

SECTION 2

RESOURCE INFORMATION AND AGENCY PROGRAM UPDATES

The tables in this section summarize budgetary information of the federal government for Fiscal Years 2003 and 2004. The funds shown are those used to provide meteorological services and associated supporting research that has as its immediate objective the improvement of these services. Fiscal data are current as of the end of July 2003 and are subject to later changes. The data for FY 2004 do not have legislative approval and do not constitute a commitment by the United States Government. The budget data are prepared in compliance with Section 304 of Public Law 87-843, in which Congress directed that an annual horizontal budget be prepared for meteorological programs conducted by the federal agencies.

AGENCY OBLIGATIONS FOR METEOROLOGICAL OPERATIONS AND SUPPORTING RESEARCH

Table 2.1 contains fiscal information, by agency, for meteorological operations and supporting research. The table shows the funding level for Fiscal Year (FY) 2003 based on Congressional appropriations, the budget request for FY 2004, the percent change, and the individual agencies' percent of the total federal funding for FY 2003 and FY 2004.

DEPARTMENT OF AGRICULTURE (USDA)

The USDA budget request for FY 2004 is \$47.2 million for operations and supporting research, representing a slight decrease from FY 2003.

Major USDA operational activities include specialized weather observing networks, such as the snow telemetry (SNOTEL) system operated by the Natural Resources Conservation Service (NRCS) 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, the irrigation water supply estimates, and Bureau of Land Management operations.

USDA and the Department of Commerce (DOC) jointly operate a global agricultural weather and information center located in Washington, D.C. This Joint Agricultural Weather Facility operationally monitors global weather conditions and assesses the

impacts of growing season weather on crop and livestock production prospects. This information keeps crop and livestock producers, farm organizations, agribusinesses, state and national farm policy-makers, government agencies, and foreign buyers of agricultural products apprised of worldwide weather-related developments and their effects on crops and livestock. Furthermore, tracking weather and crop developments in countries that are either major exporters or importers of agricultural commodities keeps the agricultural sector informed on potential competitors. USDA is also actively involved in drought monitoring efforts in concert with the National Drought Mitigation Center.

For supporting research, USDA funds research projects through the Cooperative State Research, Education and Extension Service (CSREES) that study the impact of climate and weather on food and fiber production. The goal of supporting research is to develop and disseminate information and techniques to ensure an abundance of high-quality agricultural commodities and products while minimizing the adverse effects of agriculture on the environment. Furthermore, the Agricultural Research Service (ARS) conducts research on how annual variation in weather adversely affects crop and animal production, hydrologic processes, the availability of water

from watersheds, and the environmental and economic sustainability of agricultural enterprises.

The Forest Service supports a research program, initiated in 1988, for a long-term monitoring network to assess potential effects of global climate change and variability on forest health and productivity. The Forest Service is also the world leader in developing emissions factors from fires and modeling its dispersion.

DEPARTMENT OF COMMERCE (DOC)

All reported DOC meteorological activities are within the National Oceanic and Atmospheric Administration (NOAA). The NOAA FY 2004 total congressional request of \$1.79 billion for meteorological programs represents an increase of 17.2 percent over the FY 2003 appropriated funds. NOAA's FY 2004 operations and supporting research requests for major line office activities are described below:

Weather Services

NOAA's National Weather Service (NWS) provides climate, water, and weather 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. NWS data and products form a national information database and infrastructure, which can be used by other gov-

TABLE 2.1 METEOROLOGICAL OPERATIONS AND SUPPORTING RESEARCH COSTS*, BY AGENCY
(Thousands of Dollars)

AGENCY	Operations			% of FY2004			Supporting Research			% of FY2004			Total			% of FY2003			% of FY2004			
	FY2003	FY2004	%CHG	FY2003	FY2004	TOTAL	FY2003	FY2004	%CHG	FY2003	FY2004	TOTAL	FY2003	FY2004	%CHG	FY2003	FY2004	TOTAL	FY2003	FY2004	TOTAL	
Agriculture	14792	14552	-1.6	0.6	32859	32679	-0.5	8.1	47651	47231	-0.9	17.2	55.7	59.1	1.6							
Commerce/NOAA(Subtot)	1427076	1691580	18.5	64.3	102118	101300	-0.8	25.2	1529194	1792880	17.2	55.7	59.1	1.6								
NWS	757610	820031	8.2	31.1	19630	20700	5.5	5.2	777240	840731	8.2	28.3	27.7	27.7								
NESDIS	640089	837521	30.8	31.8	25449	25594	0.6	6.4	665538	863115	29.7	24.2	28.4	28.4								
OAR	2097	3208	53.0	0.1	55220	53350	-3.4	13.3	57317	56558	-1.3	2.1	1.9	1.9								
NOS	16480	17330	5.2	0.7	350	500	42.9	0.1	16830	17830	5.9	0.6	0.6	0.6								
NOAA Corps	10800	13490	24.9	0.5	1469	1156	-21.3	0.3	12269	14646	19.4	0.4	0.5	0.5								
Defense(Subtot)	478404	484137	1.2	18.4	54041	43439	-19.6	10.8	532445	527576	-0.9	19.4	17.4	17.4								
Air Force	282771	277077	-2.0	10.5	14095	16317	15.8	4.1	296866	293394	-1.2	10.8	9.7	9.7								
DMSP**	11859	16100	35.8	0.6	3816	918	-75.9	0.2	15675	17018	8.6	0.6	0.6	0.6								
Navy	133281	130059	-2.4	4.9	18350	15450	-15.8	3.8	151631	145509	-4.0	5.5	4.8	4.8								
Army	50493	60901	20.6	2.3	17780	10754	-39.5	2.7	68273	71654.5	5.0	2.5	2.4	2.4								
Homeland Security (Subtot)	13400	14100	5.2	0.5	0	0	0.0	0.0	13400	14100	5.2	0.5	0.5	0.5								
USCG	13400	14100	5.2	0.5	0	0	0.0	0.0	13400	14100	5.2	0.5	0.5	0.5								
Interior/BLM	1100	1100	0.0	0.0	0	0	0.0	0.0	1100	1100	0.0	0.0	0.0	0.0								
Transportation(Subtot)	429632	424838	-1.1	16.1	27516	28149	2.3	7.0	457148	452987	-0.9	16.7	14.9	14.9								
FAA	429632	424838	-1.1	16.1	25016	21199	-15.3	5.3	454648	446037	-1.9	16.6	14.7	14.7								
FHWA	0	0	0.0	0.0	2500	6950	178.0	1.7	2500	6950	178.0	0.1	0.2	0.2								
EPA	0	0	0.0	0.0	7500	7500	0.0	1.9	7500	7500	0.0	0.3	0.2	0.2								
NASA	2117	2354	11.2	0.1	154456	188271	21.9	46.9	156573	190625	21.7	5.7	6.3	6.3								
NRC	95	50	-47.4	0.0	0	0	0.0	0.0	95	50	-47.4	0.0	0.0	0.0								
TOTAL	2366616	2632711	11.2	100.0	378490	401338	6.0	100.0	2745106	3034049	10.5	100.0	100.0	100.0								
% of FY TOTAL	86.2%	86.8%			13.8%	13.2%			100.0%	100.0%												

*The FY 2003 funding reflects Congressionally appropriated funds; the FY 2004 funding reflects the amount requested in the President's FY 2004 budget submission to Congress.

**DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

ernmental agencies, the private sector, the public, and the global community.

The United States is the most severe weather-prone country on Earth. Each year, Americans cope with an average of 10,000 thunderstorms, 2,500 floods, 1,000 tornadoes, as well as an average of 6 deadly hurricanes. Some 90 percent of all presidentially declared disasters are weather related, causing approximately 500 deaths per year and \$11 billion in damage. Weather is directly linked to public safety, and about one-third of the U.S. economy (one-third equals about \$3 trillion) is weather sensitive. Seasonal and inter-annual variations in climate, like El Nino, led to economic impacts on the order of \$25 billion for 1997-98. All of these impacts are further magnified by current socio-economic trends such as population growth in severe weather-prone areas of the country, drought, and increasing demands for fresh water. In addition, key NOAA customers such as industry, state and local governments, and emergency managers are demanding more reliable and more specific weather, water, and climate information for use in key decision making. These multiple demands all point to the need to sustain and improve NWS' core observing, forecasting and warning services.

The NWS continues to establish and track key service performance improvement goals and has been recognized within and outside government as a leader in performance based management and for actually delivering on the goals it has set. With the FY 2004 budget, the NWS will continue to focus resources toward improving its core performance measures including tornado warning lead time (12 minutes); flash flood warning accuracy (89 percent); Winter Storm Warning accuracy (89 percent); 48 hr Hurricane track forecast error (129 nautical miles); Aviation Ceiling/Visibility accuracy (46 percent); marine wind speed forecast

accuracy (54 percent); and marine wave height forecast accuracy (66 percent).

The FY 2004 President's Budget Request supports the funding and program requirements to enable the NWS to better use science and technology to serve our citizens and fulfill its vision of becoming America's "no surprise" weather service. This vision states the NWS will produce and deliver forecasts that can be trusted, use cutting-edge technologies, provide services in a cost-effective manner, strive to eliminate weather-related fatalities, and improve the economic value of weather information.

Local Warnings and Forecasts: Base amount is \$580,600,000, with a \$4,050,000 net increase requested in FY 2004.

\$1,300,000 increase to sustain operations and maintenance of the Susquehanna River Basin Flood System. This system provides enhanced flood prediction capabilities to States along the Susquehanna River including New York, Pennsylvania, and Maryland. The requested funding will allow NWS to maintain this system at current service levels. Funds will support operations and maintenance of the current U.S. Geologic Survey river gauge network along the Susquehanna River and enhanced NWS hydrologic forecast and warning services.

\$3,550,000 increase to preserve critical weather observation services in the Pacific. This funding increase reflects the transfer of funding responsibility for the Pacific Island Compact to NOAA from the Department of the Interior. The transfer will preserve the weather observation infrastructure necessary to support core NOAA mission responsibilities in the Pacific such as aviation, typhoon, and marine forecasts; climate monitoring; and support to U.S. Navy Operations. This increase in funding is also needed to maintain the existing level of weather

forecast warning services to the Micronesian States. The U.S. maintains a Compact of Free Association (COFA) or agreement with the Republic of the Marshall Islands (RMI), the Federated States of Micronesia (FSM), and the Republic of Palau (ROP) to provide basic government and commerce services including weather services to these island nations. The Compact, which is currently administered by the Department of the Interior (DOI), provides the necessary funding to support the NWS Weather Service Offices (WSO) and associated weather warning, forecast, and observation services for these islands including WSO Majuro, RMI; WSOs Pohnpei, Yap and Chuuk of the FSM; and WSO Koror of ROP. The U.S. has recently renegotiated the current COFA agreement which expires at the end of FY 2003. COFA2, which will cover the next 20 years, assumes each agency involved will fund its COFA programs directly instead of through the DOI reimbursement arrangement.

\$2,200,000 increase to improve overall physical security at 149 NWS facilities. This increase is needed to preclude unauthorized individuals from entering and/or tampering with NWS property. After the Oklahoma City bombing in 1995, all Government buildings were assessed for vulnerability/threat conditions and rated on a five-tiered scale. The NWS facilities are rated at the II level. From FY 1996-FY 2000, DOC/NOAA funded the improvements necessary to meet the Level II requirements. Funding is now required to replace outdated equipment and establish continuing maintenance capacity to sustain Level II security compliance. The implementation plan for this initiative requires a series of one-time procurement actions plus recurring maintenance and technology upgrades. The NWS performed an agency wide assessment of its facilities and devel-

oped a list of outstanding security issues which must be addressed to comply with the level II requirements.

Only program increases are discussed in detail in this summary. The total amount for this budget activity also includes a base reduction of \$3,000,000 to reflect savings due to the NWS Modernization.

Procurement, Acquisition and Construction (PAC) - Systems Acquisition: Base amount is \$64,900,000 with a \$10,100,000 net increase requested in FY 2004.

\$3,740,000 increase for NEXRAD Product Improvement. This increase is needed to accelerate the deployment of the NEXRAD Open Radar Data Acquisition (ORDA) and the NEXRAD Dual Polarization improvements. The acceleration of ORDA will enable the NWS to improve tornado warning lead times from 11 minutes to 15 minutes by 2007 and save \$2.4 million from the total cost of the NEXRAD Product Improvement Program. The ORDA systems, when implemented, will double the range for detection of small tornadoes from 120km to 240km, increase coverage area for small tornadoes by 80 percent and accelerate volume scanning from 5 minutes to 2.5 minutes.

\$2,870,000 increase for Telecommunications Gateway Replacement. This increase is needed to begin a two year effort to replace the National Weather Service Telecommunications Gateway (NWSTG) switching system and repair and upgrade NWSTG facilities. The NWSTG is the NWS communications hub for collecting and distributing weather information to its field units and external users. Replacing the NWSTG system with up-to-date technology will reduce the current delays in collecting and disseminating data by reducing transit time through the NWSTG. The replacement will ensure reliable delivery of NWS products to users and will fully capitalize on better observation

data and prediction models to improve services.

\$2,000,000 increase for NWS Coastal Global Observing System to establish a Coastal-Global Ocean Observing System (C-GOOS) in the NWS. The C-GOOS is a new initiative fulfilling the U.S. coastal component of the international GOOS effort and addressing the mandate of the President's Commission on Ocean Policy and the National Oceanographic Partnership Program to bring together government, industry and academia. NOAA's C-GOOS will add oceanographic sensors to the existing NWS Marine Observational Network. These new ocean measurements will provide definitive information on the effects of the changing climate on coastal U.S. communities; improve forecasts of ocean conditions which adversely impact coastline erosion and the fishing, tourism, and oil and gas industries; allow biological and chemical water sampling; provide information on locations of marine endangered or protected species; and monitor coral reef health.

\$5,500,000 increase for All Hazards Warning Network. This increase will allow the NWS to automate the collection and dissemination of civil-emergency messages over NOAA Weather Radio (NWR). Today, the NWS broadcasts non-weather civil emergency messages over NWR for events such as earthquakes, chemical spills/release, nuclear release, biohazards, and fire under authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act and Federal Emergency Management Agency's Federal Response Plan. The current process for broadcasting emergency messages requires first responders and emergency managers to call the local NWS WFO to request a message to be re-typed by an NWS employee and sent out over the NWR network. This labor intensive process introduces delays in delivering critical emergency

information to the public, is prone to error, and is subject to potential security breach. The FY 2004 request for this activity is a one time cost to modify existing AWIPS communications software to allow emergency managers to directly transmit a civil emergency message over secure lines. The existing NWR network provides the most robust, Government owned and operated dissemination infrastructure capable of meeting the all-hazard broadcasting requirements with necessary upgrades. NWR is located in every state, linked to the Emergency Broadcast System and NOAA weather radio receivers are widely available in the commercial market.

Only program increases are discussed in this summary. The total amount for this budget activity also includes reductions of \$2,130,000 in AWIPS, and \$1,875,000 in Weather & Climate Supercomputing.

Procurement, Acquisition and Construction (PAC) - Construction: Base amount is \$10,600,000 with a \$13,400,000 net increase requested for FY 2004.

\$3,000,000 increase for Acceleration of Weather Forecast Office (WFO) construction to speed completion of the ongoing NWS Facilities Construction program, including Alaska facilities modernization and necessary corrective actions at NWS WFOs nationwide. The NWS plans to replace 13 outdated field offices and employee housing complexes in Alaska. The proposed acceleration will complete the program several years earlier (FY 2008 vs FY 2013), delivering an acceptable working and living environment to NWS employees quicker and saving approximately four million dollars in inflation and program management costs. The NOAA/NWS mission will be maintained and enhanced by having reliable and code-compliant facilities.

\$10,400,000 increase for the new NOAA Center for Weather and

Climate Prediction. Funds are required in FY 2004 to award a facility construction design/build contract to be managed by GSA, and fully fund the above standard construction costs for the project, ensuring building occupancy by 2007. This planned new facility will replace the current World Weather Building with a new state-of-the-art facility to meet the operational requirements of NWS's National Centers for Environmental Prediction (NCEP) and NESDIS's Office of Research and Applications and Satellite Services Division, and OAR's Air Resources Laboratory. The Department of Commerce, the State of Maryland, and academic community advisors have all agreed on a shared vision to build a Center of Excellence for Environmental Research, Education, Applications and Operations at a location in suburban Maryland near an academic research institution with the following objectives: meet NOAA operational requirements; create research synergy in weather and climate prediction; accelerate transition of new science and technology into operations; increase interaction between students and professors; and enhance recruitment opportunities.

Only program increases are discussed in this summary. The total amount for this budget activity does not include any reductions in FY 2004.

Environmental Satellite, Data, and Information Services

Proposed funding for FY 2004 includes an increase in the Polar-Orbiting Satellite Program of \$31.6 million and a increase in the Geostationary Satellite Program of \$50.1 million. These changes allow for continuation of procurements to provide the spacecraft and instruments, launch services, and ground systems necessary to assure continuity of environmental satellite coverage. The FY 2004 budget request will maintain a system of polar-orbiting satellites that obtains global data and a system of

geostationary satellites that provides near-continuous observations of the Earth's western hemisphere. Funding is included for NOAA's share of the converged NOAA and Department of Defense (DOD) polar-orbiting system that will replace the current NOAA series and the DOD Defense Meteorological Satellite Program (DMSP).

A total of \$4.0 million is requested to continue the Ocean Remote Sensing Program, which began in FY 1995. During the next several years, NOAA will acquire data from foreign and other non-NOAA satellites that will provide measurement of ocean currents, surface winds and waves, subsurface temperature and salinity profiles, ice thickness and flows, and other marine factors.

An increase of \$2.3 million is included to maintain basic mission services including maintenance and operation of satellite ground facilities; provision of satellite-derived products, including hazards support; and conduct of research to improve the use of satellite data..

Budgetary changes of an increase of \$1.43 million are included in the NOAA Data Centers and Information Services subactivity for base operating funds.

Ocean Service

Funding provided through the FY 2003 budget should allow the continuation of the second generation of the NOS CO-OPS advanced data quality control program, the Continuous Operational Real-time Monitoring System (CORMS AI), as well as the continued implementation of its development program of the Ocean Systems Test and Evaluation Program (OSTEP). The FY 2003 budget has allowed for sufficient support to operate the National Water Level Observation Network (NWLON) and the Physical Oceanographic Real-Time System (PORTS). The FY 2004 anticipated budget will not allow for full

operation of the NWLON in terms of meeting yearly maintenance requirements, however. Both the NWLON and PORTS programs have subsets of operational water level stations with meteorological sensors installed for various partners and users, including the NWS.

Under the NOAA-Wide Coastal Storms Initiative (CSI), targeted stations of existing federal and state tide station networks have been funded to be enhanced with new meteorological sensors. Under a NOAA Ocean Service Partnership Proposal first funded in FY 2002, a subset of the NWLON in the Great Lakes was enhanced with new meteorological sensors and with continuous GPS. Previously, special, water level stations were enhanced with meteorological sensors in the Gulf of Mexico with funding from the NWS Southern Region.

In FY 2004, plans are to work cooperatively with the NWS National Data Buoy Center to establish common procedures and data streams for meteorological and water level data from NOS and NDBC observing systems. NOS operational nowcast/forecast modeling activities are expanding and rely upon NWS Eta model data streams as hydrodynamic model drivers.

Office of Atmospheric Research

Requested funding for FY 2004 for Weather and Air Quality research is \$56.6 million--a decrease of 1.3 percent from FY 2003. Increases included a base adjustment of \$1.3 million to partially cover inflationary cost increases. There also were programmatic increases of \$13.7 million for: NOAA-wide Energy Security Program initiative (\$7.3 million); the United States Weather Research Program (directed principally toward severe local storm research (THORPEX - The Observing System Research and Predictability Experiment)) (\$1.3 million); base restorations (\$4.1 million); and tornado/ severe storm research

(phased-array radar) (\$1.0 million). Finally, terminations totalling \$15.8 million were proposed for: Atmospheric Investigation Regional Modeling Analysis and Prediction (AIRMAP) (\$5.0 million); New England Air Quality Study (\$1.75 million); the "STORM" Program at the University of Northern Iowa (\$0.35 million); targeted wind sensing (\$2.0 million), energy security (California) (\$2.0 million); and the NOAA profiler network (\$4.15 million)

National Polar-orbiting Operational Environmental Satellite System (NPOESS)

The FY 2004 DOC/DOD budget request for NPOESS is \$544.4 million. FY 2004 funds will be used for the continued development of system architecture, technology development efforts, and critical sensor and algorithm development. NPOESS is planned to be launched in FY 2010. This system will exploit advanced hardware and software technologies to produce a more reliable, longer-lived spacecraft with greater mission capability. In addition to new products, NPOESS will also provide a significant reduction in the time required to move from sensed to processed data.

DEPARTMENT OF DEFENSE (DOD)

The DOD total budget request for FY 2004 is \$527.6 million which represents a funding decrease of 0.9 percent from FY 2003. Specific highlights for each of the military departments are described below:

United States Air Force

United States Air Force (USAF) resources for meteorological support fall into several categories: general operations, investment and research, DMSP operations, and DMSP and National Polar-orbiting Operational Environmental Satellite System (NPOESS) supporting research. The total Air Force request (including DMSP and NPOESS) for FY 2004 is \$578.1

million.

General Operations: The operations portion of the FY 2004 budget request is \$277 million and provides the day-to-day environmental support to the DOD. These funds will pay for support to the USAF (both active duty and reserve components), the United States Army, nine unified commands, and other agencies as directed by the Chief of Staff of the Air Force. Just over 4,000 people conduct these activities at over 200 worldwide locations. These people include active duty military, Air Force reservists, Air National Guard weather flight personnel, weather communications and computer specialists, and civilians.

General Supporting Research: The FY 2004 budget request for Air Force supporting research is \$16.3 million. The Air Force continues development of the Space Weather Analysis and Forecast System (SWAFS). This project and other research efforts will investigate the electrodynamics of the Sun and Earth's magnetosphere, ionospheric dynamics, mesoscale meteorology, visible and infrared properties of the environment, and cloud parameterization and prediction.

DMSP Operations: Though funding for DMSP comes from the Air Force, this system is the major source of space-borne meteorological data for the military services and other high-priority DOD programs. Environmental data from DMSP sensors is also distributed to the National Weather Service (NWS), National Environmental Satellite, Data, and Information Service (NESDIS), the Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC) and the Naval Oceanographic Office (NAVOCEANO), and AFWA according to the Shared Processing Program agreement.

The operations portion of the FY 2004 budget request is \$16.1 million. The major portion of this funding is for on-orbit operations, tactical ter-

minal maintenance, and long-haul communications. These funds also pay operations costs for one dedicated command and control facility. DMSP funds for 119 military and civilian personnel associated with the operation of, and to a much smaller extent, the procurement of the DMSP system.

DMSP and NPOESS Supporting Research: The FY 2004 budget for DMSP R&D is \$0.9 million. The funds will be used for launch vehicle integration; system integration and testing; and mission sensor calibration and validation efforts. The FY 2004 DOD R&D budget for NPOESS is \$267.7 million. FY 2004 funds will be used for the development of system architecture, technology development efforts, and critical sensor and algorithm development. NPOESS is scheduled to be available in 2010 as a backup to the final launch of the NOAA polar-orbiting satellites and DMSP satellites. This system will exploit advanced hardware and software technologies to produce a more reliable, longer-lived spacecraft with greater mission capability.

United States Navy

The United States Navy FY 2004 budget request for meteorological programs is \$145.5 million. The request includes \$130 million for operational programs and \$15.4 million for supporting research.

The Navy Meteorology and Oceanography (METOC) program is truly unique. Focusing support in the environmentally complex coastal/littoral regions around the globe, Navy METOC is required to provide an assessment of the impact of weather and ocean phenomena on weapon systems. Additionally, and just as important, Navy METOC provides for safe flight and navigation in support of Naval, joint, and combined forces operating throughout the world's oceans. This task is accomplished with a cadre of highly trained military and civilian personnel, schooled in both the

sciences and warfighting applications. By teaming with and leveraging the efforts of other agencies and activities, Navy METOC meets these challenges in a most cost-effective manner, providing a full spectrum of products and services with only about 5 percent of the federal weather budget.

The Navy METOC program is required to provide comprehensive and integrated weather and ocean support worldwide. The Oceanographer of the Navy sponsors programs in four closely related disciplines - meteorology, oceanography, geospatial information and services, and precise time and astrometry. All are used to protect ships, aircraft, fighting forces, and shore establishments from adverse ocean and weather conditions, and to provide a decisive tactical or strategic edge by exploiting the physical environment to optimize the performance and efficiency of platforms, sensors, and weapons.

Owing to the crucial interrelationship of the oceans and the atmosphere, the Navy requires various oceanographic products to provide the requisite meteorological services. In addition to aviation and marine METOC support, the Navy provides a variety of unique services on demand, such as electro-optical, electro-magnetic and acoustic propagation models and products, METOC-sensitive tactical decision aids, and global sea ice analyses and forecasts.

Support to Navy operations is provided under the direction of the Commander, Naval Meteorology and Oceanography Command located at the Stennis Space Center, Mississippi. Naval METOC support starts with sensing the battlespace physical environment and culminates with weapons arriving on target and personnel operating in the battlespace without being adversely affected by physical environmental phenomena. Operational support for the Navy and Marine Corps includes the day-to-day provision of

meteorological and oceanographic (METOC) products and services. As naval operations in the littoral increase, Navy METOC support is directed towards providing on-scene capabilities to personnel that directly furnish environmental data for sensor and weapon system planning and employment. These on-scene capabilities are key elements for enabling the warfighters to take advantage of the natural environment as part of battlespace management.

Navy METOC systems acquisition is accomplished through the Space and Naval Warfare Systems Command, San Diego, California. Several major METOC operations support systems are being procured or undergoing upgrades.

Navy METOC Research and Development (R&D) is cooperatively sponsored by the Oceanographer of the Navy and the Chief of Naval Research. This area is not generally system-specific; instead, Navy R&D efforts typically have applications to meteorological, oceanographic, and/or tactical systems. Navy's tabulation of budget data includes R&D funding for basic research, applied research, demonstration and validation, and engineering and manufacturing development.

Initiatives of the Navy and Marine Corps, under sponsorship of the Oceanographer of the Navy, transition projects from exploratory development to operational Naval systems. Such efforts include advances in the Navy's METOC forecasting capability, enhancements to communications and data compression techniques, further development and improvement of models to better predict METOC parameters in littoral regions, and an improved understanding of the impact these parameters have on sensors, weapon systems, and platform performance.

As the U.S. Navy transforms under SEAPOWER 21, increased emphasis will be placed on the naval force's

capabilities for operational maneuverability, precise weapons employment, indefinite sustainment and protection of joint forces. The Navy METOC Community continues to work closely with research developers and operational forces to ensure that naval and joint force commanders will always have the most accurate, timely, and geo-referenced METOC information available for successful operations.

United States Army

The U.S. Army estimates a requirement for \$60.9 million for operational support and \$10.8 million in research and development in FY 2004. The total amount of money budgeted for weather support is estimated because the costs to support the Air Force Combat Weather Teams are normally part of the overall G-3 or G-2 operating budget at the MACOM, Corps, Division, or Brigade level and do not have their own program element or budget line. Operational support is projected to increase approximately \$10.5 million over the FY 2003 expenditures, research is estimated to decrease about \$7.0 million from the previous year, and staffing should remain stable. Systems upgrades and acquisitions at Army Materiel Command for the Integrated Meteorological System (IMETS) and the Meteorological Measuring Set - Profiler (MMS-P) programs account for the bulk of the projected increase in operational funding for the Army in this year's report. Decreases in funding support at the Army Research Laboratory are reflected in reductions in both basic research and applied research program dollars. Basic research was reduced by \$1.8 million and applied research by nearly \$5.2 million in FY 2004.

Army monies for meteorology are spent in four main areas: support to U.S. Army Artillery Met Sections (ARTYMET), support to U.S. Air Force Combat Weather Teams at Army locations, research and development related to the Army mission, and the

development, production, and maintenance of Army meteorological systems.

U.S. Army Major Commands (MACOMs) with Staff Weather Officers and their associated Combat Weather Teams provide the same support and services to Air Force weather personnel that they normally provide to Army personnel. This support is provided at all levels within the MACOM where Air Force Weather personnel are assigned. Support to Air Force Weather Teams includes the use of facilities for weather operations, medical support, the use of training facilities, office supplies, utilities and maintenance for weather facilities, vehicles and tactical equipment, and funding for official travel. Eighth U.S. Army, U.S. Army Europe, U.S. Army Pacific, Forces Command, and Training and Doctrine Command all provide support to Air Force weather personnel assigned at the MACOM level and below.

Major portions of MACOM meteorological budgets go to support Artillery Meteorology Sections, also known as ARTYMET Teams, or Met Sections. Artillery Met Sections release weather balloons and track their movement to measure both speed and direction of upper level winds. Wind data are then passed to the U.S. Army Artillery units for firing computations. Artillery Met Sections range in size from six personnel at a Light Division to twelve personnel at a Heavy Division. There are twenty-five Met Sections in the Active Component, with each Met Section averaging four hundred balloon flights per year. There are forty-eight Met Sections in the Army National Guard (ARNG), with each Met Section averaging approximately one hundred balloon flights per year. The ARNG's forty-eight teams employ 288 part time personnel. Each of the Guardsmen trains an average of 39 days per year, equating to 31 FTE positions for this report. Eighth U. S. Army, U.S. Army

Europe, U.S. Army Pacific, Forces Command, and the Army National Guard all support Met Sections. Training and Doctrine Command supports twenty-four military and civilian personnel at the U.S. Army Artillery School at Fort Sill, Oklahoma. These personnel train ARTYMET Teams on the use of the AN/TMQ-41 Meteorological Measuring Set.

The Army Corps of Engineers - Civil Operations has programmed funds in FY 2004 for operational programs and basic research related to meteorology. The Army Corps of Engineers - Military Operations has programmed funding for meteorological research and development efforts related to Army transportation and aviation.

Space and Missile Defense Command (SMDC) supports several meteorological missions. SMDC has funding designated for the operational support at the High Energy Laser Systems Test Facility (HELSTF) for contract services to operate and maintain the instrumentation, equipment, and facilities to support the atmospheric sciences/meteorological mission. HELSTF has also set aside monies for systems acquisition for repair and replacement of meteorological instrumentation and for data services. SMDC also operates contract support services to operate the Ronald Reagan Missile Defense Test Site for operations support and special weather programs. The Force Development and Integration Center provides space weather support through a 0.5 government staff year effort that will continue for FY 2004.

Army Materiel Command (AMC) will fund a variety of activities for FY 2004, most of which fall into research and development and for systems acquisition. AMC will fund developmental and testing costs associated with the MMS Profiler and the Integrated Meteorological System (IMETS). Army Research Laboratory, Battlefield Environment Division, will

continue to operate an integrated program of both basic and applied research. The Small Business Innovation Research (SBIR) Program and the Defense University Research Instrumentation Program (DURIP) were provided funds for selected research projects. At the Army Research Office, core funding for basic research remains relatively stable from year to year. Significant increases in funding occur when special program initiatives or requests are approved and funded.

Headquarters, Department of the Army, Deputy Chief of Staff, G-2 employs two full-time meteorologists for development of meteorological policy; coordination of meteorological support within the Department of the Army and with other Department of Defense and Federal agencies and organizations; Department of the Army Policy concerning weather; environmental services, and oceanographic support to the Army (less those environmental services functions assigned to the Corps of Engineers); and Department of the Army policy concerning peacetime weather support and point weather warnings. This office also sponsors a company grade Army liaison officer at the Air Force Weather Agency (AFWA) in Omaha, Nebraska, and a field grade Army officer at the National Polar-orbiting Operational Environmental Satellite System Integrated Program Office in Silver Spring, Maryland. The latter two positions were vacant in FY 2003 and only the AFWA position will be filled in FY 2004.

There were only minor variations from last years budget among the MACOMs for operational support. Most MACOMs showed only minor increases in budgets, due mainly to annual cost of living increases.

It is anticipated that FY 2004 funding for weather-related research efforts at U.S. Army Research Institute of Environmental Medicine (USARIEM) will decrease relative to the FY 2003

level primarily due to the end of a Phase II SBIR.

DEPARTMENT OF HOMELAND SECURITY (DHS)

On March 1, 2003, the Department of Homeland Security (DHS) assumed primary responsibility for ensuring that emergency response professionals are prepared for any situation in the event of a terrorist attack, natural disaster, or other large-scale emergency. This entails providing a coordinated, comprehensive federal response to any large-scale crisis and mounting a swift and effective recovery effort. DHS will also prioritize the important issue of citizen preparedness, and educating America's families on how best to prepare their homes for a disaster and tips for citizens on how to respond in a crisis will be given special attention at DHS.

As part of the stand up of DHS, the U.S. Coast Guard (USCG) was transferred from the DOT to the DHS. The USCG budget figures for the entire FY 2003 are listed under DHS.

United States Coast Guard (USCG)

All of USCG's funding for meteorological programs is for operations support. For FY 2004, the requested funding level is \$14.1 million. (The Coast Guard does not have a specific program and budget for meteorology--all meteorological activities are accomplished as part of general operations.)

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.

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.

DEPARTMENT OF THE INTERIOR (DOI)

The DOI/BLM fire weather funding request for FY 2004 is \$1,100,000. This figure is for meteorological operations and support of the Bureau of Land Management (BLM) remote sensing requirements for Remote Automatic Weather Station (RAWS) and Lightning Detection Programs. Normal operations and maintenance of the Fire RAWS program is approximately \$800,000. (This includes personnel, vehicles, per diem, normal procurement and facilities).

The BLM optimization of RAWS will continue in FY 2004 as part of the Wildland Fire Agencies' consolidation of Fire Weather and National Fire Danger Rating Support. Complete optimization will take a few years. Subsequent cost savings in operations costs will be used to replace aging equipment and upgrade sensor packages. Proposed changes in Lightning Detection operations will further reduce the out-year expenditures in this program. Coordination between DOI agencies and the USDA Forest Service regarding combined meteorological requirements for the National Wildland Fire support functions is ongoing. During the coming geographic area review efforts, interagency RAWS replacement coordina-

tion will continue to maximize National Fire Danger Rating System (NFDRS) sampling points and minimize the total number of systems required in the West.

DEPARTMENT OF TRANSPORTATION (DOT)

The DOT total budget request for FY 2004 is \$453 million which represents a funding decrease of 0.9 percent from FY 2003. On March 1, 2003, the U.S. Coast Guard (USCG) was transferred from the Department of Transportation (DOT) to the Department of Homeland Security (DHS). The USCG figures for the entire FY 2003 are listed under DHS. The meteorological programs for the Federal Aviation Administration and the Federal Highway Administration, for FY 2004 are described below:

Federal Aviation Administration (FAA)

For 2004, FAA requested a total \$446 million for the Aviation Weather Programs including acquisition of new systems, operations and support, and supporting research. The actual funding for aviation weather in FY 2003 was \$454.7 million. The \$8.7 million decrease in FY 2004 constitutes a 1.9 percent reduction in total funding. The changes are comprised of (1) decreases in acquisitions of \$5.8 million (6.6 percent) to \$83.0 million, as systems are maturing to field operations and some budgetary fluctuations; (2) increases in operations and support of \$2.0 million (1 percent) to \$338.5 million, reflecting salary increases for air traffic specialists and maintenance personnel and slight reductions in logistics; and (3) a decrease for aviation weather research of \$3.8 million to a total of \$21.2 million.

The funding changes reflect major progress in the aviation weather program bringing much automation to the collection of weather observations from remote sensors, to the dissemination of weather products, graphics and decision making information available

for use by the air traffic facilities, pilots, the aviation industry and general aviation users. Specific programs that will see a change in funding greater than \$2 million are listed below:

Programs	Changes (\$ Millions)
<u>Systems Acquisition:</u>	
Integrated Terminal Weather System (ITWS)	-2.9
Corridor Integrated Weather System	-4.1
Terminal Doppler Weather Radar (TDWR)	+2.0
Low Level Windshear Advisory System	+2.7

Operations Support:

Equipment Maintenance	+2.0
Flight Service Stations (FSS)	+8.8

Research:

Aviation Weather Research Program (AWRP)	+4.8
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The AWRP will continue research into understanding the geophysical phenomenon in the atmosphere and around airports that present hazardous conditions for aircraft operations. Among these are in-flight icing, turbulence, visibility, ceiling, convective activity, tornadoes, etc. Additional work will be done to improve models, develop better graphics for decision making information, and the impacts of space weather.

Federal Highway Administration (FHWA)

The total FHWA request for surface transportation weather programs in FY 2004 is \$6.95 million, all of which will be used for supporting research and special programs.

In 1999, the FHWA began documentation of road weather data requirements, which has served as the basis for the majority of work in this area. This work includes addressing the technical aspects of the road transportation system (including weather

data collection, processing and dissemination) as well as the institutional challenges surrounding system implementation.

These institutional challenges encompassed coordination within state and local Departments of Transportation (DOTs) as well as across the transportation and meteorological communities. With regard to technical areas of interest, data collection efforts will include increased coverage of atmospheric and road condition observations, as well as incorporate road weather data (e.g., pavement and subsurface observations) into broader meteorological observation networks. Better processing includes the application of higher resolution weather models and the development of road condition prediction models (e.g., heat balance models) that are needed to develop the appropriate road weather information.

In addition, surface transportation decision-makers require road weather information disseminated in formats that are easily understood and in which human factors issues have already been incorporated. This need will be achieved through the development of improved road weather management decision support systems. A multi-year effort has been undertaken by the FHWA in cooperation with six national laboratories to prototype and field test advanced decision support tools for winter maintenance managers. This effort has led to demonstration of the Maintenance Decision Support System (MDSS) in early 2003. In addition, MDSS prototype modules have been made available to private vendors, who can incorporate them into their product lines.

FHWA is also taking an active role in promoting more efficient traffic operations during hurricane evacuations. Four regional workshops were held in 2002 and 2003 that brought together emergency managers, traffic man-

agers, and highway patrol to discuss methods to improve mobility and safety during evacuations. The FHWA is currently supporting an Evacuation Traffic Information System (ETIS), which is a web-based program that facilitates the sharing of evacuation and traffic information among coastal states in the southeast. In addition, the FHWA is investigating other Intelligent Transportation System (ITS) technologies that can be used to support emergency and traffic managers during evacuations.

Finally, the FHWA is researching how transportation management centers around the country integrate road weather information into their operations. The FHWA is interested in the types of information received (whether generic or tailored) and how that information impacts traffic management decisions. The FHWA is also investigating several other aspects of traffic management with respect to adverse weather, including traffic signal timing, traffic simulation modeling, and freeway operations. The FHWA will continue to develop outreach and training course material-such as the Best Practices for Road Weather Management CD-ROM-for program delivery, training, and promotion.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

All of the EPA's funding of meteorological programs is for supporting research. The anticipated funding level in FY 2004 for directed meteorological research is \$7.5 million which is the same as the FY 2003 funding level.

Currently, increased attention is being paid to the effects of airborne toxins and fine particulate matter on human health. In addition, to promote excellence in environmental science and engineering, EPA established a national fellowship program and substantially increased its support for

investigator-initiated research grants. The increase in funding for grants (with reliance on quality science and peer review) and for graduate fellowships (to support the education and careers of future scientists) will provide for a more balanced, long-term capital investment in improved environmental research and development.

The funding for the grants program will remain about \$100 million in FY 2004. This augmented program will fund research in areas including ecological assessment, air quality, environmental fate and treatment of toxins and hazardous wastes, and exploratory research. The portion of these grants that will be awarded for meteorological research during FY 2004 cannot be foreseen, but it is probable that the grant awards will increase the base amount of \$7.5 million listed above for directed meteorological research.

EPA is continuing its development and evaluation of air quality dispersion models for air pollutants on all temporal and spatial scales as mandated by the Clean Air Act as amended in 1990. Research will focus on indoor, urban, mesoscale, regional, and multimedia models, which will be used to develop air pollution control strategies, and human and ecosystem exposure assessments. There will be increased emphasis placed on meteorological research into regional and urban formation and transport of ozone and particulate pollution in support of the revisions to the National Ambient Air Quality Standards. Increased efficiency of computation and interpretation of results are being made possible by means of supercomputing and scientific visualization techniques.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

For FY 2004, NASA requests a total of \$190.6 million. The majority of this funding (\$188.3 million) is for support-

ing research.

These funding levels are composed of the estimated meteorology share of the supporting research and analysis programs as well as Earth Observing System (EOS) and Earth Probe instruments, EOS science, and the EOS Data Information System elements of the NASA Office of Earth Science budget. In parallel with deploying EOS, NASA Earth Science Enterprise is looking ahead to determine what will be the important Earth science questions in the next decade, and which require NASA's leadership to be answered. Drawing on existing reports of the National Academy of Sciences and the state of progress in current scientific endeavors, ESE developed a Research Strategy for 2000-2010. This strategy articulates a hierarchy of one overarching question, five broad subordinate questions and twenty-three detailed questions. For each, the Research Strategy defines the observational requirements, which in turn provide the basis for definition of candidate missions to be pursued. An early, high priority in this time frame is the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Program (NPP), which will serve to provide continuity with the Terra and Aqua missions as well as a demonstration of instruments for the converged weather satellite program. NASA and the Integrated Program Office (IPO) jointly fund the NPP mission. The IPO consists of representation from the three agencies participating in NPOESS: NASA, the National Oceanic and Atmospheric Administration, and the Air Force. NASA plans to continue to work towards the success of the EOS Terra, AQUA, AURA and IceSAT missions. In addition, NASA plans to deliver a functioning data and information system to support the processing, archival, and distribution of

data products from these missions.

NASA also funds a \$71.3 million program of weather-related research for aviation safety.

NUCLEAR REGULATORY COMMISSION (NRC)

The NRC planned expenditure of \$50,000 in FY 2004, is for meteorological operations to continue technical assistance for the analysis of atmospheric dispersion for routine and postulated accidental releases from nuclear facilities, and the review of proposed sites for possible construction of new nuclear power plants.

The meteorological support program in the NRC is focused primarily on analyzing and utilizing meteorological data in atmospheric transport and dispersion models. These models provide insight on plume pathways in the near- and far-fields for building wake and dispersion characteristics to perform dose calculations on postulated releases to the environment. Meteorological information is used as input to the probabilistic safety assessment, the assessment of the radiological impacts of routine releases from normal operations, the assessment of other (non-radiological) hazards that may impact safe operation of the facility, and the assessment of design or operational changes proposed for the facility.

Additionally, after a hiatus of some 25 years, the nuclear power industry has expressed an interest in seeking site approvals for new nuclear power plants. Three early site permit applications are expected to be received in 2003 and be under review in FY 2004. These reviews will also consider regional climatology and local meteorology. In addition to its internal review activities, the NRC may seek assistance from other Federal agencies to support its safety reviews.

AGENCY FUNDING BY BUDGET CATEGORY

Table 2.2 depicts how the agencies plan to obligate their funds for meteorological operations broken down by "budget category." The two major categories are "Operations Support" and "Systems Acquisition." To a large degree, these categories correspond to non-hardware costs (Operations Support) and hardware costs (Systems Acquisition). For agency convenience in identifying small components that do not fit into these two major categories, a third category is added called "Special Programs." Programs that provide support to several government agen-

cies such as the Air Force's DMSP are listed on a separate line.

In FY 2004, Operational Costs requested are \$2.63 billion with a total of \$1.66 billion (63.9 percent) for Operations Support, \$919 million (34.9 percent) for Systems Acquisition, and \$31.4 million (1.2 percent) for Special Programs.

Table 2.3 describes how the agencies plan to obligate their funds for meteorological supporting research according to budget categories. The agencies' supporting research budgets are subdivided along similar lines--Research and Development

(non-hardware), Systems Development (hardware), and Special Programs (for those items that do not easily fit into the two major categories).

For FY 2004, agencies will obligate a total of \$401.3 million in Supporting Research funds in the following manner: \$319 million (79.5 percent) to research and development and \$82.4 million (20.5 percent) to Systems Development.

AGENCY FUNDING BY SERVICE CATEGORY

Table 2.4 summarizes how the agencies plan to obligate operational funds for basic and specialized meteorological services; Table 2.5 is a similar breakout for supporting research funds.

Table 2.4 reveals the distribution of FY 2004 operational funds: basic meteorology services receiving 59.7 percent; aviation 20.6 percent; marine 4.3 percent; agriculture/forestry 0.6 percent; general military services 14.4 percent; and other specialized services accounting for 0.5 percent. Table 2.5 shows the distribution of supporting research funds among the services with basic meteorology receiving 25.7 percent, aviation 5.7 percent, marine 4.0 percent, agriculture and forestry 8.1 percent, general military 6.0 percent, and the remaining 50.5 percent dedicated to other meteorological services.

The definitions of specialized and basic services are described below:

Basic Services

Basic services provide products that meet the common needs of all users and include the products needed by the general public in their everyday activities and for the protection of lives and property. "Basic" services include the programs and activities that do not fall under one of the specialized services.

Specialized Meteorological Services

Aviation Services. Those services and facilities established to meet the requirements of general, commercial, and military aviation.

Marine Services. Those services and facilities established to meet the requirements of the DOC, DOD, and DOT on the high seas, on coastal and inland waters, and for boating activities in coastal and inland waters. The civil programs which are directly related to services solely for marine uses and military programs supporting fleet, amphibious, and sea-borne

units (including carrier-based aviation and fleet missile systems) are included.

Agriculture and Forestry Services. Those services and facilities established to meet the requirements of the agricultural industries and federal, state, and local agencies charged with the protection and maintenance of the nation's forests.

General Military Services. Those services and facilities established to meet the requirements of military user commands and their component elements. Programs and services which are part of basic, aviation, marine, or other specialized services are not included.

Other Specialized Services. Those services and facilities established to meet meteorological requirements that cannot be classified under one of the preceding categories; such as, space operations, urban air pollution, global climate change, and water management.

PERSONNEL ENGAGED IN METEOROLOGICAL OPERATIONS

Table 2.6 depicts agency staff resources in meteorological opera-

tions. The total agency staff resources requested for FY 2004 is 14,480. This

total represents a decrease of 2.3 percent from FY 2003.

TABLE 2.2 AGENCY OPERATIONAL COSTS, BY BUDGET CATEGORY
(Thousands of Dollars)

AGENCY	Operations Support		Systems Acquisition		Special Programs		Total		% of FY2004 TOTAL
	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	
Agriculture	14792	14552	0	0	0	0	14792	14552	-1.6
Commerce/NOAA(Subtot)	869443	902185	551636	762255	5997	27140	1427076	1691580	18.5
NWS	694226	720950	60403	75051	2981	24030	757610	820031	8.2
NESDIS	147670	149093	491233	687204	1186	1224	640089	837521	30.8
OAR	2097	3208	0	0	0	0	2097	3208	53.0
NOS	15750	16600	0	0	730	730	16480	17330	5.2
NOAA Corps	9700	12334	0	0	1100	1156	10800	13490	24.9
Defense(Subtot)	414499	409728	63042	73502	863	907	478404	484137	1.2
Air Force	243001	233827	39770	43250	0	0	282771	277077	-2.0
DMSP*	11859	16100	0	0	0	0	11859	16100	35.8
Navy	132535	129286	746	773	0	0	133281	130059	-2.4
Army	27104	30515	22526	29479	863	907	50493	60901	20.6
Homeland Security (Subtot)	13400	14100	0	0	0	0	13400	14100	5.2
USCG	13400	14100	0	0	0	0	13400	14100	5.2
Interior/BLM	940	940	160	160	0	0	1100	1100	0.0
Transportation(Subtot)	336531	338516	88788	82972	4313	3350	429632	424838	-1.1
FAA	336531	338516	88788	82972	4313	3350	429632	424838	-1.1
FHWA	0	0	0	0	0	0	0	0	0.0
EPA	0	0	0	0	0	0	0	0	0.0
NASA	2065	2234	52	120	0	0	2117	2354	11.2
NRC	95	50	0	0	0	0	95	50	-47.4
TOTAL	1651765	1682305	703678	919009	11173	31397	2366616	2632711	11.2
% of FY TOTAL	69.8%	63.9%	29.7%	34.9%	0.5%	1.2%	100.0%	100.0%	

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

TABLE 2.3 AGENCY SUPPORTING RESEARCH COSTS, BY BUDGET CATEGORY
(Thousands of Dollars)

AGENCY	Research & Development		Systems Development		Special Programs		Total		% of FY2004 TOTAL
	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	
Agriculture	32859	32679	0	0	0	0	32859	32679	-0.5
Commerce/NOAA(Subtot)	79188	81360	18780	19940	4150	0	102118	101300	-0.8
NWS	3070	3130	16560	17570	0	0	19630	20700	5.5
NESDIS	25449	25594	0	0	0	0	25449	25594	0.6
OAR	49200	51480	1870	1870	4150	0	55220	53350	-3.4
NOS	0	0	350	500	0	0	350	500	0.0
NOAA Corps	1469	1156	0	0	0	0	1469	1156	-21.3
Defense(Subtot)	35575	26204	17911	17235	555	0	54041	43439	-19.6
Air Force	0	0	14095	16317	0	0	14095	16317	15.8
DMSP*	0	0	3816	918	0	0	3816	918	-75.9
Navy	18350	15450	0	0	0	0	18350	15450	-15.8
Army	17225	10754	0	0	555	0	17780	10754	-39.5
Homeland Security (Subtot)	0	0	0	0	0	0	0	0	0.0
USCG	0	0	0	0	0	0	0	0	0.0
Interior/BLM	0	0	0	0	0	0	0	0	0.0
Transportation(Subtot)	27516	28149	0	0	0	0	27516	28149	2.3
FAA	25016	21199	0	0	0	0	25016	21199	-15.3
FHWA	2500	6950	0	0	0	0	2500	6950	178.0
EPA	7500	7500	0	0	0	0	7500	7500	0.0
NASA	104656	143071	49800	45200	0	0	154456	188271	21.9
NRC									
TOTAL	287294	318963	86491	82375	4705	0	378490	401338	6.0
% of FY TOTAL	75.9%	79.5%	22.9%	20.5%	1.2%	0.0%	100.0%	100.0%	

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

TABLE 2.4 AGENCY OPERATIONAL COSTS, BY SERVICE
(Thousands of Dollars)

AGENCY	Basic		Aviation		Marine		Agriculture & Forestry		General Military		Other		Total	
	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004
Agriculture	0	0	0	0	0	0	14792	14,552	0	0	0	0	14792	14552
Commerce/NOAA(Subtot)	1293619	1547962	70680	77680	60680	62730	0	0	0	0	2097	3208	1427076	1691580
NWS	642730	696951	70680	77680	44200	45400	0	0	0	0	0	0	757610	820031
NESDIS	640089	837521	0	0	0	0	0	0	0	0	0	0	640089	837521
OAR	0	0	0	0	0	0	0	0	0	0	2097	3208	2097	3208
NOS	0	0	0	0	16480	17330	0	0	0	0	0	0	16480	17330
NOAA Corps	10800	13490	0	0	0	0	0	0	0	0	0	0	10800	13490
Defense(Subtot)	23058	22590	40126	39160	38518	37587	0	0	369638	377907	7064	6893	478404	484136.5
Air Force	0	0	0	0	0	0	0	0	282771	277077	0	0	282771	277077
DMSP*	0	0	0	0	0	0	0	0	11859	16100	0	0	11859	16100
Navy	23058	22500	39584	38628	38518	37587	0	0	25057	24451	7064	6893	133281	130059
Army	0	90	542	532	0	0	0	0	49951	60278.5	0	0	50493	60900.5
Homeland Security (Subtot)	0	0	0	0	13400	14100	0	0	0	0	0	0	13400	14100
USCG	0	0	0	0	13400	14100	0	0	0	0	0	0	13400	14100
Interior/BLM	0	0	0	0	0	0	1100	1100	0	0	0	0	1100	1100
Transportation(Subtot)	0	0	429632	424838	0	0	0	0	0	0	0	0	429632	424838
FAA	0	0	429632	424838	0	0	0	0	0	0	0	0	429632	424838
FHWA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EPA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NASA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRC	95	50	0	0	0	0	0	0	0	0	2117	2354	2117	2354
TOTAL	1316772	1570602	540438	541678	112598	114417	15892	15652	369638	377907	11278	12455	2366616	2632710.5
% of FY TOTAL	55.6%	59.7%	22.8%	20.6%	4.8%	4.3%	0.7%	0.6%	15.6%	14.4%	0.5%	0.5%	100.0%	100.0%

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

TABLE 2.5 AGENCY SUPPORTING RESEARCH COSTS, BY SERVICE
(Thousands of Dollars)

AGENCY	Basic Meteorology		Aviation		Marine		Agriculture & Forestry		General Military		Other		Total	
	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004	FY2003	FY2004
Agriculture Commerce/NOAA(Subtot)	0	0	0	0	0	0	32,859	32,679	0	0	0	0	32859	32679
NWS	100143	99175	1625	1625	350	500	0	0	0	0	0	0	102118	101300
NESDIS	19630	20700	0	0	0	0	0	0	0	0	0	0	19630	20700
OAR	25449	25594	0	0	0	0	0	0	0	0	0	0	25449	25594
NOS	53595	51725	1625	1625	0	0	0	0	0	0	0	0	55220	53350
NOAA Corps	0	0	0	0	350	500	0	0	0	0	0	0	350	500
Defense(Subtot)	1469	1156	0	0	0	0	0	0	0	0	0	0	1469	1156
Air Force	5799	3986	0	0	18350	15450	0	0	29411	24003	481	0	54041	43439
DMSP*	0	0	0	0	0	0	0	0	14095	16317	0	0	14095	16317
Navy	0	0	0	0	18350	15450	0	0	3816	918	0	0	3816	918
Army	5799	3986	0	0	0	0	0	0	11500	6768	0	0	18350	15450
Homeland Security (Subtot)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USCG	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interior/BLM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transportation(Subtot)	0	0	25016	21199	0	0	0	0	0	0	2500	6950	27516	28149
FAA	0	0	25016	21199	0	0	0	0	0	0	0	0	25016	21199
FHWA	0	0	0	0	0	0	0	0	0	0	2500	6950	2500	6950
EPA	0	0	0	0	0	0	0	0	0	0	7500	7500	7500	7500
NASA	0	0	55.7	71.3	0	0	0	0	0	0	154400	188200	154455.7	188271.3
NRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	105942	103161	26696.7	22895.3	18700	15950	Not Applicable	Not Applicable	29411	24003	164881	202650	378489.7	401338.3
% of FY TOTAL	28.0%	25.7%	7.1%	5.7%	4.9%	4.0%	8.7%	8.1%	7.8%	6.0%	43.6%	50.5%	100.0%	100.0%

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

TABLE 2.6 PERSONNEL ENGAGED IN METEOROLOGICAL OPERATIONS
(Units are Full Time Equivalent Staff Years)*

<u>AGENCY</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>% CHANGE</u>	<u>% of FY 2004 TOTAL</u>
Agriculture	238	237	-0.4	1.6
Commerce/NOAA (Subtotal)	5,831	5,691	-2.4	39.3
NWS	4,726	4,586	-3.0	31.7
NESDIS	905	905	0.0	6.3
OAR	32	32	0.0	0.2
NOS	114	114	0.0	0.8
NOAA Corps	54	54	0.0	0.4
Defense	5,162	5,040	-2.4	34.8
Air Force (Subtotal)	3,423	3,305	-3.4	22.8
Air Force Weather	3,304	3,186	-3.6	22.0
DMSP	119	119	0.0	0.8
Navy	1,458	1,453	-0.3	10.0
Army	281	282	0.4	1.9
Homeland Security (Subtotal)	106	106	0.0	3.0
USCG***	106	106	0.0	3.0
Interior (Subtotal)	12	12	0.0	0.1
BLM	8	8	0.0	0.1
Reimbursed**	4	4	0.0	0.0
Transportation (Subtotal)	3,572	3,498	-2.1	24.2
FAA	3,569	3,495	-2.1	24.1
FHWA	3	3	0.0	0.0
EPA	0	0	0.0	0.0
NASA	0	0	0.0	0.0
NRC	1	2	100.0	0.0
TOTAL	14,816	14,480	-2.3	100.0

* Numbers of personnel are rounded to nearest whole number.

** "Reimbursed" are personnel funded by other agencies.

*** On March 1, 2003, the U.S. Coast Guard (USCG) was transferred from the Department of Transportation (DOT) to the Department of Homeland Security (DHS).

INTERAGENCY FUND TRANSFERS

Table 2.7 summarizes the reimbursement of funds from one agency to another during FY 2003. Agencies routinely enter into reimbursable agreements when they determine that one agency can provide the service more efficiently and effectively than the other. While specific amounts may vary from year-to-year, the pattern shown is essentially stable and reflects a significant level of interagency cooperation.

Department of Commerce. NWS will reimburse DOT \$2,500 for Alaska housing utilities. NASA will receive \$22,000 for stratospheric studies. NESDIS will transfer a total of \$279.5 million to NASA for procurement and launches of polar-orbiting (\$90.5 million) and geostationary (\$189 million) satellites.

Department of Defense. The Air Force will reimburse DOC a total of \$3.77 million for operations [e.g., OFCM support (\$140,000), Lightning Data (\$626,000), NCEP operations (\$14,000), Shared Processing Network (\$207,000), NEXRAD support (\$1,870,000), HAWCNET support (\$71,000), modeling and simulation support (\$535,000), COMET training development (\$150,000), geomagnetic data (\$145,000), and IPO support (\$8,000)] and \$310,000 to UPOS for supporting research. In addition, the Air Force will reimburse NASA \$160,000 for technical data and USGS \$200,000 for the purchase of a magnetometer. The Navy will reimburse DOC \$215,000 for basic climatological analysis and forecasting, and interagency coordination. The Army reim-

bursements to DOC/NOAA include \$450,000 from COE to NWS for maintaining precipitation reporting stations and \$80,000 from COE and ARL to NOAA laboratories for precipitation modeling and basic/applied research. The Army TRADOC will also reimburse the AF Air Combat Command \$56,000 for operations and maintenance of weather systems. Army will also reimburse NASA \$60,000 for wind tunnel testing. Finally, the United States Geological Survey will be reimbursed by COE \$510,000 for operations and maintenance of hydrologic and precipitation reporting stations.

Department of Transportation. The FAA will reimburse NOAA \$37.5 million for FY 2003. Included in those funds are development of enhancements and operational support associated with the WSR-88D, ASOS maintenance, the Center Weather Service Units at all Air Route Traffic Control Centers, the World Area Forecast System, meteorology instructors at the FAA, and studies and OFCM support.

The FAA will reimburse the Air Force a total of \$3,700,000 and the Navy \$365,000 for supporting research.

National Aeronautics and Space Administration (NASA). The Air Force will be reimbursed a total of \$2.178 million--\$1.428 million for observations, forecasts, and operations/maintenance of weather infrastructure and replacement of upper air systems at Trans-Atlantic Abort Landing Sites and \$750 million for technology transition at Applied

Meteorology Unit, Eastern Range. NOAA's NWS will receive \$16,000 for upper air analysis and research; National Data Buoy Center will receive reimbursements of \$97,000 for the operation of two data buoys. NASA will also reimburse GSA \$666,000 for replacement of upper air weather support systems at Transatlantic Abort Sites.

Environmental Protection Agency (EPA). NOAA's Air Resources Laboratory (ARL) will receive \$7.5 million for development, evaluation, and application of air quality dispersion models; and for provision of meteorological expertise and guidance for EPA policy development activities.

Nuclear Regulatory Commission (NRC). The NRC enjoys a unique relationship with the DOE as a result of the Energy Reorganization Act of 1974. The act realigned the Atomic Energy Commission into a regulatory organization-NRC and a research and promotional organization-ERDA (which was subsequently absorbed into DOE). As a result, the NRC has access to the DOE national laboratories for technical assistance activities. This assistance, while not a reimbursable agreement, results in the transfer of funds from NRC for specific technical assistance by DOE laboratories. In FY 2004, the NRC expects to task DOE laboratories and the National Oceanic and Atmospheric Administration's National Climatic Data Center at a funding level of \$50,000.

FACILITIES/LOCATIONS FOR TAKING METEOROLOGICAL OBSERVATIONS

Table 2.8 indicates the number of facilities/locations or platforms at

which the federal agencies carry out (or supervise) the taking of various

types of meteorological observations.

TABLE 2.7 INTERAGENCY FUND TRANSFERS FOR METEOROLOGICAL OPERATIONS AND SUPPORTING RESEARCH

<u>Agency Funds Transferred from:</u>	<u>Agency Funds Transferred to:</u>	<u>FY 2003 Funds (\$K)</u>	
		<u>Operations</u>	<u>Supporting Research</u>
Commerce/NOAA	DOT/USCG	2.5	
	NASA Stratospheric Research	22	
	NASA	279,496	
Defense/Air Force	DOC/NOAA/OFCM	140	
	DOC/NOAA/OAR/SEC	145	
	DOC/NOAA/LDS	626	
	DOC/NOAA/NCEP	14	
	DOC/NOAA/SPN	207	
	DOC/NOAA/NWS	1,941	
	DOC/NOAA/COMET	150	
	DOC/NOAA/OGP/UPOS		310
	DOC/NOAA/NESDIS/NGDC	535	
	DOC/NOAA/NESDIS/IPO	8	
	DOI/USGS	200	
	NASA	160	
Defense/Navy	DOC/NOAA/NCDC	50	
	DOC/NOAA/OFCM	165	
Defense/Army	DOC/NOAA/NWS	450	
	DOC/NOAA/ETL		80
	DOI/USGS	510	
	DOD/USAF/ACC	56	
	NASA		60
Transportation/FAA	DOC/NOAA	29,961	7,563
	DOD/USAF		3,700
	DOD/USN		365
NASA	DOD/USAF	1,428	750
	DOC/NOAA/NDBC	97	
	DOC/NOAA/NWS		16
	GSA	666	
EPA	DOC/NOAA/ARL		7,500
NRC	DOE/PNNL	50	

TABLE 2.8 FACILITIES/LOCATIONS FOR TAKING METEOROLOGICAL OBSERVATIONS

TYPE OF OBSERVATION/AGENCY	No. of Locations (FY 2003)	TYPE OF OBSERVATION/AGENCY	No. of Locations (FY 2003)
<u>Surface, land</u>		<u>Upper air, rocket</u>	
Commerce (all types)	841	NASA	1
Air Force (U.S. & Overseas)	130	Army (U.S. & Overseas)	2
Navy (U.S. & Overseas)	72		
Army (U.S. & Overseas)	39	<u>Doppler weather radar (WSR-88D) sites</u>	
Marine Corps (U.S. & Overseas)	13	Commerce (NWS)	123
Transportation (Flight Service Stn)	8	Air Force (U.S. & Overseas)	29
Transportation (Lim Aviation Wx Rptg Stn)	114	Army (U.S. & Overseas)	2
Transportation (Contract Wx Obsg Stn)	189	Transportation	12
Transportation (Auto Wx Obsg Stn)	198		
Transportation (Auto Sfc Obsg Sys, fielded)	569	<u>Doppler weather radar (Not WSR-88D) sites</u>	
Transportation (USCG Coastal)	100	Air Force (Transportable)	3
Interior	470	Army	2
Agriculture	1390	Navy (Fixed)	9
NASA	3	Marine Corps (Mobile)	10
<u>Surface, marine</u>		<u>Off-site WSR-88D Processors (PUPs)</u>	
Commerce (SEAS-equipped ships)	140	Commerce (NWS)	63
Commerce (Coastal-Marine Autom Network)	65	Air Force	140
Commerce (NOAA/NOS/PORTS)	6	Navy	24
Commerce (Buoys--moored)	64	Army	5
Commerce (Buoys--drifting)	21	Marine Corps (U.S. & Overseas)	9
Commerce (Buoys--large navigation)	10	Transportation	25
Commerce (Water-level gauges)	*175	NASA	2
*Number of which have meteorology sensors	59		
Navy (Ships with met personnel)	29	<u>Airport Terminal Doppler weather radars</u>	
Navy (Ships without met personnel)	289	Transportation (Commissioned)	45
Transportation (USCG Cutters)	225	Army (not airfield--Test Range/USAREUR)	2
NASA	2		
		<u>Conventional radar (non-Doppler) sites</u>	
		Commerce (NWS)	31
		Commerce (at FAA sites)	27
		Air Force, Fixed (U.S. & Overseas)	3
		Air Force, Remote Displays	2
		Air Force, Mobile Units	17
		Marine Corps, Mobile units	15
		<u>Weather reconnaissance (No. of aircraft)</u>	
		Commerce (NOAA)	3
		Air Force Reserve Command (AFRC)	10
		<u>Geostationary meteorological satellites (No. operating)</u>	
		Commerce (planned config of 2)	2
		<u>Polar meteorological satellites (No. operating)</u>	
		Commerce (planned config of 2)	2
		Air Force	4
		Navy GFO	(1 in orbit, status TBD)
<u>Atmospheric Profilers</u>			
Army	7		