SPACE STUDIES BOARD

The National Academies of SCIENCES ENGINEERING MEDICINE

Space Weather and Geospace/Heliophysics Community Strategic Planning

Sarah Gibson

Space Studies Board

The Space Studies Board provides an independent, authoritative forum for information and advice on all aspects of space science and applications.

- Decadal Surveys
- U. S. National Committee to the Committee on Space Research (COSPAR)
- Discipline Committee: Committee on Solar and Space Physics (CSSP)

2013 Decadal Survey
Solar and Space Physics: A Science for a Technological Society

Chapter 7 – “vision for a space weather and space climate program for the nation that could provide the new, integrated capabilities needed to serve the needs of a society ever more reliant on space.”

2013 Decadal Survey
Solar and Space Physics: A Science for a Technological Society

TABLE S.2 Summary of Top Level Decadal Survey Applications Recommendations

Priority	Recommendation	NASA	NSF	Other
1.0	**Recharter the National Space Weather Program**	X	X	X
2.0	**Work in a multi-agency partnership for solar and solar wind observations**	X	X	X
2.1	Continuous solar wind observations from L1 (DSCOVR, IMAP)	X		X
2.2	Continue space-based coronagraph and solar magnetic field measurements	X		X
2.3	Evaluate new observations, platforms, and locations	X	X	X
2.4	Establish a SWx research program at NOAA to effectively transition from research to operations			X
2.5	Develop and maintain distinct programs for space physics research and space weather specification and forecasting	X	X	X

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Understanding space weather to shield society: A global road map for 2015–2025 commissioned by COSPAR and ILWS

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"Review current space weather capabilities and identify research and development priorities in the near, mid and long term which will provide demonstrable improvements to current information provision to space weather service users"

Road map recommendations

Research: observational, computational, and theoretical needs

- Advance the international Sun-Earth system observatory along with models to improve forecasts based on understanding real-world events through the development of innovative approaches to data incorporation;

- Understand space weather origins at the Sun, initially prioritizing post-event solar eruption modeling to develop multi-day forecasts of geomagnetic disturbance times and strengths, after propagation through the heliosphere;

- Understand the factors which control the generation of geomagnetically-induced currents (GICs) and of harsh radiation in geospace, involving the coupling of the solar wind disturbances to internal magnetospheric processes in the magnetosphere and the ionosphere below;

- Develop a comprehensive space environment specification

Road map recommendations

Teaming: coordinated collaborative research environment

- Quantify vulnerability of society's infrastructure for space weather by partnering with user groups;
- Build test beds in which coordinated observing supports model development;
- Standardize (meta-)data and product metrics, and harmonize access to data and model archives;
- Optimize observational coverage of the Sun-society system.

Road map recommendations

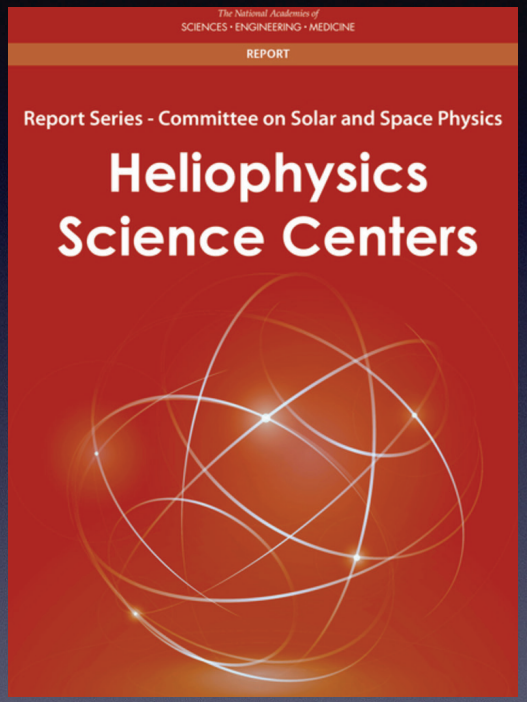
Collaboration between agencies and communities

- Implement open space-weather data and information policy;
- Provide access to quality education & information materials;
- Execute an international, inter-agency assessment of the state of the field on a 5-year basis to adjust priorities and to guide international coordination;
- Develop settings to transition research models to operations;
- Partner with the weather and solid-Earth communities to share lessons-learned.

Committee on Solar and Space Physics

The overarching purpose of the committee is to provide advice on the implementation of “decadal surveys” and oversee the activities of ad hoc committees established by the Academies to author reports on issues related to solar and space physics (Heliophysics). The committee interacts with sponsors and serves as a venue for dialogue between the government and the scientific community.

CSSP and short reports



- Decadal survey recommended Heliophysics Science Centers “to tackle the key science problems of solar and space physics that require multidisciplinary teams of theorists, observers, modelers, and computer scientists”
- CSSP Report charge was to clarify how to make HSCs unique and to provide options for implementation
- Conclusions emphasize importance of cross-cutting teams of critical mass, and open competition

CSSP and Space Wx

- Space Weather continues to be a major topic of discussion for the CSSP
- A mini symposium on Space Weather was held a the CSSP meeting October 2016
- A panel discussion was held at the Space Studies Board meeting November 2016

CSSP and Space Wx

Identified Six Impediments to Progress in Space Weather:

- Vision: What are the horizon goals that drive our strategic and tactical programs?
- Science: What gaps exist in measurements, modeling, and forecasting tools?
- Policy: Is there a program to support Research to Operations and Operations to Research?
- Implementation: How are community models best developed, maintained and improved??
- Awareness: What really are the important requirements and who is responsible for them?
- Culture: How can we overcome the persistent apparent conflict between pure and applied science?

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- The SSB and CSSP welcomes interactions with the full range of Space Wx stake-holders
- CSSP an engage in informal discussion at bi-annual meetings (Fall and Spring in DC as part of Space Science Week – March 27-29 2018)
- Panel discussions, mini-symposia, or short reports are also possible modes of engagements
- Contact Abigail Sheffer, CSSP Study Director, asheffer@nas.edu, nationalacademies.org/SSB