
- *Interagency Coordinating Committee for Airborne Geosciences Research and Applications (ICCAGRA)
- Research Coordination Committee
- Committee for Operational Environmental Satellites
- Interdepartmental Committee for Meteorological Services and Supporting Research
- Space Weather Enterprise Forum

July

- *Friends and Partners in Aviation Weather

August

- Research Coordination Committee

September

- Committee for Operational Environmental Satellites
- Interdepartmental Committee for Meteorological Services and Supporting Research

Asterisks indicate meetings not sponsored by OFCM.

FY 2017 OFCM Publications

The publications listed in table 3 were added to OFCM's website (<http://www.ofcm.gov>) during FY 2017.

Table 3: FY17 OFCM Publications

OFCM Publication	Date	Number
Federal Plan for Meteorological Services and Supporting Research, Fiscal Year 2017	September 2016	FCM-P1-2016
National Hurricane Operations Plan 2017 Build 17.X Dual Pol WSR-88D Tropical Cyclone Operations Plan 17.X "QUICK CHECK" List 2017 Build 16.1 Dual Pol WSR-88D Tropical Cyclone Operations Plan 16.1 "QUICK CHECK" List	May 2017	FCM-P12-2017
2017 Tropical Cyclone Operations and Research Forum/71st Interdepartmental Hurricane Conference Summary Report	April 2017	n/a
Summary report of the Special Session, 21st Annual George Mason University (GMU) Atmospheric Transport and Dispersion Modeling Conference	July 2017	n/a
Federal Standard for Siting Meteorological Sensors at Airports Change 1	December 2016	FCM-S4-1994
National Plan for Disaster Impact Assessments: Weather and Water Data	March 2017	FCM-P33-2017
Summary Report of the Space Weather Enterprise Forum	July 2017	n/a