

NATIONAL SPACE WEATHER PROGRAM

2013 SPACE WEATHER ENTERPRISE FORUM

EXECUTIVE SUMMARY



Photo by Matthew Brown (NOAA)

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2013 SPACE WEATHER ENTERPRISE FORUM SUMMARY

This document provides a synopsis of the 2013 Space Weather Enterprise Forum (SWEF)—an event sponsored by the National Space Weather Program (NSWP) Council and hosted by Mr. Samuel P. Williamson, Federal Coordinator for Meteorology and Chair of the NSWP Council, on June 4, 2013, at the National Oceanic and Atmospheric Administration (NOAA) Auditorium and Science Center in Silver Spring, MD. This year's theme was *Space Weather Impacts: They Happen All the Time!*

Motivation

Over the past few years, an increase in solar activity has produced several events that have caused significant impacts to our national technological infrastructure and captured the attention of the general public. While reports of massive solar flares and the resultant potential disruptions in communications and navigational systems have generally been accurate, the overall impacts of these solar events are often overstated and sensationalized. The potential for extremely rare, but potentially devastating impacts, are very possible, but, fortunately, we haven't experienced any in many decades. This year, the SWEF explored the space weather impacts that routinely occur but generally go unnoticed by the press and the general public. Though our need to be vigilant and prepared for the high-impact, low-frequency event is critically important, we must also know how to cope with high-frequency, low-impact events that happen all the time.

Program

Sponsorship: The SWEF is sponsored by the National Space Weather Program Council. Established in 1994 and sponsored by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM), the Council is a multi-agency group designed to provide oversight and direction to the integrated process of setting national priorities, focusing agency efforts, and leveraging resources. The Council ensures coordination and collaboration across the agencies involved in space weather activities. Council members include representatives of the Departments of Commerce, Defense, Energy, Homeland Security, Interior, State, and Transportation as well as the National Aeronautics and Space Administration and the National Science Foundation. Additionally, the White House Office of Science and Technology Policy and Office of Management and Budget serve as observers on the Council.

Objectives: The SWEF brought together the space weather community to share information and ideas among policymakers, senior government leaders, researchers, service-provider agencies, private-sector service providers, space weather information users, the media, and congressional legislators and staff to pursue the following objectives:

- Share information across the enterprise and raise awareness for new users, decision makers, and policymakers.

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- Identify effective approaches to build resilience across society, particularly in critical infrastructure protection and support.
- Identify effective approaches to raise awareness in the broader society.
- Improve communications within and external to the enterprise.
- Collect information to support the development of new NSWP Science and Implementation Plans.

Format: A panel format was used, which included brief presentations by the expert panelists followed by time for questions from a diverse group of attendees. The agenda was developed by the interagency SWEF Organizing Committee and approved by the NSWP Council. Due to budget and policy constraints, the SWEF was conducted in a government facility at no additional cost to the American taxpayer.

The Opening session consisted of remarks and presentations from the Chairman of the NSWP, Congress, NASA, and NOAA. Three distinguished feature speakers provided key insights, which are summarized below, into important NSWP emphasis areas. The final session included a summary of the key points of the meeting and closing remarks.

The four panel sessions are summarized as follows:

Scientific Understanding, Observations, and Future Exploration : Forecasting space weather depends on understanding the fundamental processes that give rise to hazardous events. Continued support for research is essential to achieve the level of understanding required for accurate predictions. Particularly important is the study of processes that link the Sun-Earth system and that control the flow of energy within the coupled system. In this session, the new frontiers of scientific exploration and discovery needed to advance our space weather service capabilities were discussed.

Understanding the Day-To-Day Impacts of Space Weather: The Nation faces many uncertainties from increasing reliance on space weather-affected technologies for communications, navigation, security, electrical power generation and distribution, and other activities. This session focused on the impacts of space weather that occur frequently but are absorbed by the technological infrastructure and seldom noticed by the public.

The Unified National Space Weather Capability: Over the past year, the Federal agencies engaged in the National Space Weather Program have established closer coordination in providing space weather science, research, and services to our Nation. The Unified National Space Weather Capability—the focus of this session—seeks to achieve maximum efficiency and effectiveness in the provision of space weather services, research, and technology to our customers and stakeholders.

Future Directions of Industry and their Space Weather Needs: As the need for space weather services and capabilities has expanded, so has need for public-private partnerships for space weather services. In this session, panelists from the Federal government and industry described how they are working to define and advance

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space weather requirements and capabilities available to both government and the general public.

Summary of Distinguished Speaker Comments

The Honorable Steven M. Palazzo, United States Representative, Mississippi's 4th Congressional District

Mr. Palazzo highlighted importance of space weather for everyday life and recognized the significant role of NOAA Space Weather Prediction Center. He emphasized the need for improving our understanding of heliophysics despite the difficult budgetary constraints on NASA and other federal research. From his experience as Chairman of the House Subcommittee on Space and Aeronautics he provided a summary of the National Research Council Decadal Survey on Solar and Space Science as a basis for guide decisions on research priorities. Mr. Palazzo closed by stating that he was concerned with developing future researchers and state of science education in America since this is a key to our success and prosperity.

Mr. Charles Bolden, Administrator, National Aeronautics and Space Administration

Mr. Bolden began his remarks by stating he was pleased to be able to speak to the space weather community since he knew, first-hand how important space weather services are to the nation and NASA missions. He regaled the audience with anecdotes of his four space missions especially STS-31 which he commanded with Dr. Kathy Sullivan as payload specialist for deployment of Hubble Space Telescope. On a serious note, Mr. Bolden recognized the heroes and victims of the recent tornado outbreak in Oklahoma and credited NOAA forecasts and warnings for saving countless lives.

Administrator Bolden then addressed the importance of space weather and the need to continue to advance the science. He shared the results of radiation instruments on the Mars Science Laboratory in demonstrating how the harshness of the space environment on the surface of Mars will be a challenging mission planning factor.

He told the audience that the NASA currently operates 18 space missions as part of the Heliophysics Observatory. As Voyager probes the outmost "edge" of the solar system, the Van Allen Probes in near-earth orbit have discovered new short-lived radiation belts. The Solar Dynamics Observatory, STEREO, and other NASA missions provide critical measurements 24 hours per day/7 days per week from all aspects of solar system both to meet their intended research goals and provide key observations for real-time operational space weather analysis, forecasts and warnings.

NASA is work closely with NOAA to replace the Advanced Composition Explorer (ACE) spacecraft, which has been providing real-time measurements of the solar wind for 15 years, with the Deep Space Climate Observer (DSCOVR)—planned for launch in FY 2015. Upcoming missions include the Interface Region Imaging Spectrograph (IRIS) scheduled to launch later this month and the Magnetospheric Multiscale Mission (MMS).

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He then praised the space weather community for their very active and successful international partnerships, highlighting the Solar Probe Plus mission, Science Operation Center with the European Space Agency, and the recognition by the United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS) of the importance of space weather.

Dr. Kathryn Sullivan, Undersecretary of Commerce for Oceans and Atmosphere and NOAA Administrator (Acting)

Dr. Sullivan reminded the audience that we are at the start of severe weather season as we approach solar maximum. She said NOAA had received a charge from the President that if space weather poses a threat now, that we must do something now to address it. She pointed to progress being made to deploy new space weather sensors on the NOAA DSCOVR and GOES-R missions and the Sun Jammer solar sail technology demonstrator. However, the call to action goes beyond spacecraft and instruments. Our reliance on new technologies has inadvertently increased our vulnerabilities. Our responsibility goes beyond prediction of space weather. We must provide better information and help the nation weather the storm better. We must help the nation plan for impact mitigation and response and recovery from space weather events. The President's budget highlights resilience and disaster preparedness. Space weather is now one of six potential national exercise preparedness exercises from the executive office.

Space environmental intelligence is a vital to effective readiness and response. The Space Weather Prediction Center (SWPC) is charged with providing operational space weather support and services to the public. They now have 36,000 customers and that number continues to increase. The GPS users are the fastest growing sector of community. In order to be effective, we need strong coordination across agencies and between government and industry to meet the needs of the nation.

It has been estimated that for a Carrington-level space weather event, 20-40 million people could be affected for 2 weeks. The Northeast corridor is at greatest risk from these events. The power generation and distribution industry needs to make plans and be prepared to react when an extreme geomagnetic storm occurs. Since everyone needs to get the alerts NOAA has forged many working relationships with the power industry, National Electric Reliability Corporation, and the Federal Electric Reliability Commission.

Dr. Sullivan told the audience that NOAA is working with the Federal Aviation Administration to develop operational space weather requirements. These will support the implementation of the NexGen Commercial Air Transportation System which will heavily rely on space-based navigation and communication technologies susceptible to space weather. The new requirements will also support the nascent commercial space tourism and transportation industry.

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She closed by echoing NASA Administrator Bolden's praise for NOAA's work in the UNCOPOUS forum to develop standards for space weather, international partnerships with the United Kingdom and South Korea, and to work with the new Space Weather Center in Brussels, Belgium. **Key Takeaways and Forum Outcomes**

The SWEF is a critical element in the pursuit of the NSWP goal to improve public awareness, readiness, and response. The 257 registered attendees set a new record for SWEF participation. Nine media outlets covered the SWEF, including Space News, The Washington Post, and the Associated Press. NASA and NOAA Public Affairs provided live Twitter updates during the forum. The NSWP SWEF website provided a wealth of information for forum participants and served as an excellent source of information about the space weather enterprise. All available presentations from the 2013 SWEF and supporting material can be found at: http://www.nswp.gov/swef/swef_2013.html.

The key takeaways and outcomes are summarized as follows:

- The threat posed by space weather events is both real and immediate. NOAA's Space Weather Prediction Center is responsible for provide critical real-time forecast and warning services to the public.
- NASA, NSF, and other science/research-driven organizations must continue to advance the science utilizing the guidelines of the National Research Council Decadal Survey for Solar and Space Physics and provide support to the Nation's operational space weather centers.
- For the past 18 years, the NSWP has served as a catalyst among the Federal agencies to advance the state of the scientific understanding, technology development, and operational space weather services and application to serve the growing needs of the Nation.
- As the Federal budget becomes ever-more constrained, the need for interagency coordination, collaboration, and partnership is more important than ever to achieve our mutual goals of the NSWP partner agencies.
- The commercial and private sectors can provide unique and cost-effective support and services to advance the Unified National Space Weather Capability.
- Although the public, industry, and policy makers are becoming aware of space weather, they often can be confused and have limited understanding of the relevance in their daily lives and affairs. NSWP agencies should work in a more cohesive manner to ensure that consistent and effective Public Awareness Readiness and Response (PARR) activities are planned and executed.
- Space weather and its impacts are both regional and global in nature and therefore must be addressed by international cooperation as demonstrated by the development of space weather services outside the U.S. with international recognition by the United Nations.

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The Way Ahead

The key takeaways and forum outcomes reinforce the NSWP's direction and way ahead.

- Organizational leaders from the NSWP Council will leverage support earned through the SWEF and other NSWP efforts to keep the DSCOVER program on track and work to identify domestic and international resources to execute the COSMIC-2 program.
- The NSWP Council, through the OFCM-sponsored Committee for Space Weather, will use the National Research Council Decadal Survey for Space and Solar Physics, along with agency-developed plans, to complete the NSWP Roadmap & Strategic Research Plan.
- The NSWP Council and agencies will pursue additional public outreach actions and activities, including a workshop on space weather public awareness, readiness, and response.
- The NSWP Council will work to develop and improve effective private/public partnerships with the assistance of the American Meteorological Society (AMS) weather commission and the American Commercial Space Weather Association (ACSWA).
- The NSWP agencies will continue to expand the Unified National Space Weather Capability (UNSWC), to include an update to the NSWP Charter and improvements to the National Space Weather Portal website.
- The NSWP Council will continue to plan and conduct the annual Space Weather Enterprise Forum as the key event for Federal interagency interaction with the public, commercial, military, academic, foreign, and international space weather communities.

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