Weather Information for Surface Transportation (WIST): Update on Weather Impacts and WIST Progress

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ABSTRACT

Just over five years ago, the National Oceanic and Atmospheric Administration (NOAA) released its first report on improving surface transportation safety and cost efficiency through improved weather and climate information products. The 2002 report, Weather Information for Surface Transportation: A National Needs Assessment Report, which sought to provide the roadmap for the nation’s surface weather activities, helped launch a rapid expansion of interagency, intergovernmental, and public-private efforts to enhance safety and mitigate the economic impacts of what was called “surface transportation weather.” The six sectors of the surface transportation community affected by this report are roadway, railway, transit, pipeline, marine transportation system, and airport ground operations.

This update of the 2002 report focuses on the status of surface transportation weather issues in the United States and the results achieved since the first report. This update delineates the positive impact of the increased focus and attention on the functional area of surface transportation weather, which has helped reduce fatalities and injuries, improve operations efficiency, and reduce property damage on the nation’s transportation systems, thus enhancing the nation’s economy. While challenges remain in terms of gathering the data needed to distinctly tally the safety and economic impacts of weather on every transportation sector, and in terms of demonstrating the difference that timely, targeted weather information can make in enhancing safety and economic benefits, the available data does indicate progress. This update also details efforts to develop a federal surface transportation weather research and development program plan.

Key words: research—safety—surface transportation—weather
FEDERAL METEOROLOGICAL COMMUNITY ORGANIZATION

Office of the Federal Coordinator for Meteorological Services and Supporting Research Mission

The mission of the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) is “to ensure the effective use of federal meteorological resources by leading the systematic coordination of operational weather requirements and services, and supporting research, among the federal agencies.” The key point is the focus on systematic coordination among the federal agencies and their stakeholders.

Federal Meteorological Coordinating Infrastructure

The OFCM executes this mission through the Federal Meteorological Coordinating Infrastructure, as depicted in Figure 1. The overall policy guidance is provided by the Federal Committee for Meteorological Services and Supporting Research. Fifteen federal departments and agencies are currently engaged in meteorological activities and participate in the OFCM’s coordination infrastructure. The OFCM carries out its tasks through an interagency staff working with representatives from the federal agencies, who lead and serve on program councils, committees, working groups, and joint action groups. This infrastructure supports all of the federal agencies that are engaged in meteorological activities or that have a need for meteorological services. The OFCM also assesses the adequacy of the total federal meteorology program and reviews current and proposed programs to identify opportunities for improved efficiency, reliability, and cost avoidance through coordinated actions and integrated programs. The OFCM also provides analyses, summaries, and evaluations that provide a factual basis for federal agencies and the executive and legislative branches to make appropriate decisions related to the allocation of funds. In this regard, the OFCM recently made significant contributions to the interagency meteorology community in areas such as natural disaster reduction (hurricanes and post-storm data acquisition), wildland fires, space weather, phased array radar, and weather information for surface transportation.

Figure 1. Federal Meteorological Coordination Infrastructure
Weather Information for Surface Transportation

Based on the OFCM-sponsored document, *Weather Information for Surface Transportation: A National Needs Assessment Report* (2002), it became apparent to the federal meteorological community’s leadership that it needed to conduct an in-depth coordination and synchronization of all requirements, research and development needs, and services regarding weather information for surface transportation (WIST). Therefore, a Working Group for Weather Information for Surface Transportation (WG/WIST) was chartered and aligned under the Committee for Environmental Services, Operations, and Research Needs, within the Federal Meteorological Coordinating Infrastructure, to coordinate and synchronize WIST.

**IMPACT OF WEATHER ON SURFACE TRANSPORTATION SYSTEMS**

It is common knowledge that weather has a significant impact on the nation’s surface transportation systems. For the roadway sector, weather-related accidents and weather events, as indicated by safety and cost data estimates, lead to approximately 7,300 fatalities per year, 713,537 injuries, and $42 billion in economic costs. Moreover, nearly 25% of nonrecurrent delays on freeways are weather-related. In the railway sector, annual average weather-related fatalities are much lower than for roadways. However, between 1995 and 2005, 865 weather-related accidents or incidents occurred on America’s railways, causing 8 deaths, 1,242 injuries, and property damage of more than $189 million. Most of these weather-related deaths (62.5%) and injuries (91.1%) between 1995 and 2005 were associated with accidents or incidents associated with extreme temperature variations. In the marine transportation system sector, between 1996 and 2000 weather-related events accounted for 11% of marine transportation accidents and 3.6% of all recreational boating accidents. In the pipeline systems sector, between 2002 and 2005 the pipeline systems sector experienced 4 weather-related fatalities and 14 weather-related injuries, all occurring in 2005. In 2005, the number of pipeline incidents caused by natural forces (defined as heavy rains/floods, high winds, lightning, temperature, earth movement, and various other causes) increased dramatically due to hurricane damage. Three of the fatalities were attributed to incidents caused by temperature, and one was due to high winds; all four incidents were in natural gas distribution activities.

Finally, weather’s impact on transportation congestion is large. During remarks to the National Retail Federation in May 2006, Secretary of Transportation Norman Mineta called congestion one of the single largest threats to the economy and announced a new national initiative to tackle highway, freight, and aviation congestion. In May 2006, the Department of Transportation released the National Strategy to Reduce Congestion on America’s Transportation Network, which attributed 15% of all transportation system congestion to the adverse weather conditions of snow, ice, and fog.

**PROGRESS BEING MADE THROUGH WIST**

There is preliminary evidence that, since the first WIST report was released in 2002, some improvement has been achieved in terms of lessening the impact of weather on the surface transportation system. Although data collection and incident monitoring is still limited, the available data do show that potentially some progress is being made, specifically in the following areas:

- On the nation’s roadways, weather-related crash injuries declined by 3.5% (21,023 fewer injuries) in the first two years following the release of the WIST report in 2002. During the same period, vehicle-miles driven increased by 3.7%. The 21,023 fewer injuries equate to about $0.5 billion saved in direct and indirect economic costs.
• From 2002 to 2004, weather-related recreational boating accidents decreased from 228 (with 66 fatalities) to 178 (with 43 fatalities). In 2002, weather dropped out of the coast guard’s top ten contributing factors for recreational accidents. While weather returned to the list in 2005, there were fewer accidents than in past years.

• Surveys of users of state 511 road information services show that users want and use information about weather conditions that affect their route of travel. Most of these WIST users have altered their routes or their travel plans to avoid weather-related hazards or delays. Local television and radio stations now routinely carry combined traffic and weather updates for their broadcast area.

• Roadway freight lines are equipping their trucks to receive National Oceanic and Atmospheric Administration (NOAA) weather radio anywhere on the nation’s highways. Automobile manufacturers are offering new cars equipped with radios that can receive NOAA weather radio.

The successes achieved are due to the combined efforts of many federal agencies, state and local authorities and transportation departments, the university research and development community, professional organizations, the news media, and partners in industry who provide or use WIST services and products. When statewide transportation incident reporting systems are implemented, we will be better able to monitor, assess, and manage transportation weather risks, as well as evaluate the benefits of WIST-informed transportation decisions. Research and development programs are currently improving warnings and decision support systems, implementing weather-responsive traffic management in communities, and providing the observational support necessary for location-specific WIST.

**CHALLENGES FACING WIST**

**Focusing Resources**

In today’s constrained federal budget environment, we must focus limited resources on the top-priority needs in research and development and application development regarding surface transportation weather. Some of these key needs include the following:

• Lessening weather’s impact in terms of causing congestion
• Meeting travelers’ need for timely, local weather information
• Improving access to WIST before and during travel
• Enhancing surface transportation weather observation collection
• Incorporating WIST into warning and decision support processes
• Increasing user understanding of the use of WIST products

**Partnering and Leveraging**

With limited budget resources, moreover, we will be challenged to take advantage of all opportunities to partner and leverage other research and development and application development activities, even those outside the surface transportation weather community, to meet WIST needs. Some opportunities for such partnering and leveraging may be found in the following research areas:

• Urban meteorology
• Aviation meteorology
• Tropical cyclone research and development
• Multifunction Phased Array Radar (MPAR) Risk Reduction Program
• University transportation centers
• Commercial weather vendors
• Automobile manufactures
• State and local departments of transportation and road maintenance activities
• Social science

FUTURE DEVELOPMENTS FOR WIST

The OFCM and the Federal Highway Administration are sponsoring the Third National Surface Transportation Weather Symposium, July 25–27, 2007, at the Sheraton Premiere at Tysons Corner in Vienna, Virginia. The theme for the symposium is “improving commerce and reducing deaths and injuries through innovative weather-related research and development and applications for the surface transportation system.”

The overarching objective for the symposium is to provide a forum for the surface transportation weather and transportation research and user communities to work together to enhance collaboration and partnerships, ultimately helping to improve surface transportation weather products and services for those who use, operate, and manage surface transportation infrastructure. The sub-objectives for the symposium include the following:

• Enhance understanding of the social and economic benefits derived from the increased use of improved surface transportation weather and climate information.
• Review, validate, and prioritize surface transportation weather research and development needs.
• Define and prioritize the products and services needed to support the surface transportation community.
• Provide recommendations for the weather and surface transportation communities regarding the way ahead to meet needs, using attendee input and feedback.
• Provide information on surface transportation weather and climate activities to enhance decision making processes.

CONCLUSIONS

Based on projections of U.S. population growth and the limited expansion of our highway system, the need for improved surface transportation weather data, forecasts, integration, dissemination, and education is real and growing. Much is already being done to meet the surface transportation user community’s needs for weather information, as outlined in the 2002 WIST report, and there is some preliminary data showing that progress is being made in reducing deaths, injuries, and property damage. However, to continue to move forward effectively, a coordinated and prioritized approach is needed to improve our surface transportation weather products and services that incorporates the ideas and capabilities of all the stakeholders and service providers. Through the WG/WIST, work is underway to develop such an approach, and it will take the input and support of the surface transportation and meteorology communities to achieve success.
REFERENCES

