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***Office of the Federal Coordinator for Meteorological  
Services and Supporting Research (OFCM)***

***THE NATIONAL SPACE WEATHER PROGRAM***



**Committee on Solar and Space Physics  
National Research Council  
Space Studies Board**

**Washington, DC  
March 7, 2013**

***Mr. Michael F. Bonadonna***  
***Executive Secretary***  
***National Space Weather Program Council***

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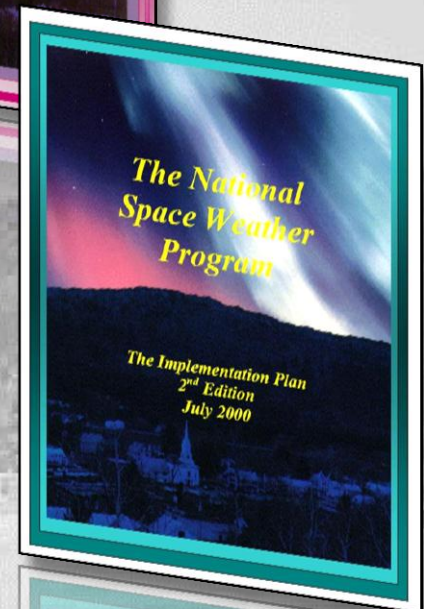
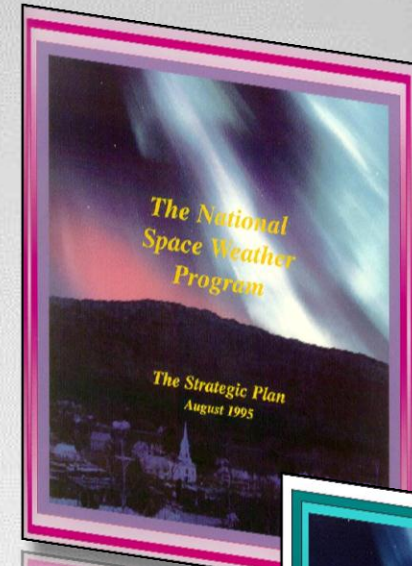
# Overview

- **Background**
- **What is the National Space Weather Program (NSWP)?**
- **Accomplishments and Current Activities**
- **Preparing for the Future**



# National Space Weather Program

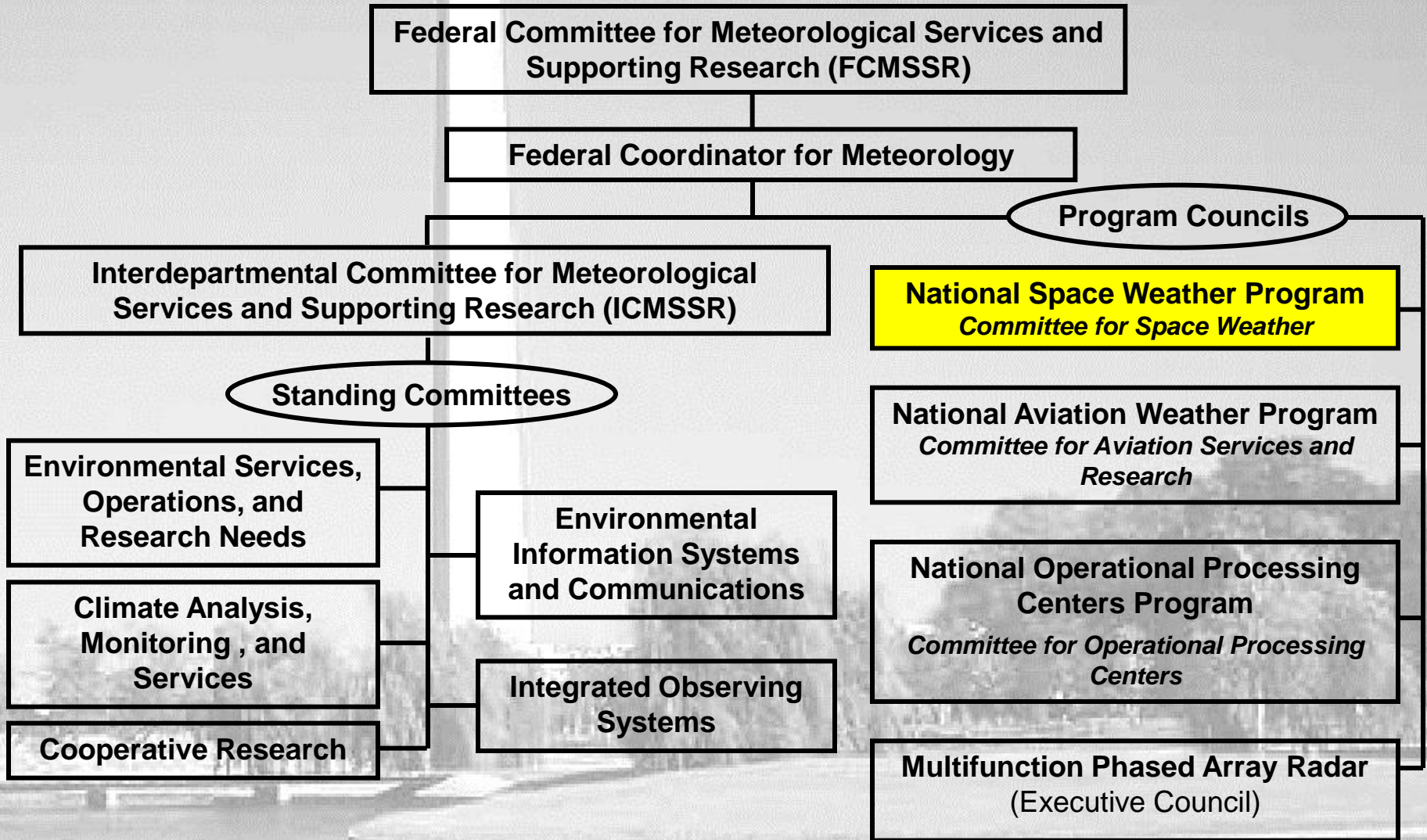
- The National Space Weather Program (NSWP) established in 1995 with publication of **Strategic Plan**
  - Pulled federal community together
  - Set a vision for the future
- **Implementation Plan, 2<sup>nd</sup> Edition**, published in 2000
  - Defined details on capabilities, strategies, goals, research, technology transition, education and outreach, and program management
  - Linked National Security Space Architect efforts and the NSWP





# Federal Meteorological Coordinating Infrastructure

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# Space Weather – “A Team Sport”

*The NSWP achieves synergistic results allowing each partner agency to enhance national capabilities.*

## • Program Council

- Member Agencies: NOAA (NWS and NESDIS), Defense (Air Force), Energy, Homeland Security, Interior, State, Transportation, NASA, and National Science Foundation
- Observers: White House Office of Science and Technology Policy (OSTP) and Office of Management and Budget (OMB)
- Sets overall policy, guidance, and direction

## • Committee for Space Weather

- Member Agencies: Same as Council
- Executes Council guidance and implements the program





# NSWP Strategic Plan 2010

## ***Vision***

A Nation that capitalizes on advances in science and forecasting to better cope with the adverse impacts of space weather on human activity and on advanced technologies that underlie our global economy and national security.

Developed by the Committee for Space Weather

Based on  
10 Key Documents  
and  
185 Recommendations

Approved by the NSWP Council and OMB








## ***Mission***

The National Space Weather Program (NSWP) serves as the focal point for the Federal government's national space weather enterprise and partnerships. By providing an active, synergistic, interagency forum for collaboration, the NSWP facilitates mutually beneficial interactions among the Nation's research and operational communities.



# NSWP Strategic Goals

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-  **Discover and understand the physical conditions and processes that produce space weather and its effects.**
-  **Develop and sustain necessary observational capabilities.**
-  **Provide tailored and accurate space weather information where and when it's needed.**
-  **Raise national awareness of the impacts of space weather.**
-  **Foster communications among government, commercial, and academic organizations.**

**Available at <http://www.ofcm.gov/nswp-sp/fcm-p30.htm>**



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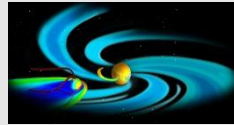
# NSWP Facilitated Accomplishments

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*Since 1995, major progress has been made in reaching the NSWP goals.*

*Some specific accomplishments initiated within the NSWP framework include:*

- NSWP initiated an interagency collaboration to establish the Community Coordinated Modeling Center (CCMC) in 1998 to support development advanced space weather models for research and operations.



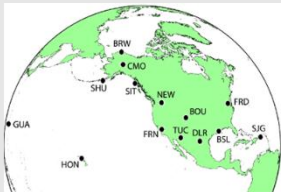
- NSWP has supported the annual Space Weather Workshop and Space Weather Enterprise Forum bringing together researchers, governmental policymakers, users, and private sector vendors.
- NSF, NASA, and DoD agencies have carried out dedicated programs supporting basic research aimed at promoting NSWP goals.
- In 2001 NASA leveraged the NSWP partnership to embarked on the Living with a Star (LWS) program, which is providing essential space missions, data analysis, and modeling development relevant to space weather research.



# NSWP Facilitated Accomplishments (cont.)

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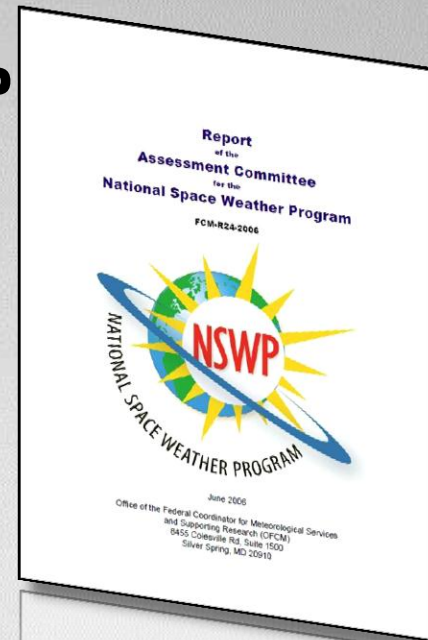
- Citing support of NSWP Goals:
  - The DoD supported Multidisciplinary University Research Initiatives for space weather.
  - NSF established the Center for Integrated Space Weather Modeling
  - The Air Force Research Lab established the Space Weather Forecast Lab to enhance research to operations technology transition.
- NASA has included real-time radio beacons on a variety of spacecraft continues to support long duration missions to provide timely environmental data for the operational space weather centers.
- USGS has undertaken significant upgrades of its global magnetic observatory network to support operational space weather uses.
- DOC/NOAA has continued its program of geostationary space weather measurements with the launches of the GOES N, O, and P satellites. The GOES R program is in development and will carry significant improvements on all of its space weather sensors.





# NSWP: Improving the Program

- **2006: Independent Assessment of the NSWP**
  - **23 recommendations overall**
  - **Four key areas**
    - **Increasing program effectiveness through centralize program management, funding priorities, and collaboration**
    - **Maintain continuity of critical data sources**
    - **Strengthen the science-to-user chain**
    - **Emphasize public and user awareness**



# Grand Challenges in Disaster Reduction

- NSWP partnered with the National Science and Technology Council's Subcommittee on Disaster Reduction (SDR) to publish the "Grand Challenges for Space Weather."

- Challenge 1: Provide hazard and disaster information where and when it is needed
- Challenge 2: Understand the natural processes that produce hazards
- Challenge 3: Develop hazard mitigation strategies and technologies
- Challenge 4: Reduce the vulnerability of infrastructure.
- Challenge 5: Assess disaster resilience.
- Challenge 6: Promote risk-wise behavior.

- This succinct plan provides a roadmap for action and detailed planning.

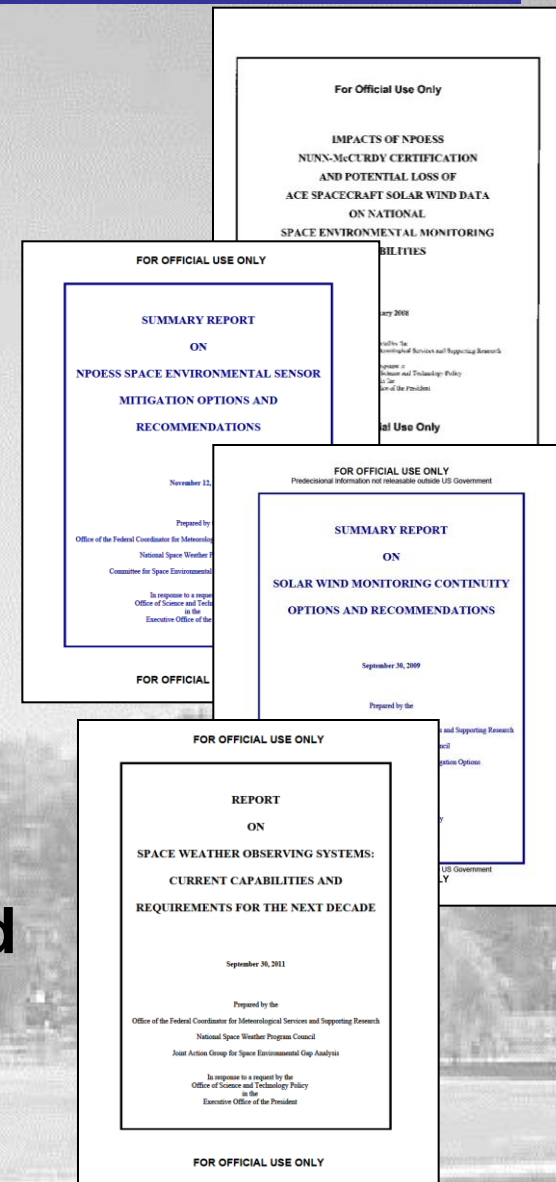
Available at: <http://www.sdr.gov/>





# NSWP: Responding to OSTP Requests

- 2008: Impact assessment of Low Earth-Orbit and Solar Wind monitoring loss
  - *Detailed the impact of the loss of SWx data and the need for observing capability.*
- 2009: Space Environmental Sensing Mitigation Options for Low Earth Orbit
  - *Supported COSMIC-2 and SSAEM missions.*
- 2009: Space Environmental Sensing Mitigation Options for Solar Wind Monitoring
  - *Supported DSCOVR and follow-on missions.*
- 2011/2012: Report on current and planned Space Weather Observing Systems
  - *Documented SWx observing architecture.*



# 2012: A Busy and Productive Year

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- NSWP Council worked to establish a cooperative agreement for the *Unified National Space Weather Capability (UNSWC)*
  - Interagency Memorandum of Understanding (MOU)
- Completed an assessment of current and planned space weather observing systems, architecture, and priorities.
  - Results informed the President's budget, answered congressional requests, and was used in the National Earth Observing Assessment
- Established the National Space Weather Portal website
- Hosted the 6<sup>th</sup> annual Space Weather Enterprise Forum
- Supported several key recurring conferences and events:
  - American Meteorological Society, 9th Space Weather Conference
  - NOAA's Space Weather Workshop
  - American Geophysical Union Conference
  - Johns Hopkins Applied Physics Lab. SEASONS 2012 Conference.
  - Space Enterprise Council: "A Day Without Space"



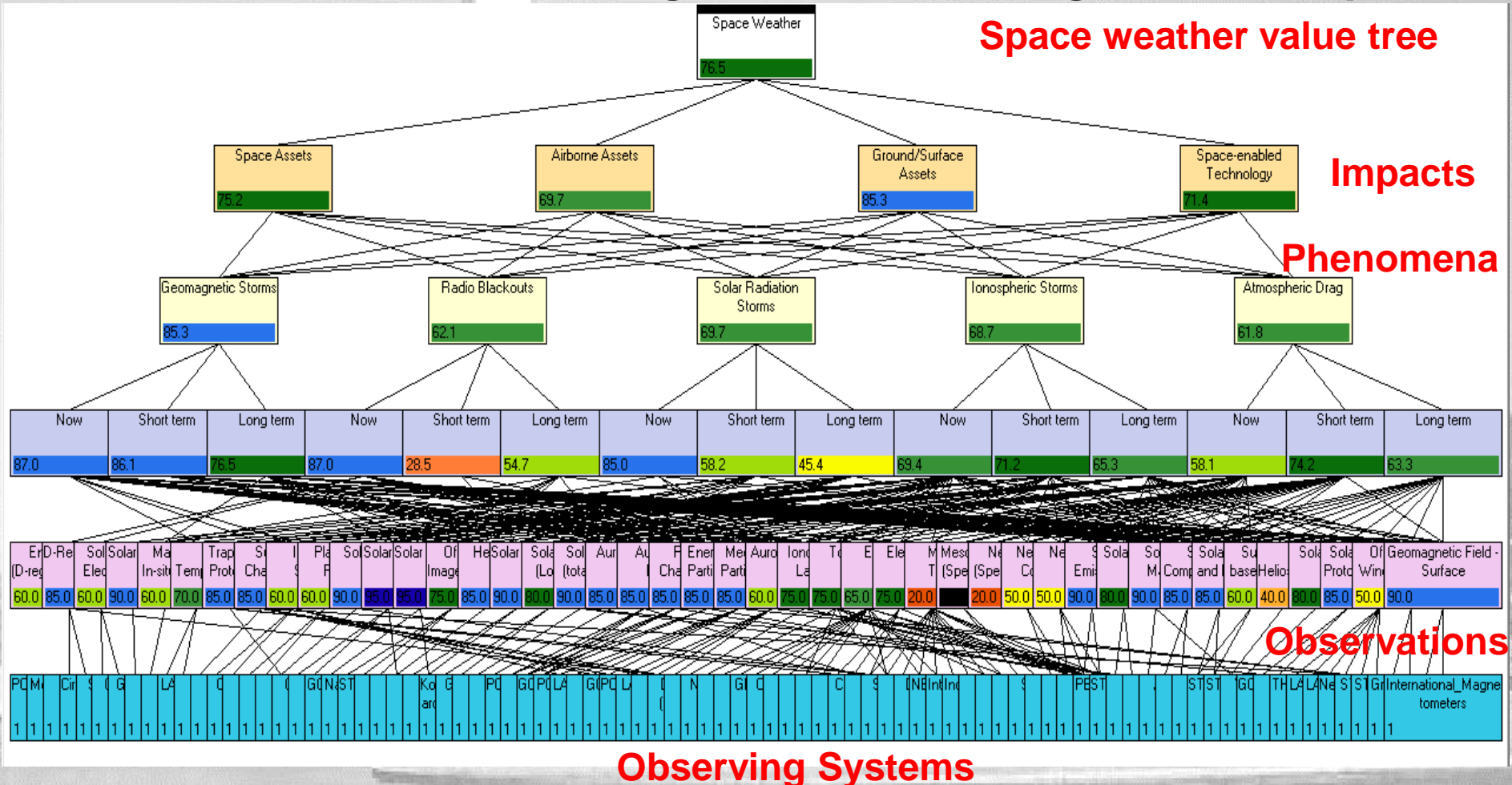
# Unified National Space Weather Capability

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- **NSWP Council established the UNSWC concept to:**
    - Strengthen the interagency partnerships and cooperation
    - Allow us to effectively implement the NSWP Strategic Plan
    - Provide the formal structure which serves as the foundation for the UNSWC partners to justify these cooperative and synergistic activities.
    - Serve as an umbrella agreement under which specific annexes will be developed to establish specific bilateral or multilateral objectives.
  - **The UNSWC is a collaboration among all nine NSWP partners.**
    - Five NSWP agencies (DoD, DOC, NASA, NSF, and USGS) wanted an MOU to provide a stronger foundation for committing substantial resources for interagency initiatives.
  - **The NSWP has taken a bold step towards improving our Nation's space weather capabilities by establishing the UNSWC**
    - The NSWP will continue to coordinate our efforts in space weather operational and research capabilities to provide the best possible benefit to our nation.
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- ## Space weather value tree





# National Space Weather Portal

<http://www.spaceweather.gov/portal>

- **Goal:** To provide a website to guide visitors to the full range of national space weather resources.
- **Purpose:** The Portal provides an entry point that describes various U.S. government services and resources.
- **Concept:** The Portal provides information on:
  - 1) SWx products and services
  - 2) Satellite and ground based infrastructure
  - 3) Research (data, models)
  - 4) Education and public outreach resources
  - 5) Federal programs and agency involvement
  - 6) International and commercial organizations



**Initial capability  
Established in  
June 2012**

# 6<sup>th</sup> Space Weather Enterprise Forum

- **When/ Where:** June 5, 2012 /National Press Club Washington, DC
- **Theme:** "How Space Weather Will Affect You During Solar Maximum 2013"
- **Sessions:**
  - Why SWx matters and what we're doing about it.
  - Critical infrastructure protection & impact mitigation
  - The Unified National Space Weather Capability
  - Space weather science benefits the public
  - Improving public understanding and response space weather events
- **Results:**
  - Solidified support for the Unified National Space Weather Capability
  - Brought together over 200 attendees from various government, military, industrial, academic, and international organizations
  - Raised awareness of emerging space weather hazards to power distribution, global communications and navigation, transportation, agriculture, and the banking industry
  - Outstanding media coverage and congressional interest





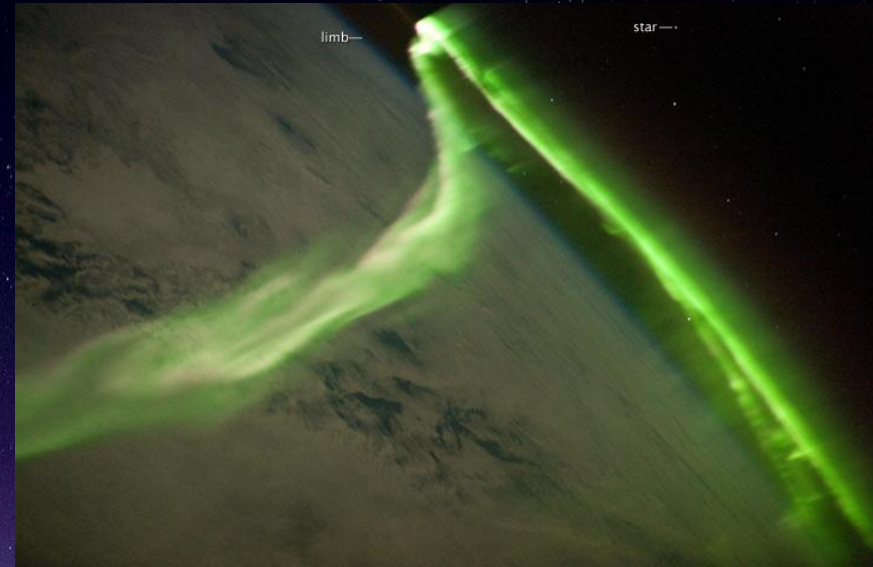
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# The Year Ahead

- **Improve the Unified National Space Weather Capability**
  - **Execute the MOU and Annexes**
- **CSW complete Near-term Integrated Action Plan Initiatives**
- **Expand the new National Space Weather Portal**
- **Complete the new NSWP Strategic Research Plan**
- **Pursue Education and Public Outreach Actions and Activities**
- **Conduct 2013 Space Weather Enterprise Forum**
- **Begin NSWP Implementation Plan Development**





# Integrated Action Plan

## *NSWP “to-do list” to help guide interagency action*

- **This year:** Four **near-term** actions requiring immediate attention  
Including:
  - Research to Operations Planning
  - NSWP Strategic Research Plan
  - NSWP Education and Public Outreach Planning
  - Update NSWP and CSW Charters
- **Next two years:** Eight **mid-term** actions to continue improving the UNSWC
  - 1-3 year actions to improve space weather research and operational capabilities
- **Out years:** Nine **long-term** actions based on NSWP Goals/Objectives

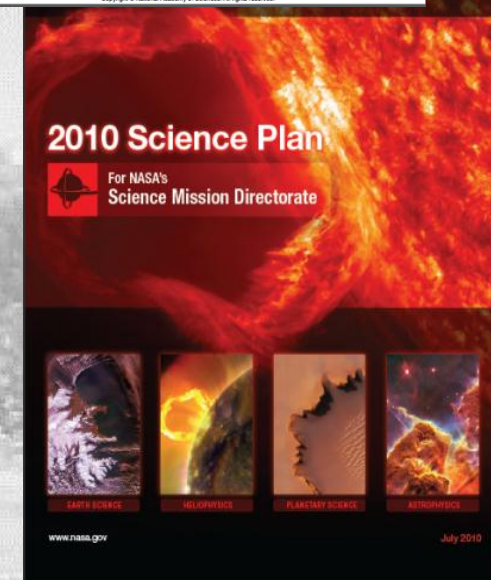
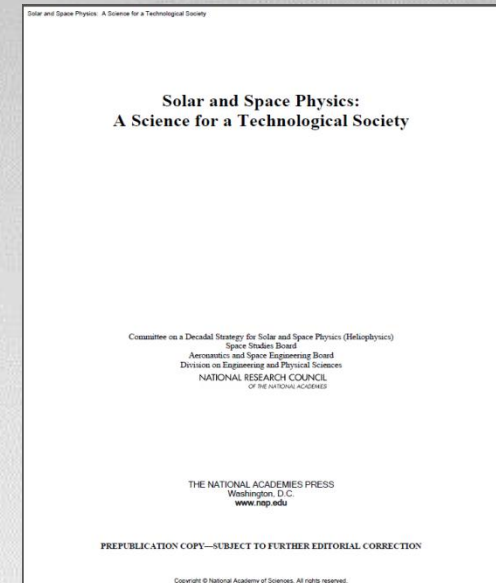
National Space Weather Program  
Integrated Action Plan  
(IAP)

December 2012

Prepared by the  
Office of the Federal Coordinator for  
Meteorological Services and Supporting  
Research  
National Space Weather Program

# NSWP Strategic Research Plan

- NSWP Strategic Research Plan will establish the roadmap and priorities for:
  - Basic scientific research
  - Applied research to improve the UNSWC
  - The transition of technology and research to improve products and services
- The NSWP Strategic Research Plan will address recommendations from the National Research Council **Decadal Survey on Space and Solar Physics** and all previous NSWP studies and plans.
- Updated science plans from the NSWP agencies will help guide the interagency planning effort.
- NASA, NSF, DoD, and NOAA will play key roles in developing the plan along with significant contributions from the other NSWP agencies.
- The CSW intends to have the draft plan ready for public review in late summer 2013.





# Education and Outreach Planning

- **Coordinate efforts** to reach out to expand awareness of space weather and upcoming solar max
  - **Improve** stakeholder and user awareness of the impacts of SWx on operations and entities
  - **Increase** public awareness of the impacts on daily activities
- Identify target **audiences**
  - Public, private sector, academia, government
- Identify resources, including professional, trade organizations, educational programs
- Plan and develop **activities, materials, initiatives, and actions** – TV, radio, print, journals, web sites, science fairs, etc.
- Integrate **social science principles** to optimize value of space weather services to the Nation
- **Track activities and evaluate effectiveness**



# New Implementation Plan

- **Specific actions and activities** to achieve the Strategic Plan goals and objectives
- The Implementation Plan will be the **culmination** of NSWP studies and planning activities over the past several years
- NSWP will begin work on the Implementation Plan following completion of Science plan

Observing System Analysis

NSWP Research Plan

Previous Studies and Plans

Decadal Survey Results



**National Space Weather Program  
Implementation Plan**

Prepared by the  
Office of the Federal Coordinator for  
Meteorological Services and  
Supporting Research  
National Space Weather Program  
**Draft**



# 7<sup>th</sup> Space Weather Enterprise Forum

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**When:** June 4, 2013

**Where:** National Press Club Washington, DC



**Theme:** "Space Weather Impacts – They Happen all the Time"

## **Sessions:**

- Understanding the day-to-day impact of space weather
- Scientific understanding, observations, and future exploration
- The Unified National Space Weather Capability
- Future directions of industry and their space weather related needs

**Speakers:** Senior Administration, Congressional, Industry and Academic Leader to be announced

# Summary

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- *Building on the success of the program since its beginnings in the mid 1990's, the NSWP is helping the Nation prepare for the future by establishing the **Unified National Space Weather Capability (UNSWC)***
- **2013 Focus:**
  - Execute the UNSWC MOU and Annexes
  - Complete the NSWP Strategic Research Plan
  - Expand the National Space Weather Portal
  - Continue NSWP Education and Outreach Planning
  - 7<sup>th</sup> SWEF in June in Washington, DC

Visit the National Space Weather Portal for  
more information at

[\*\*http://www.spaceweather.gov/portal\*\*](http://www.spaceweather.gov/portal)



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Back Up Slides

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# Why Space Weather Is Important

National infrastructure and services are complex and interdependent; a major outage in any one area has a widespread impact.



“Potential damage resulting from these critical dependencies can be minimized by having a robust capability to monitor, model, and predict what is happening in the space environment.”

Ref: National Research Council (NRC) report, “Severe Space Weather Events” (2008)

## *Examples of dependencies and impacts*

**Global Satellite Communications:** Widespread service disruptions impact everything from National-level decisions to financial, telemedicine, and internet services.



**GPS Positioning:** Degraded military weapons accuracy, increased collateral damage, degraded air traffic management, transportation, precision survey/construction, ship navigation/commerce, etc.



**Satellites & Spacecraft:** Loss of satellites and capabilities, loss of space situational awareness (detection of hostile actions), increased probability of satellite-debris collisions, degraded communication, navigation, astronaut safety, etc.

**Air and Missile Defense:** Accuracy and reliability of radars to identify threats.



***Space environmental monitoring provides actionable information to operators and decision makers that can mitigate these risks and impacts.***