

# APPENDIX A

## FEDERAL COORDINATION AND PLANNING

### BASIS FOR FEDERAL COORDINATION PROCESS

In 1963, Congress and the Executive Office of the President expressed concern about the adequacy of coordination of Federal meteorological activities. In response, 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) issued a report entitled "Survey of Federal Meteorological Activities" (1963). The report described each agency's program in some detail, particularly its operational services, and detailed the relationship between the programs of the various agencies. The report revealed close cooperation but little evidence of systematic coordination. Based on this study, the Bureau of the Budget issued a set of ground rules to be followed in the coordination process. It established a permanent general philosophy for assignment and assessment of agency roles in the field of meteorology and set certain goals to be achieved by the coordination process. The Bureau of the Budget 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 own needs.

The implementation of these directives by DOC led to the creation of the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) which operates with policy guidance from the Federal Committee for Meteorological Services and Supporting Research. The principal work in the coordination of meteorological activities and in the preparation and maintenance of Federal plans is accomplished by the OFCM staff with the advice and assistance of the Interdepartmental Committee for Meteorological Services and Supporting Research, and over 30 program councils, committees, working groups, and joint action groups.

### MISSION OF THE OFFICE OF THE FEDERAL COORDINATOR FOR METEOROLOGY (OFCM)

The mission of the OFCM is to ensure the effective use of Federal meteorological resources by leading the systematic coordination of operational weather requirements, services, and supporting research, among the Federal agencies. The high level focus and output as a result of carrying out this mission includes needs and requirements; issues and problems; studies, reports, plans, and handbooks; and crosscut reviews, assessments, and analyses.

OFCM's objectives in carrying out its mission include:

- Documenting agency programs

and activities in a series of national plans and reports that enable agencies to revise/adjust their individual ongoing programs and provide a means for communicating new ideas and approaches to fulfill requirements.

- Providing structure and programs to promote continuity in the development and coordination of interagency plans and procedures for meteorological services and supporting research activities.

- Preparing analyses, summaries, or evaluations of agency meteorological programs and plans that provide a factual basis for the Executive and Legislative branches to make appropriate decisions related to the allocation of funds.

- Reviewing Federal weather pro-

grams and Federal requirements for meteorological services and supporting research. This review may suggest additions or revisions to current or proposed programs, or identify opportunities for improved efficiency, reliability, or cost avoidance through coordinated actions or integrated programs.

As detailed in the report which follows, this has been an excellent year for OFCM in carrying out its interagency activities. The accomplishments of FY07 were substantial and meaningful for the nation, and the foundation has been placed for a similarly productive FY08.

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## FEDERAL COMMITTEE FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

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The Federal Committee for Meteorological Services and Supporting Research (FCMSSR), established in 1964, provides policy-level agency representation and guidance to the Federal Coordinator to address agency priorities, requirements, and issues related to services, operations, and supporting research, and also resolves agency differences that arise during the coordination of meteorological activities and the preparation of Federal plans. The Under Secretary of Com-

merce for Oceans and Atmosphere, who is also the Administrator of the National Oceanic and Atmospheric Administration (NOAA), serves as the FCMSSR Chairperson.

The 15 Federal agencies that engage in meteorological activities, or have a need for meteorological services, are represented on FCMSSR. The FCMSSR membership includes: DOC, DOD, DOT, the Departments of Agriculture (USDA), Energy (DOE), Homeland Security (DHS), Interior

(DOI), and State (DOS), the Environmental Protection Agency (EPA), National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), National Transportation Safety Board (NTSB), Nuclear Regulatory Commission (NRC), the Office of Science and Technology Policy (OSTP), and the Office of Management and Budget (OMB).

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### HIGHLIGHTS FOR FISCAL YEAR 2007 AND PLANS FOR FISCAL YEAR 2008

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#### NATURAL DISASTER REDUC- TION

##### INTERDEPARTMENTAL HURRI- CANE CONFERENCE

The OFCM annually hosts the Interdepartmental Hurricane Conference (IHC) to provide a forum for the responsible Federal agencies, together with representatives of the user communities such as emergency management, to review the nation's hurricane forecast and warning program and to make recommendations on how to improve the program. The OFCM hosted the 61st IHC in New Orleans, Louisiana, March 5-9, 2007. The theme of the 2007 conference was *The Nation's Hurricane Program: An Interagency Success Story*. The conference attendance was more than 190 for the eighth consecutive year. VADM Conrad C. Lautenbacher, Jr., USN (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration (NOAA), set the tone for the meeting during his Monday afternoon keynote address *The Nation's Hurricane Program: An Interagency Success Story*. He also paved the way for the rollout of the *Interagency Strategic Research*

*Plan for Tropical Cyclones: The Way Ahead*, one of the conference's principal objectives, by stating that the plan provides a comprehensive strategy to help meet the needs of the tropical cyclone warning and forecast centers and guide improvements in the nation's tropical cyclone forecast and warning program over the next decade. Objectives of the 2007 IHC included the following: (1) review the nation's tropical cyclone forecast and warning program from end-to-end, and update the *National Hurricane Operations Plan* for 2007; (2) evaluate the 2006 Joint Hurricane Testbed (JHT) results and successfully transition research results into operations, as well as potential candidates for 2007 and beyond; and (3) address and build upon the actions and results from the 60th IHC [rollout the *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead* and begin addressing recommendations; and examine how hazard risk reduction improvements can be made through stronger partnerships and alliances]. The IHC proved to be an extremely valuable forum to bring the operational and research communities together to produce the best possible tropical cyclone forecast and warning program, to address the needs of

the Federal agencies and user communities that have a stake in the nation's tropical cyclone program, and also to build interagency consensus for the new strategic research plan for tropical cyclones. Actions resulting from the conference are: (1) publish the *2007 National Hurricane Operations Plan* by May 15, 2007; (2) establish the Working Group for Tropical Cyclone Research to implement the recommendations of the new strategic research plan for tropical cyclones the *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*; (3) work with diverse user groups to develop and test message format modifications (60th IHC action); and (4) coordinate bringing together the appropriate Federal agencies to begin the process of reviewing and improving the national hurricane warning "system" (60th IHC action). In May 2007, the 45th edition of the *National Hurricane Operations Plan* (NHOP), which provides the basis for hurricane reconnaissance for the 2007 season and details Federal agency responsibilities, operations, and procedures; products; aircraft, satellite, radar, and buoy data collection; and marine weather broadcasts, was published based on the inputs and discussions from the 61st

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IHC. The 2008 IHC is being planned for Charleston, South Carolina.

#### TROPICAL CYCLONE RESEARCH AND DEVELOPMENT PLAN

The tropical cyclone forecast and warning program is an interdepartmental collaboration to provide the United States and designated international recipients with forecasts, warnings, and assessments concerning tropical and subtropical weather systems. The three centers that cooperate to provide the operational forecast and warning services are the Tropical Prediction Center/National Hurricane Center (TPC/NHC), the Central Pacific Hurricane Center (CPHC), and the Joint Typhoon Warning Center (JTWC). The plan, *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*, was published in February 2007, and provides a strategy for continuing to improve the effectiveness of operational forecasts and warnings through strategic coordination and increased collaboration among the major players in the operational and research and development (R&D) communities. The plan represents extensive efforts by the Joint Action Group for Tropical Cyclone Research (JAG/TCR), established by the Federal Coordinator for Meteorological Services and Supporting Research in 2005, to respond to a principal action item, proposed at the 58th Interdepartmental Hurricane Conference in 2004, to develop a comprehensive strategy for tropical cyclone R&D to guide interagency efforts over the next decade. The action item was reviewed and supported by both the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) in November 2004, and the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) in December 2004. The plan notes that vast improvements in tropical cyclone prediction are attainable with focused research efforts;

enhanced transition of research to operations capabilities; strong interagency partnerships, coordination, and planning; and most importantly, sufficient resources—both human and infrastructure. The capability to gain skill in forecasting rapid intensity changes and to improve predictions of hurricane intensity and structure, sea state/storm surge, and precipitation is currently on the horizon, much as improving hurricane track was two decades or so ago. The ultimate goal is to prevent loss of life and injuries and to reduce the nation's vulnerability to these potentially devastating storms. This goal can and must be accomplished for the good of the nation.

#### EXPLORATORY REVIEW

During this period, the OFCM conducted an exploratory review, a first step in an end-to-end assessment of our national warning system for natural and technological hazards (with an initial focus on tropical cyclones). The exploratory review was responsive to an Interdepartmental Hurricane Conference action item as well as a recommendation of the *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*. It was performed in two locations prone to tropical cyclones—Mobile County, Alabama, and Charleston County, South Carolina. The emphasis of the review was on the tropical cyclone information flow from the emergency management community to the various organizations and entities and citizens of a community. The objectives of the exploratory review were to: (1) understand and document the information flow; (2) summarize information flow requirements and gaps; and (3) provide follow-on considerations to improve the flow that would ultimately aid in saving lives, reducing injuries, and protecting property. The review noted that the majority of citizens receive tropical cyclone information through one or more communications means:

television, radio, newspaper media; computer internet and email; and NOAA Weather Radio. The review also noted the need to continue efforts to ensure the poor, elderly, disabled, non-English speaking, individuals with medical concerns, and those in outlying areas receive vital tropical cyclone information. The review also noted that NOAA Weather Radio should be used as much as possible to disseminate evacuation notices as well as tropical cyclone and other weather warnings; community-based organizations such as churches, civic groups, and neighborhood associations should be encouraged to form notification call trees to further disseminate information; and Mobile and Charleston Counties and the entire network of public and private entities involved in improving the public alert and warning system must continue to account for the entire demographics of the at-risk population. The OFCM is preparing the report for the exploratory review which the office has begun, with an initial focus on tropical cyclones, in an end-to-end assessment of our national warning system for natural and technological hazards. The report will include recommendations for future work and inclusion of information dissemination issues for other hazards such as tornadoes and human-caused hazards.

#### POST-STORM DATA ACQUISITION

The OFCM continued to coordinate, as required, timely post-storm data acquisition surveys in response to Presidentially declared natural disasters and other agency requirements to evaluate, for example, the impact on the coastal ecosystems. These natural disaster reduction efforts contribute to the determination of the intensity and magnitude of storms, and, in many cases, help to determine the extent of damage for use in Presidential disaster declarations. The additional data collected after hurricane landfall is also

used in validating modeling efforts with both emergency management models (e.g., FEMA's HAZUS) and hurricane storm-surge models (e.g., NOAA's SLOSH). These models are used in real time to assist decision makers in evacuation decisions and procedures. Post-storm data are also used to update FEMA Flood Insurance Rate Maps. A senior OFCM staff person spearheaded efforts to develop Memorandums of Understanding (MOU) between the Department of Commerce (DOC)/OFCM and the Department of Defense/Office of the Secretary of Defense to provide continued USAF Auxiliary-Civil Air Patrol aerial support and reconnaissance for post-storm and natural disaster data assessment. The 5-year (FY 2007 - FY 2011) Umbrella Agreement and the 1-year Annual Agreement (FY 2007) were approved by NOAA and DOC, and the DOD; they were signed by the Federal Coordinator for Meteorology and the Deputy Chief of Staff, Operations, Plans and Requirements of the United States Air Force, in May 2007.

#### ENHANCED FUJITA SCALE IMPLEMENTATION

Following OFCM coordination with the interagency meteorological community, in February 2007, the NOAA National Weather Service fully implemented the Enhanced Fujita (EF) Scale to rate tornadoes, replacing the original Fujita Scale. The Fujita Scale was developed in 1971, by T. Theodore Fujita, Ph.D., to rate tornadoes and estimate associated wind speed based on the damage they cause. The EF Scale refines and improves the original scale. It was developed by the Texas Tech University Wind Science and Engineering Research Center, along with a forum of wind engineers, universities, private companies, government organizations, private sector meteorologists, and NOAA meteorologists from across the country. The EF

Scale incorporates more damage indicators and degrees of damage than the original Fujita Scale, allowing more detailed analysis and better correlation between damage and wind speed. A correlation between the original Fujita Scale and the EF Scale has been developed; this makes it possible to express ratings in terms of one scale to the other, preserving the historical data base.

#### URBAN METEOROLOGY

##### NATIONAL WILDLAND FIRE WEATHER NEEDS ASSESSMENT

An important contribution to urban meteorology during the period of this report is related to the *National Wildland Fire Weather Needs Assessment* which is being conducted by OFCM. The formation of the Joint Action Group for National Wildland Fire Weather Needs Assessment (JAG/NWFWNA) and conduct of the assessment is responsive to ICMSRR Action Item 2005-1.1 where ICMSRR "concurred that OFCM should move forward to form a Joint Action Group (JAG) under the Committee for Environmental Services, Operations, and Research Needs (CESORN), to review the needs and requirements for wildland fire weather information, to include identifying organizational responsibilities and addressing the following issues: data collection, fire weather research, weather forecast services, data assimilation, air quality, information dissemination, education and outreach, and user response." An abundance of accumulated biomass in forests and rangelands, persistent drought conditions, and encroaching urbanization are contributing to larger, more costly wildland fires; and to effectively manage and suppress wildland fires, fire managers need timely, accurate, and detailed fire weather and climate information. 2005 and 2006 were record years for acres burned; acres burned have trended upwards

more than 100 percent since the mid-1980's; and wildland fire suppression, preparedness, fuels management, and other activities receive approximately \$2.7 billion in Federal funding annually.

An important benchmark is the June 2005 Western Governors' Association (WGA) meeting where they approved Policy Resolution 05-04: National Wildland Fire Weather Program. Within the policy, the WGA urged NOAA to have the OFCM complete a *National Needs Assessment Report* of Federal, state, and local fire managers' needs for weather information in their wildfire and prescribed fire decision making processes and a framework to meet those needs by the National Weather Service and Predictive Services. The JAG/NWFWNA was established in December 2005, and has moved forward to conduct the assessment. Validated needs have been found in the eight functional areas of the assessment: (1) Data collection, integrity, processing, and archival, (2) Fire weather research and development, (3) Forecast products and services, (4) Modeling, prediction, and data assimilation, (5) Information dissemination and technologies, (6) Education, training, outreach, partnering, and collaboration, (7) User response, decision support, and resulting user impacts, and (8) Socioeconomic factors. The OFCM conducted a Special Session on wildland fire weather and climate use in decision making at the 3rd International Fire and Ecology Congress, November 14, 2006, in San Diego, California; briefed the Interdepartmental Committee for Meteorological Services and Supporting Research at its July 18, 2006, and May 31, 2007, meetings; presented a summary of user needs and issues at the June 10-12, 2007, Western Governors' Association meeting in Deadwood, South Dakota; and is completing a detailed report of user needs and issues, and a framework to meet the needs. In connection with

this activity, the Chairman of the Western Governors' Association, Governor M. Michael Rounds, in a June 26, 2007 letter, thanked the Federal Coordinator and the OFCM team for the great work on the wildland fire needs assessment, and for the Federal Coordinator's presentation of the initial assessment to the governors at the WGA Annual Meeting in Deadwood, South Dakota.

#### ATMOSPHERIC TRANSPORT AND DIFFUSION RESEARCH AND DEVELOPMENT

The OFCM developed an atmospheric transport and diffusion (ATD) implementation strategy for the recommendations for which OFCM has primary responsibility in the *Federal Research Needs and Priorities for Atmospheric Transport and Diffusion Modeling* (September 2004) report. The implementation strategy has three parts: (1) working with the agencies to identify and improve a baseline set of national ATD modeling capabilities; (2) helping the agencies implement a common framework for model development and evaluation; and (3) recommending criteria for multifunctional joint urban test beds ["urban" describes a metropolitan area and its interfaces with surrounding areas]. In accordance with this, OFCM formed a Joint Action Group for Joint Urban Test Beds (JAG/JUTB) under the Working Group for Urban Meteorology (WG/UM); and this joint action group has met frequently, and is continuing work to develop an operational concept document for multifunctional joint urban test beds to provide services and data to model developers, test and evaluation personnel, and users. The operational concept document will include capabilities and benefits, management structure, infrastructure requirements, selection process, implementation framework, definitions, and characteristics of urban scales. The joint urban test beds will support the following functional areas: severe

weather (e.g., hurricanes, tornadoes, heat waves and cold spells, drought, and wildland fires), homeland security (dispersion of hazardous materials), climate, air quality (e.g., particulate matter aerosols), and water quality (e.g., deposition of airborne contaminants on water sources and waterborne transport of contaminants). JAG/JUTB is currently planning to pursue implementation of a JUTB over the National Capital Region first; this JUTB would be the proof of concept and our experience with it would allow for the improved development of an operational concept document based upon experiences with this first JUTB.

#### GEORGE MASON UNIVERSITY ATMOSPHERIC TRANSPORT AND DISPERSION MODELING CONFERENCE

George Mason University (GMU), Fairfax, Virginia, conducted its 11th Annual Conference on Atmospheric Transport and Dispersion Modeling, July 10-12, 2007. The OFCM cosponsored the event, together with the Joint Science and Technology Office for Chemical and Biological Defense, Defense Threat Reduction Agency (DTRA); the Naval Surface Warfare Center, Dahlgren Division (NSWCDD); and GMU. Themes for the conference were: improve understanding of atmospheric transport and dispersion processes; support homeland security requirements; and share experience across different sectors. Participants included representatives from DOD, EPA, DOE, NOAA, universities, private companies and other agencies doing related research, as well as scientists from other countries. Technical topics of interest for the conference were: new developments in basic theories of boundary layer models and transport and dispersion models; urban-scale meteorological and dispersion experiments and models; computational fluid dynamics (CFD) model theory and applications; field experi-

ments and laboratory experiments concerned with boundary layer studies and turbulence and dispersion studies; mesoscale meteorological modeling for input to transport and dispersion models; the use of remote sensing technology in boundary layer and transport and dispersion studies; model evaluation methods, uncertainty/sensitivity analyses, and risk assessments; improvements in model inputs (e.g., land-use data, 3-D building data) and output visualizations; and methods and criteria for emergency response and decision making.

The OFCM conducted a special session related to the OFCM's ongoing work with other members of the Federal meteorological community to implement the recommendations in the report, *Federal Research Needs and Priorities for Atmospheric Transport and Diffusion Modeling*. The special session provided much information on benefits of joint urban test beds; it was chaired by Dr. Walter Bach, Jr., Program Manager of the Environmental Sciences Division of the U.S. Army Research Office. The special session provided much information on joint urban test beds, including NOAA/Air Resources Laboratory's national capital region experience; enabling advanced urban meteorology, dispersion and air quality modeling with high resolution urban databases and access portal tools; applying joint urban test bed results to the meteorological needs of the Army; a responder view of urban test beds; and opportunities for satellite and aircraft remote sensing within a joint urban test bed.

#### CLIMATE

The OFCM supports the U.S. Climate Change Science Program (CCSP). The OFCM arranged for the former Director of the CCSP to brief the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) so that member agencies can stay abreast of the pro-

gram and coordinate priorities for atmospheric requirements through the OFCM for inclusion in CCSP, and forwarded to the CCSP results of a Climate Services Survey to identify new climate products and services that have been developed and implemented since the Board on Atmospheric Sciences and Climate defined "climate services" in 2001, as "the timely production and delivery of useful climate data, information, and knowledge to decision makers." The Federal Coordinator, through his participation on the Committee on Environment and Natural Resources (CENR), reviewed and provided concurrence on a number of U.S. CCSP Synthesis and Assessment Products. Also during FY 2007, an OFCM staff person provided a presentation at the fall 2006 American Geophysical Union (AGU) conference on *Climate-Induced Wildland Fires in the Wildland-Urban Interface (WUI) and Their Aftereffects*. The presentation (1) documented the close linkages between climate, changes in climate, drought, and WUI fires, (2) focused on the repercussions of the interconnectedness between climate, drought, and WUI fires, and (3) presented a holistic approach to considering climate, potential climate changes, drought, WUI fires, and the possible environmental, social, economic, and human-health consequences.

In addition, the OFCM is preparing for a meeting of the Committee for Climate Analysis, Monitoring, and Services which will be centered on extreme weather events. The goal is to be proactive in answering a number of questions, to include:

- Are the numbers and magnitude of extreme weather events on the increase?
- Can these extreme weather events be related to climate change?
- What is our capability to model and forecast these extreme events?
- Do our climate models have any skill in forecasting extreme events?

- What are the needs and requirements for climate services related to extreme weather events?

- What are the gaps in our capabilities to meet these needs?

- What will it take to fill these gaps—more research (basic and applied), more/better observations, improved models, etc.?

#### **OPERATIONAL PROCESSING**

OFCM's activities regarding Operational Processing Centers (OPC) continue to improve processing and backup capabilities of NOAA's National Centers for Environmental Prediction and Office of Satellite Data Processing and Distribution, the Air Force Weather Agency, and the U.S. Navy's Fleet Numerical Meteorology and Oceanography Center and Naval Oceanographic Office. Efforts continue to improve backup support and capabilities and to coordinate preparation for the implementation of the Weather Research and Forecasting (WRF) modeling system, in accordance with the *National Concept of Operations Framework for the Operational Processing Centers*, which is contained in an April 1, 2004, memorandum of agreement signed by the directors of the OPC's. Of particular significance during FY 2006, was the establishment of a National Operational Processing Centers (NOPC) Program Council within the OFCM coordinating infrastructure, to help achieve national priorities by focusing agency efforts and leverage resources to gain the maximum return. This was in response to the OPC Directors' determination that effectively coordinating the OPCs' efforts and providing the resources to support those efforts necessitated high-level policy guidance and oversight. OFCM's previously existing Committee for Operational Processing Centers (COPC) and its Working Group for Cooperative Support and Backup (WG/CSAB) and joint action groups for operational

community modeling, centralized communications management, and operational data acquisition for assimilation, were placed under the new NOPC Program Council. During FY 2007, and in response to a request from the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Senior Users Advisory Group (SUAG), COPC agreed to foster the synergistic coordination, program development, and implementation of NPOESS data exploitation strategies.

#### **ANNUAL FEDERAL PLAN**

In October 2006, the OFCM issued *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2007*. The Federal Plan is congressionally mandated and is a one-of-a-kind document which articulates the meteorological services provided and supporting research conducted by agencies of the Federal government. The Federal Plan helps to reduce overlap and duplication among the agencies. It is a comprehensive publication that documents proposed programs for FY 2007, and reviews agency programs in FY 2006. The feature article for the FY 2007 Annual Federal Plan is *Roadmap for Tropical Cyclone Research to Meet Operational Needs*. The article reviews three projects focused on tropical cyclone research and development to improve the nation's tropical cyclone forecast and warning service, and provides details on one of the projects, the development of an OFCM-sponsored interagency tropical cyclone research plan. The feature article for the FY 2008 Annual Federal Plan describes a cross-cutting assessment of Federal agency hydrometeorological products, services, and supporting research.

#### **WEATHER INFORMATION FOR SURFACE TRANSPORTATION**

Since 1998, OFCM has made weather services and research and

development (R&D) activities supporting the surface transportation community a priority for the Federal meteorological community. In December 2002, OFCM published the comprehensive report, *Weather Information for Surface Transportation-National Needs Assessment Report*, which provides the first-ever compilation and analysis of weather support needs across six surface transportation sectors (roadway, railway, transit, marine transportation, pipeline systems, and airport ground operations). In August 2004, OFCM established the Working Group for Weather Information for Surface Transportation (WG/WIST) to develop both a *WIST R&D Plan* and a *WIST Implementation Plan*. OFCM also conducted two WIST workshops June 6-7 and June 13-14, 2006, with the objectives to: (1) help determine the priorities for the surface transportation weather information research needed to provide improved weather information and services to the surface transportation community; (2) gather and crossfeed information concerning ongoing or planned (next 3 years) surface transportation weather-related research and development; and (3) hear from workshop attendees on what they see as a vision (3-10+ years) on how weather information will be used to optimize surface transportation operations and safety, and what specific hurdles must be overcome to reach such a vision. Information from these workshops has been reviewed and organized to support continued progress in this important area, which will lead to the *WIST R&D Plan* and *WIST Implementation Plan* mentioned above. In addition, in August 2006, OFCM published the report, *Weather Information for Surface Transportation-Update on Weather Impacts and WIST Results*. This update focused on the status of transportation weather issues in the nation and the results achieved since the first WIST report in 2002. It also highlighted areas where

further steps can be made in the near term. When statewide transportation incident reporting systems are implemented, we will be able to monitor, assess, and manage transportation weather risks, as well as evaluate the benefits of WIST-informed transportation decisions. R&D programs are in progress to improve warnings and decision support systems, implement weather-responsive traffic management in communities, and provide the observational support necessary for location-specific WIST

During the period of this report, OFCM attended and participated in the National Research Council Transportation Research Board (TRB) 86th Annual Meeting in Washington, D.C., January 21-25, 2007; the Intelligent Transportation Society of America (ITS-A) 2007 Annual Meeting and Exposition in Palm Springs, California, June 4-6, 2007; and the Mid-Continent Transportation Research Symposium in Ames, Iowa, August 16-17, 2007.

Very importantly, from July 25-27, 2007, OFCM and the Federal Highway Administration Road Weather Management Program cosponsored the Third National Symposium on Surface Transportation Weather in Vienna, Virginia. The symposium theme was *Improving Commerce and Reducing Deaths and Injuries through Innovative, Weather-related R&D and Applications for the Surface Transportation System*. The goal of the symposium was to advance the state of the surface transportation weather enterprise, including the use of weather and climate information to support decision making, safety, and productivity within the six surface transportation modes and related industries. Objectives were to: (1) Articulate a clear observation strategy for surface transportation weather that defines the types of data that are needed and the optimal mix of observing platforms required to meet those needs; (2) Identify the priorities,

challenges, and opportunities for research and development that will contribute to saving lives, reducing injuries, and improving efficiency in the nation's surface transportation infrastructure; (3) Define the needs for advanced computing capacity required for surface transportation weather modeling and for the assimilation of data from multiple data sources; (4) Identify the needs for new products and services driven by current operations or concepts for future surface transportation systems; (5) Investigate opportunities to document and substantiate the socioeconomic impacts of improved surface transportation weather products and services; (6) Identify the potential and emerging information dissemination technologies available to get the "right message" to surface transportation weather stakeholders; and (7) Establish partnerships with the stakeholder community to ensure that customers and stakeholders understand how to effectively use surface transportation weather products and services in their decision-making processes. Keynote addresses were given by Mr. Jeffrey N. Shane, Undersecretary of Transportation for Policy, U.S. Department of Transportation; VADM Conrad C. Lautenbacher, Jr., USN (Ret.), Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator, U.S. Department of Commerce; and Dr. Gene Whitney, Assistant Director for Environment, Science Division, White House Office of Science and Technology Policy.

Information stemming from the eight symposium sessions was summarized into categories that cut across many of the sessions. The categories are: current and emerging capabilities and transition of research to operations activities to improve products and services; getting the right message out-need for social science involvement; education and outreach; need for metrics to measure success and guide

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resource allocation; gaps and research priorities; and opportunity for a near-term intermodal initiative. Action items from the symposium are:

- The background work has been done and there is a need for more significant interagency coordination and support.

- Within the OFCM infrastructure, ICMSRR should consider raising the level of agency representation for WG/WIST to a level more appropriate for supervising work that falls within and under the WG/WIST's purview.

- The community should seriously consider requesting OFCM-sponsored Joint Action Group(s) be formed to accomplish actions outlined below. The JAG(s) would be aligned under the WG/WIST.

- Develop an integrated observing strategy to include identification of critical new surface transportation weather and road condition sensor needs.

- Establish several high-level R&D priorities for agencies to focus on and to collaborate with the academic community and the private sector.

- Improve interagency coordination of products and services for common applications (joint use/cross-feed/new requirements).

- Consider sponsoring a multi-mode surface transportation weather demonstration project (road/rail/maritime/pipeline/etc.).

- Conduct socioeconomic surveys of impacts and needed format/semantic changes to improve understanding and usability of required products and services.

- Consider fast tracking a Post-Doctoral position assigned to the National Centers for Environmental Prediction/Environmental Modeling Center, focused on surface transportation needs for modeling and prediction and products and services.

## **AVIATION WEATHER**

In August 2007 OFCM published an important document in the area of aviation weather support, *The National Volcanic Ash Operations Plan for Aviation and Support of the International Civil Aviation Organization International Airways Volcano Watch (NVAOPA)*. This plan is the national operations plan in support of observing, tracking, monitoring, forecasting and reporting volcanic ash in the atmosphere that affects the safety of flight operations in the U.S. National Airspace System (NAS). It identifies the Federal agencies that implement these actions and describes their responsibilities, procedures, actions, and message formats. It also provides information on how the Federal Aviation Administration (FAA) meets its obligations to the International Airways Volcano Watch, sponsored by the International Civil Aviation Organization. Participating agencies include, in addition to FAA, the Department of Commerce National Oceanic and Atmospheric Administration's National Environmental Satellite, Data, and Information Service, the National Weather Service, and the Office of Oceanic and Atmospheric Research; the Department of Defense U.S. Air Force; and the Department of Interior's U.S. Geological Survey. The National Aeronautics and Space Administration (NASA) and the Smithsonian Institution also provide support to the Federal agencies through extending the benefits of earth science research in the areas of volcanic ash monitoring and tracking.

The OFCM continues to facilitate the continuation of interagency funding for the acquisition of automated meteorological observations from aircraft in partnership with several major U.S. commercial airlines.

The OFCM attended the Next Generation Air Transportation System (NGATS) Weather Integrated Product Team (IPT) Executive Committee and

Friends and Partners in Aviation Weather meetings held in Orlando, Florida, in October 2006. OFCM also continued to implement the National Aviation Weather Program during FY 2007. The Federal interagency National Aviation Weather Program has resulted in a major reduction of weather-related accidents. The program remains on track toward meeting the established goal to reduce weather-related accidents by 80 percent by 2007. The OFCM continues to monitor progress in meeting this goal by monitoring weather-related aviation accident events and trends. *A National Aviation Weather Program Mid-Course Assessment* was completed in August 2003. OFCM is preparing a final assessment for 2007, the ten year point of the National Aviation Weather Program.

The OFCM continues to implement the National Aviation Weather Program, and is working with the agencies to advance meteorological standards, improve products, enhance services, and participate in research that contributes to the overall goal of providing the best state-of-the-art information to aviation end users where and when they need it. OFCM is a member of the Executive Committee of the interagency Joint Planning and Development Office (JPDO) Weather Integrated Product Team (WxIPT), and has monitored the early development of the Next Generation Air Transportation System concept of operations with special emphasis on how weather support will be integrated into the concept of operations for the overall NAS 2025. OFCM's coordinating infrastructure will continue to contribute to collaboration and coordination in the aviation community.

## **SPACE WEATHER**

It was noted at the November 16, 2004, and December 1, 2004, meetings of the Interdepartmental Committee for Meteorological Services and Sup-



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porting Research (ICMSSR) and Federal Committee for Meteorological Services and Supporting Research (FCMSSR), respectively, that the National Space Weather Program (NSWP) was nearing the end of its 10-year period to accomplish its overarching goal to achieve an active, synergistic, interagency system; providing timely, accurate, and reliable space weather warnings, observations, specifications, and forecasts by 2007. It was also noted that it was time to perform an interagency assessment to look at the progress toward meeting its goals. A National Space Weather Program Assessment Committee was formed by OFCM to perform the assessment, which was led by Dr. Louis J. Lanzerotti, Distinguished Research Professor, Center for Solar-Terrestrial Research, New Jersey Institute of Technology. The charge to the Assessment Committee was to review the NSWP to quantify and document the progress toward meeting the NSWP stated goals in observations, research, modeling, transition of research to operations, and education and outreach; to see if the program is still on target and moving in the direction pointed to by the *Strategic Plan*; to determine whether the strategic goals should be adjusted at this time based on emerging/evolving requirements; and to suggest a way ahead which will form a basis for a new strategic plan covering the next 10 years. The committee's activities in conducting the assessment included briefings at OFCM; visits to the National Security Space Office, National Reconnaissance Office, NOAA's Space Environment Center, U.S. Geological Survey, Air Force Space Command, Air Force Weather Agency, Air Force Space Weather Operations, STRATCOM, and Air Force Research Laboratory; community and user questionnaires; and issuance of a September 2005 interim report. Important reference sources were the *National Security*

*Space Architecture 2000: Space Weather Architecture*; U.S. Department of Commerce Service Assessment, April 2004; and the *National Academies report, The Sun to the Earth-and Beyond: A Decadal Research Strategy in Solar and Space Physics, 2002*.

In its *Report of the Assessment Committee for the National Space Weather Program* (June 2006), the Assessment Committee concluded that, since the program's inception in 1995, it has had a number of noteworthy achievements, most of which likely would not have been attained without the program's existence. The committee also found shortfalls in the program. Based on the conclusions of the committee as contained in the report, continuation of the NSWP is strongly warranted because of the enormous potential to enhance the nation's space weather mission over the next 10 years through improved operational capabilities, which capitalize on the transition of innovative research. Moving NOAA's operational space weather prediction center (i.e., the Space Environment Center) from its research organization to the National Weather Service was a positive step to improve operational focus within the NSWP. The committee made a number of recommendations to further strengthen the NSWP in the areas of (1) centralized program management, national priorities, and increased effectiveness; (2) continuity of data sources; (3) strengthening the science-to-user chain; and (4) public and user awareness of space weather.

It was agreed that the *Report of the Assessment Committee for the National Space Weather Program* should proceed for consideration by the National Space Weather Program Council (NSWPC), and that the Program Council should be the executive agent for FCMSSR for continuing activities in this area. The NSWPC has accepted the report and has begun taking actions to address the report's rec-

ommendations.

Space weather activities also include creating a Space Weather Implementation Plan (SWxIP) as requested by the Committee on Environment and Natural Resources (CENR) Subcommittee for Disaster Reduction (SDR). Space weather was identified as one of the SDR's Grand Challenges for Disaster Reduction and SDR requested that the OFCM spearhead an effort, through the NSWP, to develop the SWxIP.

In addition the OFCM sponsored the American Meteorological Society policy workshop on "Integrating Space Weather Observations and Forecasts into Aviation Operations" which was held November 29-30, 2006, in Washington, D.C., that led to recommendations on how to improve the safety and operations of the aviation system through better integration of space weather information. The workshop revealed that there are four main policy issues that need to be addressed to ensure the best use of current space weather information: communication, standardization of information and regulations, education and training, and cost benefit and risk analysis. The report of the policy workshop was issued in March 2007; it provided detailed recommendations for each of the main policy areas.

The OFCM also formed a Joint Action Group for Space Environment Sensors (JAG/SES) to address guidance from the Office of Science and Technology Policy (OSTP), requesting that the OFCM conduct, through its Federal coordinating infrastructure, an assessment of the impacts on the National Space Weather Program of Nunn-McCurdy certification of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) program, which resulted in a significant decrease in the capability of the space environment sensor (SES) suite previously manifested on NPOESS. The assessment will be completed in the fall of 2007.

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## PHASED ARRAY RADAR

The OFCM Joint Action Group for Phased Array Radar Project (JAG/PARP) completed the report, *Federal Research and Development Needs and Priorities for Phased Array Radar* (June 2006). It is responsive to ICMSSR Action Item 2004-2.3 where ICMSSR supported the joint action group's "continued work to identify and document the potential needs and benefits that phased array radar and an adaptive radar sensing strategy would address, and to integrate those identified needs into a multiagency-coordinated R&D plan that would focus R&D efforts on meeting each agency's need." The report identified research and development for the next 9 years to capitalize on the replacement opportunity. This would support the research needed to reduce risk, determine the capability of multifunction phased array radar (MPAR) to meet multiple user needs concurrently, develop a full MPAR prototype, and perform a cost analysis to determine system affordability. Delays in performing the necessary MPAR research, development, and testing could result in a missed opportunity to replace legacy radars. At its July 18, 2006, meeting, ICMSSR decided that an MPAR interagency working group should be established within the OFCM infrastructure with a defined charter to develop a strategy to address the key findings and recommended next steps in the MPAR report, and agency comments from the ICMSSR meeting. The Working Group for Multifunction Phased Array Radar (WG/MPAR) was established in September 2006. Cochairs for WG/MPAR are Dr. James F. Kimpel, Director of the NOAA National Severe Storms Laboratory (NSSL); Col Michael Babcock, USAF, Air Force Weather Deputy for Federal Programs; Mr. James H. Williams, Director of Systems Engineering for the Federal Aviation Administration; and Mr. Kevin

"Spanky" Kirsch of the Science and Technology Directorate, Department of Homeland Security.

Benefits of an affordable MPAR include: potential replacement for the aging fleet of mechanically scanning radars over the next 20 years; allows consolidation of multiple single-mission radars into a single system, reducing the national radar fleet by more than 40 percent, saving nearly \$5 billion over a 30-year lifecycle; provides both air and weather surveillance from a single radar site; no moving parts, lower maintenance costs; multiple transmit/receiver components, avoiding single point of failure; scalable design of prototype will provide proof of concept for future MPAR; better weather measurements; increased safety and capacity in severe weather conditions; terminal and en route surveillance; homeland security; and discrimination of non-meteorological hazards such as volcanic ash, airborne debris, smoke detection and tracking, and biological scatterers such as bird flocks.

Future efforts include: (1) Develop an affordable MPAR prototype for civilian use; (2) Refine radar requirements and lay the groundwork for MPAR cost/benefit analysis; (3) Implement the 9-year research and development plan proposed in the report, *Federal Research and Development Needs and Priorities for Phased Array Radar*; (4) Establish contacts and initiate partnerships with industry leaders in phased array technology; (5) Coordinate agency programming for the MPAR risk reduction effort; (6) The Board on Atmospheric Sciences and Climate evaluation of the MPAR planning process to date, *Evaluation of the Multifunction Phased Array Radar Planning Process*; (7) The MPAR Symposium, October 10-12, 2007, in Norman, Oklahoma, which will engage Federal stakeholders, academia, and industry; (8) Working Group for Multifunction Phased Array Radar

(WG/MPAR) continue to refine user requirements; and (9) solidify technical requirements for the MPAR system, including engineering trade studies to balance user needs with lowest cost.

In a June 1, 2007 letter of commendation to the Federal Coordinator, Brig Gen Lawrence A. Stutzriem, USAF, Director of Weather, emphasized that MPAR will have a direct influence on the Air Force's capabilities. He also noted that other relevant, important projects in which OFCM is engaged include space weather, wildland fire, tropical cyclones, weather information for surface transportation, and volcanic ash. Also, in a January 31, 2007, Program Decision Memorandum issued by VADM Conrad C. Lautenbacher, Jr., USN (Ret.), Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator, the Admiral emphasized evaluating the electronically steered MPAR as an alternative to mechanically steered conventional radar to meet severe and non-severe weather and aviation weather service requirements and to track the release of toxic agents as input into atmospheric dispersion forecasts; and, also, if the technical trade-off study and preliminary cost-benefit analysis support transitioning MPAR to operations, development of a transition plan for this purpose. The Program Decision Memorandum also included highlights for OFCM's hurricane, wildland fire, and weather information for surface transportation activities.

## ATMOSPHERIC RESEARCH AND DATA ASSIMILATION/DATA MANAGEMENT

Advances in data assimilation are key to meeting virtually any forecast goal relating to model performance. It was stated in the *Strategic Plan for the U.S. Integrated Earth Observation System* (April 2005) that "In order to take the 'pulse of the planet,' we must

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establish a valid end-to-end process that will take us from observations to user-related products. Scientific needs for this end-to-end process require that we ... assimilate the Earth observation data streams into models (eventually in real time) ..." and "Data assimilation may be the most critical path through which advances in forecasting convective precipitation will be modulated." At its November 16, 2004, meeting, the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) supported action to examine gaps in data assimilation and data management capability, articulate challenges that lie ahead in meeting future requirements, and propose strategy to address gaps in capability and future challenges. And Action Item 2004-1.2 from the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) December 1, 2004, meeting, recommended that: FCMSSR agencies will support R&D needs and requirements based on agency priorities and will continue to identify issues and concerns that are necessary for the development of capabilities required to realize societal benefits; Federal requirements and capabilities in key areas like data assimilation need to be surveyed and further addressed; and FCMSSR agencies will support and facilitate opportunities for the transition of research into operational applications.

The data assimilation survey and follow-on strategy was briefed at the July 18, 2006, ICMSSR meeting. It was noted that the focus of the report which is being prepared is on data assimilation for the purpose of improving forecast skill of a numerical weather prediction (NWP) model; the scope of data assimilation is restricted to incorporation of observational data as a forcing factor in cycles of forward NWP models; and broader definition of data assimilation would be addressed through inclusion of related

activities such as climate reanalysis, trace constituent monitoring, and air quality. Key data assimilation issues are:

- Data delivery and standard formatting.
- How best to evolve assimilation techniques over time to meet future application challenges.
- Early delivery of new instrument data.
- Testing and transitioning new data assimilation techniques and concepts into "hardened" data assimilation instruments for operational use.
- Availability of high performance computing and trained personnel
- Data staging and delivery required for Global Earth Observation System of Systems (GEOSS)-level infrastructure capability.
- Education and public outreach: implications for data assimilation and modeling.

Data gathering and data assimilation activity analysis tasks are essentially complete; the report framework and key issues have been defined by the data assimilation group; and next steps are being defined. The draft report, *Federal Meteorological Data Assimilation Capabilities*, will be coordinated with ICMSSR at its November or December 2007 meeting.

### **CROSSCUTTING HYDROMETEOROLOGICAL ASSESSMENT**

During this period OFCM began a crosscutting assessment of Federal agency hydrometeorological products, services, and supporting research. The three primary objectives of the assessment are: (1) Define the needs and requirements for hydrometeorological products, services, and supporting research for the Federal agencies and the customers they support; (2) Investigate agency plans and alternatives for satisfying new requirements; and (3) Create more efficient and effective partnerships among the agencies to better leverage subject-matter expert-

ise and resources to meet the growing needs for better hydrometeorological products and services. Agencies which will be involved include: NOAA (National Weather Service and National Ocean Service-principal providers); Department of Interior (U.S. Geological Survey-stream flow, streamgaging, flood monitoring, ground-water climate response network; U.S. Bureau of Reclamation-dams, reservoirs, and *Agrimet* and *Hydromet* operations; U.S. Fish and Wildlife Service-coastal ecosystems; and National Park Service-tourism and natural resource monitoring and management); Department of Agriculture (USDA-drought monitor; National Resources Conservation Service-conservation and watershed planning); Department of Defense (U.S. Army Corps of Engineers-flood plain management, Gulf Coast Hurricane Protection System); Department of Homeland Security (Federal Emergency Management Agency-National Flood Insurance Program, flood hazard mapping, post-storm data acquisition; U.S. Coast Guard-protect against degradation of natural resources associated with maritime transportation, fishing, and recreational boating); Environmental Protection Agency-water resource protection; and National Aeronautics and Space Administration-remote sensing. A key element of the assessment is to engage the users of this Federal information and OFCM is ensuring that we understand the needs of user groups such as the National Emergency Management Association, International Association of Emergency Managers, Association of State Floodplain Managers, National Hydrologic Warning Council, American Meteorological Society, and the media (e.g., The Weather Channel and other TV broadcasters).

### **ENVIRONMENTAL LITERACY**

The OFCM has laid out a vision, framework, and methodology which

the office will embrace to systematically promote and execute environmental literacy through interdepartmental collaboration within the OFCM coordinating infrastructure. The methodology defines how to determine if an opportunity to promote environmental literacy exists. It also describes the method to be used to determine the target public, private, and/or academic sector audiences and how to reach them. Determining the target audiences' needs and a means for assessing how those needs are being met is incorporated into the methodology as well. Executing this methodology will result in a nation better able to understand the linkages between weather and climate and personal and professional choices and build a national capacity to solve problems and respond to change. It will provide for a more environmentally literate citizenry. In this regard, the OFCM developed an implementing strategy/action plan to make environmental literacy a crosscutting priority within the OFCM coordinating infrastructure. An *Implementing Strategy for Promoting Environmental Literacy as an OFCM Crosscutting Priority* was presented to the science community at the American Geophysical Union (AGU) Fall Meeting, December 5-9, 2005, in San Francisco, California. OFCM is also making environmental literacy an important part of the *National Wildland Fire Weather Needs Assessment* discussed earlier in this report. The OFCM is also continuing its support of an American Meteorological Society undergraduate scholarship in the atmospheric and related oceanic and hydrologic sciences.

## **FREQUENCY MANAGEMENT**

Both international and domestic spectrum policy are of critical importance to the Federal meteorological community and can significantly impact our ability to carry out our assigned duties and responsibilities.

The OFCM Working Group for Frequency (Radio Spectrum) Management (WG/FM) acts as a two-way clearinghouse for information on environmental use of the radio spectrum. It fosters cooperation and coordination among Federal agencies for the collection and consolidation of agency needs and requirements related to frequency management issues as they affect meteorological services, and for planned non-environmental spectrum uses that may affect the environmental community for good or ill. During FY 2007, the OFCM updated its frequency management issues document to provide the interagency community with background information, current status of meteorological uses, potential future technology that could impact spectrum bandwidth, identification of other new frequency management issues, and recommendations for agency involvement in the radio spectrum area.

## **GUIDANCE AND PRACTICES FOR XML**

During FY 2007, the charter for the Committee for Environmental Information Systems and Communications (CEISC) Joint Action Group for Extensible Markup Language and Web Services (JAG/XMLWS) was enhanced so that this group would serve as the primary national collaboration forum to work on three primary objectives. These include: (1) Establish agreed national standards (develop by JAG/XMLWS or obtained from national or international standards bodies) and common services and components for common weather information exchange in a net-centric operations environment. (2) Serve as the national working body to develop the U.S. position and candidate standards for adoption consideration for the newly formed World Meteorological Organization (WMO) Expert Team on the Assessment of Data Representation Systems. And (3) Support the development of a specialty subset of

national standards specifically related to aviation weather. This is needed both in support of the Next Generation Air Transportation System (NextGen) and to support the Federal Aviation Administration (FAA) engagement with EUROCONTROL on a similar need for equivalent aviation system modernization. The desired intent is to develop common standards to be used both by EUROCONTROL and by NextGen.

## **COLLABORATION WITH NAS/NRC BOARD ON ATMOSPHERIC SCIENCES AND CLIMATE**

The OFCM continued its mutually beneficial interactions with the National Academy of Sciences/National Research Council (NAS/NRC). The NAS/NRC Board on Atmospheric Sciences and Climate (BASC) conducted a strategic planning workshop on August 8-9, 2006, in which the Federal Coordinator for Meteorology participated. The workshop was held at the J. Erik Jonsson Woods Hole Center of the National Academy of Sciences in Woods Hole, Massachusetts. The purposes of the meeting were to identify emerging issues facing the atmospheric sciences and climate communities, and to discuss future goals of BASC and set priorities for action. Emerging issues were examined in meteorology, weather, atmospheric composition and other areas relevant to the BASC mission. A balance was achieved in considering issues in basic and applied science, and policy; varied disciplines and interdisciplinary areas; and technology as well as research. In addition, during FY 2007 the OFCM initiated an activity with BASC to evaluate the planning to date related to continued development of multifunction phased array radar (MPAR). Specifically, a BASC committee will evaluate whether the planning process to date has been comprehensive and inclusive;

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whether the June 2006 OFCM report, *Federal Research and Development Needs and Priorities for Phased Array Radar*, has identified the full range of benefits, costs, challenges, and potential participants; whether cost estimates to date are realistic, represent the best available information, and exclude any potential life-cycle benefits or costs; whether there are any significant gaps or errors in initial planning; whether appropriate areas of uncertainty have been identified and follow-on risk assessments conducted; and, based on the information available to the committee, whether the MPAR planning process should go forward and what improvements could be recommended.

## **COLLABORATION WITH THE COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES**

### **CENR PRINCIPALS**

The Federal Coordinator continued to be a participant on the CENR, and continued to assist CENR through review and concurrence of CENR reports and materials. At the request of the Office of Science and Technology Policy (OSTP), the Federal Coordinator also reviewed and approved the reports, *A Strategy for Federal Science and Technology to Support U.S. Water Availability and Quality*, and *National Assessment of Efforts to Predict and Respond to Harmful Algal Blooms in U.S. Waters*.

### **SUBCOMMITTEE ON DISASTER REDUCTION**

The OFCM has been an active participant in the work of the CENR Subcommittee on Disaster Reduction (SDR). SDR has developed Grand Challenges implementation plans, to improve the nation's capacity to prevent and recover from disasters. These disaster scenarios serve as a useful tool for sharing the ideas behind the 2005

SDR Grand Challenges document and demonstrating their possible application. The implementation plans include such topics as assessing disaster resilience, understanding the natural processes that produce hazards, promoting risk-wise behavior, etc. Space weather was identified as one of the SDR's Grand Challenges for Disaster Reduction, and during FY 2007, SDR requested that the OFCM spearhead an effort, through the National Space Weather Program, to develop a Space Weather Implementation Plan (SWxIP). SDR has also completed a Windstorm Impact Reduction Implementation Plan which is the culmination of an SDR-led, coordinated Federal effort, in cooperation with other levels of government, academia, and the private sector, to improve understanding of windstorms and their impact, and develop and encourage implementation of cost-effective mitigation measures to reduce those impacts while promoting community resilience. In addition, the SDR working group on satellite issues has participated in the creation of a waiver for the 24-hour wait period on high resolution commercial satellite imagery. The need of state and local governments as well as private entities to respond quickly in the aftermath of Hurricane Katrina and other natural disasters was the impetus behind the waiver request, which has been instituted domestically. OFCM is committed to working with SDR to provide a forum for information sharing, development of collaborative opportunities, and interactive dialogue with the U.S. policy community to advance informed strategies for managing risks associated with natural and technological disasters.

### **AMERICAN METEOROLOGICAL SOCIETY**

During FY 2007, the OFCM supported the 2007/2008 American Meteorological Society (AMS) Freshman Undergraduate Scholarship Program.

The scholarship program is open to all high school students and designed to encourage study in the atmospheric and related sciences. The scholarships will be awarded, based on academic excellence, to high school seniors entering their freshman year of study in the atmospheric, oceanic, or hydrologic sciences. The scholarships are for the freshman and sophomore years, with second-year funding dependent on successful completion of the first year. The OFCM also supports AMS endeavors by participating in AMS conferences and workshops and other environmental science education and outreach programs, including for example the January 14-18, 2007, 87th AMS Annual Meeting in San Antonio, Texas; the April 16-17, 2007, AMS Policy Forum in Washington, D.C.; the June 24-29, 2007, AMS 22nd Conference on Weather Analysis and Forecasting/18th Conference on Numerical Weather Prediction, Park City, Utah; and the September 10-13, 2007, 7th AMS Symposium on the Urban Environment in San Diego, California. The OFCM also sponsored the American Meteorological Society policy workshop on "*Integrating Space Weather Observations and Forecasts into Aviation Operations*" which was held November 29-30, 2006, in Washington, D.C., that led to recommendations on how to improve the safety and operations of the aviation system through better integration of space weather information. In addition, during this period an OFCM staff member was Chairperson of the AMS Weather Analysis and Forecasting Committee; and served as Cochair of the 2007 AMS Annual Meeting held in San Antonio, Texas. Another OFCM person initiated and is serving as lead for an AMS Hurricane Disasters Annual Partnership Topic (APT) on *Building America's Resilience to Hurricane Disasters*, which is exploring how the private sector can engage more fully in hurricane disaster prevention, pre-

paredness, and recovery actions; protecting the poor and most vulnerable in hurricane disasters; and education issues on responses to forecasts and warnings for hurricanes. And the Federal Coordinator was selected to serve as a member of the AMS Commission on the Weather and Climate Enterprise (CWCE) and its Commission Steering Committee (CSC).

## INTERNATIONAL COLLABORATION

During FY 2007, the China Meteorological Administration (CMA) completed the task of translating the OFCM document, *Weather Information for Surface Transportation-National Needs Assessment Report (2002)*, into the Chinese language. This OFCM report is a first-ever compilation of weather information for surface transportation (WIST) needs across the six surface transportation sectors—roadway, railway, transit, marine transportation, pipeline systems, and airport ground operations—and an analysis of these needs. In a preface to the Chinese edition of the WIST report which was provided by the U.S. Federal Coordinator for Meteorology, the Federal Coordinator noted that the commitment to translate the document into Chinese shows that the value of weather information for surface transportation is becoming recognized around the world, and that it offers substantial returns on investment to every society that desires safe and efficient transportation systems. He also noted that WIST is a wonderful example of the need for every modern society to view its meteorological services from the perspective of end-to-end systems: from the atmospheric and other environmental observations all the way to the decision processes of the users. OFCM continued to participate in other opportunities as they arose during FY 2007. The OFCM Committee for Environmental Information Systems and Communications

(CEISC) Joint Action Group for XML and Web Services (JAG/XMLWS) served as the national body to develop the U.S. position and candidate standards for adoption consideration for the newly formed World Meteorological Organization (WMO) Expert Team on the Assessment of Data Representation Systems, and also supported the development of a specialty subset of national standards specifically related to aviation weather.

## PUBLICATIONS

The following publications were prepared in hard copy and/or have been placed on OFCM's Web site ([www.ofcm.gov](http://www.ofcm.gov)):

- *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2007*
- *National Hurricane Operations Plan*
- *Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead*
- *Federal Plan for Cooperative Support and Backup Among Operational Processing Centers*
- *The National Volcanic Ash Operations Plan for Aviation and Support of the International Civil Aviation Organization International Airways Volcano Watch*
- *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part A-System Concepts, Responsibilities and Procedures*
- *Federal Meteorological Handbook No. 11-Doppler Radar Meteorological Observations; Part C-WSR-88D Products and Algorithms*

The following documents are planned for publication during FY 2008:

- *The Federal Plan for Meteorological Services and Supporting Research-Fiscal Year 2008*
- *National Hurricane Operations Plan*
- *Strategic Plan for Improved Tropical Cyclone Reconnaissance Systems*
- *Exploratory Review of Information Dissemination Flow*
- *National Wildland Fire Weather: User Needs and Issues*
- *National Wildland Fire Weather: Strategic Framework to Meet User Needs*
- *Federal Meteorological Data Assimilation Capabilities*
- *Criteria for Selection of Joint Urban Test Beds (JUTB)*
- *The National Space Weather Program: Strategic Plan - 2nd Edition*
- *The National Space Weather Program: Implementation Plan - 3rd Edition*
- *National Wildland Fire Weather: A Summary of User Needs and Issues*

Table A.1 Current OFCM Publications

<u>Publication Title</u>	<u>Date</u>	<u>Number</u>
<i>Federal Plan for Meteorological Services and Supporting Research, Fiscal Year 2007</i>	October 2006	FCM-P1-2006
National Plan for Space Environment Services and Supporting Research: 1993-1997	August 1993	FCM-P10-1993
<i>National Severe Local Storms Operations Plan</i>	May 2001	FCM-P11-2001
<i>National Hurricane Operations Plan</i> <i>WSR-88D Tropical Cyclone Operations Plan</i>	May 2007	FCM-P12-2007
<i>National Winter Storms Operations Plan</i>	December 2005	FCM-P13-2005
Federal Plan for Cooperative Support and Backup Among Operational Processing Centers	Mar 2007	FCM-P14-2007
National Plan for Stratospheric Monitoring, 1988-1997	July 1989	FCM-P17-1989
National Aircraft Icing Technology Plan	April 1986	FCM-P20-1986
National Plan to Improve Aircraft Icing Forecasts	July 1986	FCM-P21-1986
Federal Plan for the Coordination of Automated Weather Information System Programs	May 1988	FCM-P23-1988
Federal Plan for Meteorological Information Management	July 1991	FCM-P24-1991
National Plan for Tropical Cyclone Research and Reconnaissance (1997-2002)	January 1997	FCM-P25-1997
National Aviation Weather Program Plan	September 1992	FCM-P27-1992
National Geostationary Operational Environmental Satellite (GOES) Data Collection System (DCS) Operations Plan	August 1997	FCM-P28-1997
Federal Plan for Marine Environmental Data, Services, and Supporting Research	June 1996	FCM-P29-1996
<i>The National Space Weather Program: Strategic Plan</i>	August 1995	FCM-P30-1995
<i>The National Space Weather Program: Implementation Plan - 2<sup>nd</sup> Edition</i>	July 2000	FCM-P31-2000
<i>National Aviation Weather Strategic Plan</i>	April 1997	FCM-P32-1997
<i>National Post-Storm Data Acquisition Plan</i>	March 2003	FCM-P33-2003
<i>National Aviation Weather Initiatives</i>	February 1999	FCM-P34-1999
<i>National Volcanic Ash Operations Plan for Aviation and Support of the ICAO International Airways Volcano Watch</i>	August 2007	FCM-P35-2007
<i>Interagency Strategic Research Plan for Tropical Cyclones: The Way Ahead</i>	February 2007	FCM-P36-2007
Tropical Cyclone Studies	December 1988	FCM-R11-1988
Tropical Cyclone Studies Supplement	August 1989	FCM-R11-1988S
<i>Interdepartmental Meteorological Data Exchange System Report, IMDES</i>	August 1998	FCM-R12-1998

Table A.1 Current OFCM Publications (cont.)

<u>Publication Title</u>	<u>Date</u>	<u>Number</u>
Federal Meteorological Requirements 2000	October 1990	FCM-R13-1990
<i>U.S. Wind Profiler: A Review</i>	<i>March 1998</i>	<i>FCM-R14-1998</i>
<i>Aviation Weather Training: A Report on Training for Emerging and Recently Implemented Aviation Weather Programs</i>	<i>April 2002</i>	<i>FCM-R16-2002</i>
Atmospheric Modeling of Releases from Weapons of Mass Destruction	August 2002	FCM-R17-2002
<i>Weather Information for Surface Transportation--National Needs Assessment Report</i>	<i>December 2002</i>	<i>FCM-R18-2002</i>
<i>Report on Wind Chill Temperature and Extreme Heat Indices: Evaluation and Improvement Projects</i>	<i>January 2003</i>	<i>FCM-R19-2003</i>
<i>National Aviation Weather Program Mid-Course Assessment</i>	<i>August 2003</i>	<i>FCN-R20-2003</i>
<i>Aviation Weather Programs/Projects-2004 Update (Tier ¾ Baseline Update)</i>	<i>December 2004</i>	<i>FCM-R21-2004</i>
<i>Urban Meteorology: Meeting Weather Needs in the Urban Community</i>	<i>January 2004</i>	<i>FCM-R22-2004</i>
<i>Federal Research and Development Needs and Priorities for Atmospheric Transport and Diffusion Modeling</i>	<i>September 2004</i>	<i>FCM-R23-2004</i>
<i>Report of the Assessment Committee for the National Space Weather Program</i>	<i>June 2006</i>	<i>FCM-R24-2006</i>
<i>Federal Research and Development Needs and Priorities for Phased Array Radar</i>	<i>June 2006</i>	<i>FCM-R25-2006</i>
<i>Weather Information for Surface Transportation - Update on Weather Impacts and WIST Results</i>	<i>August 2006</i>	<i>FCM-R26-2006</i>
<i>Federal Meteorological Handbook No. 1 - Surface Weather Observations and Reports</i>	<i>September 2005</i>	<i>FCM-H1-2005</i>
Federal Meteorological Handbook No. 2 - Surface Synoptic Codes Surface Synoptic Code Tables (Update)	December 1988 July 1990	FCM-H2-1988 FCM-T1-1990
<i>Federal Meteorological Handbook No. 3 - Rawinsonde and Pibal Observations</i>	<i>May 1997</i>	<i>FCM-H3-1997</i>
Federal Meteorological Handbook No. 10 - Meteorological Rocket Observations	December 1988	FCM-H10-1988
Federal Meteorological Handbook No. 11 - Doppler Radar Meteorological Observations <i>Part A - System Concepts, Responsibilities and Procedures</i> <i>Part B - Doppler Radar Theory and Meteorology</i> <i>Part C - WSR-88D Products and Algorithms</i> <i>Part D - WSR-88D Unit Description and Operational Analysis</i>	<i>May 2007</i> <i>December 2005</i> <i>Apr 2006</i> <i>February 2006</i>	<i>FCM-H11A-2007</i> <i>FCM-H11B-2005</i> <i>FCM-H11C-2006</i> <i>FCM-H11D-2006</i>
<i>Federal Meteorological Handbook No. 12 - United States Meteorological Codes and Coding Practices</i>	<i>December 1998</i>	<i>FCM-H12-1998</i>
Standard Formats for Weather Data Exchange Among Automated Weather Information Systems	November 1994	FCM-S2-1994
Standard Telecommunication Procedures for Weather Data Exchange (under revision)	October 1991	FCM-S3-1991



Table A.1 Current OFCM Publications (cont.)

<u>Publication Title</u>	<u>Date</u>	<u>Number</u>
<i>Federal Standard for Siting Meteorological Sensors at Airports</i>	<i>August 1994</i>	<i>FCM-S4-1994</i>
<i>Directory of Atmospheric Transport and Diffusion Consequence Assessment Models</i>	<i>March 1999</i>	<i>FCM-I3-1999</i>
<i>Federal Directory of Mobile Meteorological Equipment and Capabilities</i>	<i>December 1995</i>	<i>FCM-I5-1995</i>
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