

The National Space Weather Program: Two Decades of Interagency Partnership and Accomplishments

United Nations/United States of America
Workshop on the International Space Weather
Initiative

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Massachusetts, USA

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Main Points

- The NSWP fostered improved communication among the federal agencies, industry and academic space weather communities.
- The NSWP was keenly aware of external factors and events regarding space weather and adapted to these new influences accordingly.
- The NSWP agencies view the SWORM initiative as the "Coming of Age" of the Federal Space Weather community and graduation to the next level.

Outline

- Introduction
- Beginnings of the National Space Weather Program (The First Decade: 1994-2004)
- The Assessment and Beyond (2005 – 2010)
- Key Events from 2011 to 2014
- Culmination of the NSW P and Transition of National Space Weather Leadership (2014-2015)
- Conclusion

National Space Weather Program Milestones

External Factors	NSWP Internal Actions
Space Weather induced Hydro-Quebec Power Outage 1989	
	FCMSSR Established NSWP 1994
	1st Strategic Plan 1995
1st Space Weather Workshop in Boulder, CO 1996	1st Implementation Plan 1997
NSSA Space Weather Architecture 1999	CCMC Framework Established 1999
NASA Living With a Star Program Initiated 1999	
NSF Funds CISM at Boston Univ. 2002	2nd Implementation Plan 2000
Decadal Survey 2002	
AGU Launches Space Weather Journal 2002	
1st Annual AMS Space Weather Symposium 2003	Assessment of NOAA SEC 2003
Halloween Space weather Storm 2003	
NOAA Converts OAR/SEC to NWS/SWPC 2005	
NSWP Independent Assessment 2006	1st Space Weather Enterprise Forum (SWEF) 2007
NRC Severe Space Weather Impacts Study 2008	NPOESS / ACE Impacts Report 2008
	LEO Mitigation Options Report (COSMIC-2) 2009
	Solar Wind Mitigation Options Report (DSCOVER) 2009
NASA Authorization Act 2010	
ACSWA Formation 2010	
GAO Report 10-456, 2010	2nd NSWP Strategic Plan 2010
SDR Grand Challenge Space Weather I-plan 2010	
Lloyds Report: Solar Storm Risk 2010	SEGA Reports 2011 – 2013
Supported Nat'l Earth Observing Report 2012	National Space Weather Portal 2012
Near-miss Carrington Analog Storm 2012	Unified National Space Weather Capability MOU 2013
Decadal Survey 2013	
SWORM Task Force Established 2014	3d NSWP Implementation Plan (Draft) 2014
Supported SWORM 2015 +	NSWP Council Deactivated 2015



Beginnings of the NSWP (The First Decade: 1994-2004)

<u>External Factors</u>		<u>NSWP Internal Actions</u>
	1994	FCMSSR Established NSWP
	1995	1st NSWP Strategic Plan
1st Space Weather Workshop	1996	
	1997	1st NSWP Implementation Plan
NSSA Space Weather Architecture	1999	CCMC Framework Established
NASA Living With a Star Program	1999	
	2000	2nd NSWP Implementation Plan
NSF Funds CISM at Boston Univ.	2002	
Decadal Survey	2002	
AGU Space Weather Journal	2002	
1st AMS Space Weather Symposium	2003	Assessment of NOAA SEC
Halloween Space weather Storm	2003	

The National Space Weather Program

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



- Program Council

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

US Government Collaboration

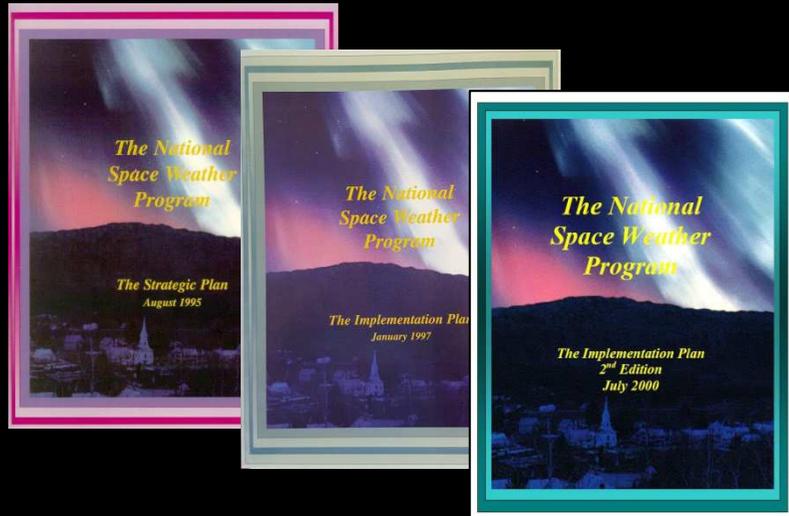


Committee for Space Weather

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



Early NSWP Accomplishments and Influences



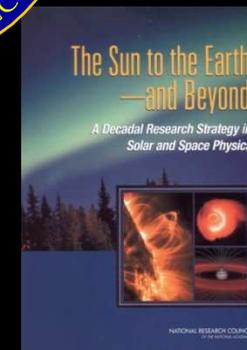
NSWP Accomplishment

- 1995: Established the National Space Weather Program and published the 1st NSWP Strategic Plan, 1995
- 1997: Published the 1st NSWP Implementation Plan
- 1999: Established the Community Coordinated Modeling Center Framework
- 2000: Published the 2^d NSWP Implementation Plan 2000



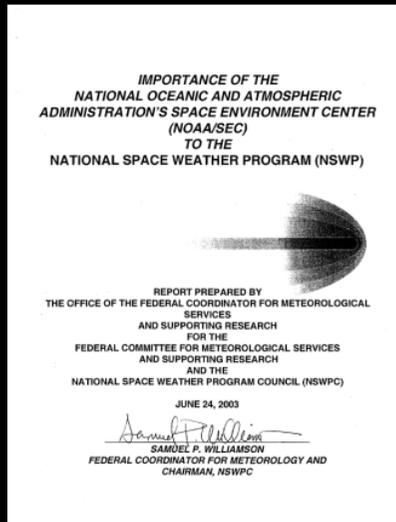
External Factors

- 1999: Supported the NSSA Space Weather Architecture Study
- 2002: Guided by the Solar and Space Physics Decadal Survey
- 2002: AGU Space Weather Journal gives the community a voice



NSWP Assessment of NOAA Space Environment Center

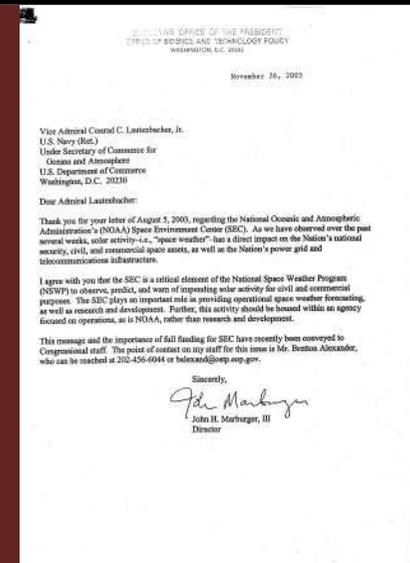
- 2003: NSWP Assessment of NOAA Space Environment Center (SEC)
 - Conducted by the NSWP Council
 - NOAA submitted to OSTP to justify the interagency need to fully fund the NOAA SEC
 - OSTP Director forwarded report to Congress and endorsed the NSWP findings



"I agree with you that the SEC is a critical element of the National Space Weather Program (NSWP) to observe, predict, and warn of impending solar activity for civil and commercial purposes. The SEC plays an important role in providing operational space weather forecasting, as well as research and development. Further, this activity should be housed within an agency focused on operations, as is NOAA, rather than research and development."

"This message and the importance of full funding for SEC have recently been conveyed to Congressional staff."

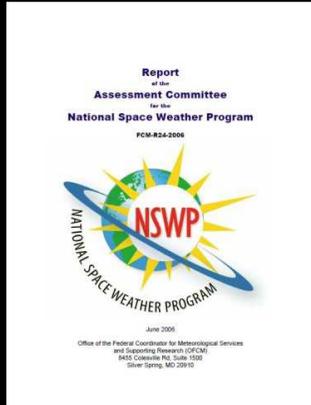
Dr. John H. Marburger III, Director, OSTP



The Assessment and Beyond (2005 – 2010)

<u>External Factors</u>		<u>NSWP Internal Actions</u>
NOAA Converts OAR/SEC to NWS/SWPC	2005	
NSWP Independent Assessment	2006	
	2007	1st Space Weather Enterprise Forum
NRC Severe Space Weather Impacts Study	2008	NPOESS / ACE Impacts Report
	2009	LEO Mitigation Options Report
	2009	Solar Wind Mitigation Options Report
NASA Authorization Act	2010	
ACSWA Formation	2010	
GAO Report 10-456	2010	
SDR Grand Challenge SWx I-plan	2010	2nd NSWP Strategic Plan
Lloyds Report: Solar Storm Risk 2010	2010	

Accomplishments and Influences Following the NSWP Assessment



NSWP Accomplishment

- 2007: NSWP Agencies conduct the 1st annual Space Weather Enterprise Forum
- 2008: Space Weather Impact Study for OSTP
- 2009: Space Environmental Sensor Mitigation Option Reports for OSTP
- 2010: Published the 2d NSWP Strategic Plan



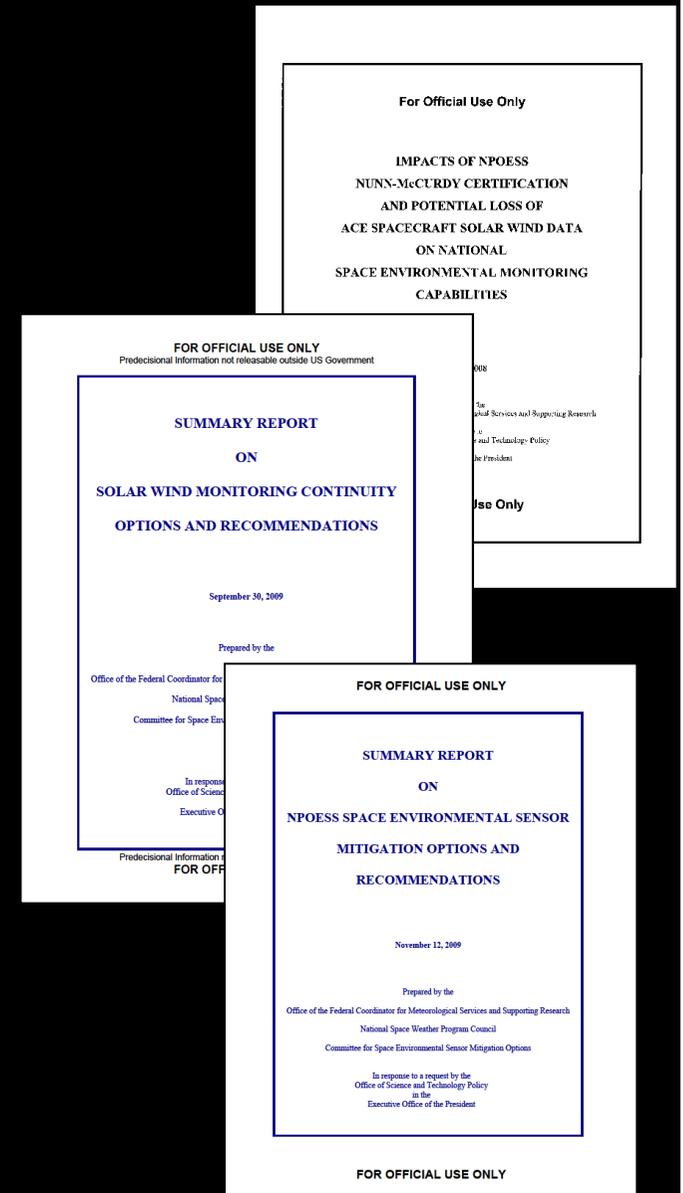
External Factors

- 2006: Independent Assessment of the NSWP
- 2008: NRC Severe Space Weather Report
- 2008: NSWP Experts develop the Subcommittee for Disaster Reduction Space Weather Implementation Plan
- 2010: American Commercial SWx Assoc. formed



NSWP: Responding to OSTP Requests

- 2008: Impact assessment of Low Earth-Orbit and Solar Wind monitoring loss (NPOESS/ACE)
 - Detailed the impact of the loss of SWx data and the need for observing capability.
- 2009: Space Environmental Sensing Mitigation Options for Solar Wind Monitoring
 - Supported DSCOVR and follow-on missions.
 - Result: DSCOVR launched 2015
- 2009: Space Environmental Sensing Mitigation Options for Low Earth Orbit
 - Supported COSMIC-2 and DoD missions.
 - Result: COSMIC-2 to be launched in 2018



NSWP Strategic Plan 2010

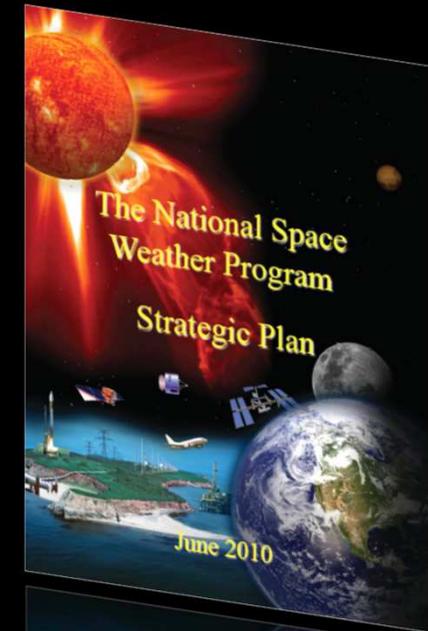
Vision

Approved by the NSWP Council and OMB

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 with support from the broader space weather community

Based on
10 Key Documents
and
185 Recommendations



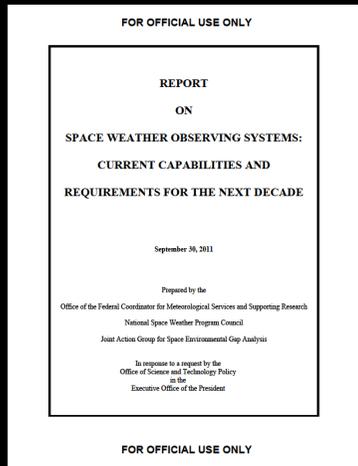
Mission

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.

Key Events from 2011 to 2014

<u>External Factors</u>		<u>NSWP Internal Actions</u>
	2011	SEGA Reports (2011, 2013)
Supported Nat'l Earth Observing Report	2012	National Space Weather Portal
Near-miss Carrington Analog Storm	2012	Unified National Space Weather Capability MOU
Decadal Survey	2013	
SWORM Task Force Established	2014	3d NSWP Implementation Plan (Draft)

Key Events from 2011 to 2014



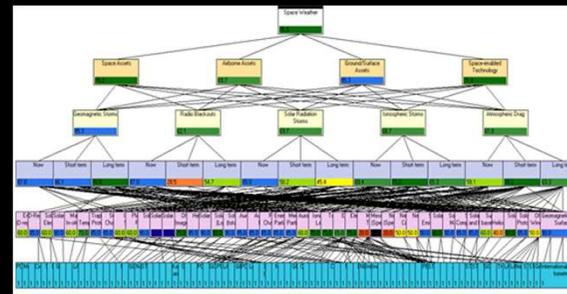
NSWP Accomplishment

2011: SEGA Reports 2011 – 2013

2012: National Space Weather Portal

2012: Unified National Space Weather Capability MOU

2014: 3d NSWP Implementation Plan (Draft)



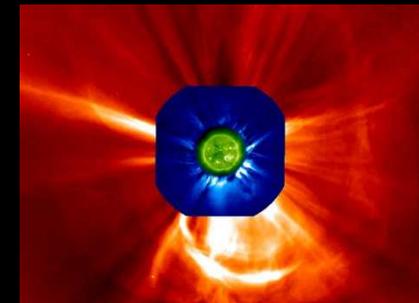
External Factors

2012: Supported Nat'l Earth Observing Report

2012: Near-miss Carrington Analog Storm

2012: Decadal Survey

2014: SWORM Task Force Established



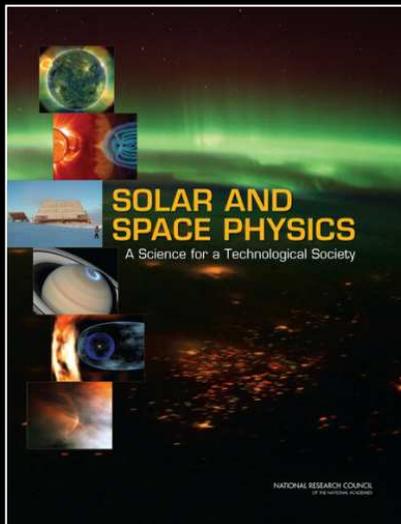
Congressional Direction and National Research Council Recommendation

NASA Authorization Act of 2010 (Sec. 809)

ACTION REQUIRED.—The Director of OSTP shall:

- (1) improve the Nation's ability to prepare, avoid, mitigate, respond to, and recover from potentially devastating impacts of space weather events;
- (2) **coordinate the operational activities of the NSWP Council members**
- (3) submit a report to the appropriate committees of Congress that details the current and future data sources, both space- and ground-based, that are necessary for space weather forecasting.

(NSWP provided the SEGA reports through OSTP in response)



National Research Council Decadal Survey 2013

“The survey committee recommends ... **the NSWP should be rechartered under the auspices of the NSTC** and should include the active participation of the OSTP and OMB.”

Culmination of the NSWLP and Leadership Transition (2014-2015)

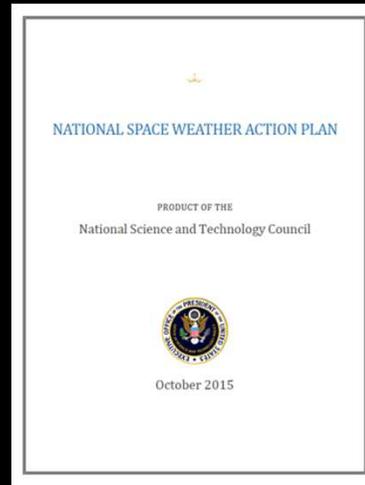
<u>External Factors</u>		<u>NSWP Internal Actions</u>
SWORM Task Force Established	2014	
Supported SWORM	2015	NSWP Council Deactivated

Space Weather Operations, Research, and Mitigation (SWORM)



National Science and
Technology Council

Space Weather Operations,
Research, and Mitigation
Subcommittee (SWORM)



- Chartered under White House Office of Science & Technology Policy (OSTP)
 - Co-Chaired by OSTP, National Weather Service, and Dept. of Homeland Security.
- National Space Weather Strategy and Space Weather Action Plan were officially released on 29 October 2015
- Outlines goals for operations, research, mitigation, and response in preparation for extreme events

Conclusion

- The NSWP fostered improved communication among the federal agencies, industry and academic space weather communities.
- The NSWP was keenly aware of external factors and events regarding space weather and adapted to these new influences accordingly.
- The NSWP agencies view the SWORM initiative as the "Coming of Age" of the Federal Space Weather community and graduation to the next level.

Acknowledgments

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This Presentation is based on:

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