Committee on Solar and Space Physics

Co-Chairs: Sarah Gibson and Maura Hagan

Members: Brian Anderson, Steve Battel, Yue Deng, Stephen Fuselier, Todd Hoeksema, Mary Hudson, Robyn Millan, Tai Phan, Jiong Qiu, Josh Semeter, Howard Singer, Leonard Strachan, Barbara Thompson, Gary Zank

Staff: Abigail Sheffer, Anesia Wilks, and Marchel Holle

Space Weather

- Widespread interest, national and international (NSTC; FERC; DHS; FAA; UN; WMO; NATO*)
- New and planned NOAA satellites (GOES, DSCOVR**)
- Research to Operations – Operations to Research (SWORM*** white paper: multi-agency sponsored center capability)
- Situation continues to evolve


Congressional Record
Proceedings and Debates of the U.S. Congress

May 2, 2017
115th Congress, 1st Session
Issue: Vol. 163, No. 75 — Daily Edition

Space Weather Research and Forecasting Act: Senate passed S. 141, to improve understanding and forecasting of space weather events, after agreeing to the committee amendment in the nature of a substitute.

*National Science and Technology Council, Federal Energy Regulatory Commission, Department of Homeland Security, Federal Aviation Administration; United Nations; World Meteorological Organization; North Atlantic Treaty Organization

** Geostationary Operational Environmental Satellite, Deep Space Climate Observatory

*** Space Weather Operations, Research, and Mitigation

NSF Geospace (GS) portfolio review (PR)

- **NAS assessment report:**
  - Bottom line: PR committee fulfilled its charge within imposed constraints.
  - Recommendations for NSF Atmospheric and Geospace (AGS) division strategic plan and implementation of midscale program; also recommendations for coordination between GS section and community regarding PR implementation, requirements, and implications

NSF Geospace (GS) portfolio review (PR)

- **NSF GS response:**
  - Moving forward with PR recommendations (Arecibo, Sondrestrom radar, CubeSats, new investments)
  - Community driven strategic vision; PR every 3-4 years

Discussion informing Heliophysics Science Centers Report

Solar & Space Physics Decadal Survey -- DRIVE (Diversify, Realize, Integrate, Venture, Educate)

- ***NASA and NSF*** *together should create heliophysics science centers (HSCs) to tackle the* ***key science problems*** *of solar and space physics that require* ***multidisciplinary teams*** *of theorists, observers, modelers, and computer scientists, with annual funding in the range of* ***$1 million to $3 million*** *for each center for* ***6 years****, requiring NASA funds ramping to $8 million per year (plus increases for inflation).*

Discussion informing Heliophysics Science Centers Report

<u>Statement of Task</u>:

The Committee on Solar and Space Physics (CSSP) will draft a very brief report to provide a set of options for NASA and NSF to consider for the creation of HSCs. Topics may include:

- How to make the HSCs unique from other research elements; and

- Options for implementation (for example, consideration of a virtual institution).

Discussion informing Heliophysics Science Centers Report

- Questions that arose during discussion with agencies:
  - What should HSC **framework and priorities** be?
  - How to **scope and bound** them?
  - How to decide **what science to tackle first**?
  - How should the **community be engaged?**

Discussion informing Heliophysics Science Centers Report

- **Intention of Solar & Space Physics Decadal Survey** (Drake)
  - Heliophysics involves complex, coupled systems posing problems that are **difficult to solve**. At the same time, **breakthroughs** are occurring in computation, observations, and theory.
  - **Bringing together** people who may not necessarily usually work together **enables progress** on problems too difficult to be solved otherwise
  - The **range of topics** covered by HSCs would necessarily be **limited;** they **do not replace** but rather **augment existing research programs**

Discussion informing Heliophysics Science Centers Report

- **Intention of Solar & Space Physics Decadal Survey** (Drake)
  - A **center-like environment** involving some (not too many) institutions, with **sufficient funding** for substantial coordinated efforts
  - Science **topics** would be **identified by proposers**, not prescribed top-down
  - **Success s**hould be judged based on **scientific progress**

Discussion informing Heliophysics Science Centers Report

- **NSF Physics Frontiers Center** (PFC; Caldwell)
  - **10 PFCs** in existence; some in partnership with NSF Biology Division
  - **Multi-institutional** connections **not required**
  - **~$2.5M per year for 5 years**; competition **every 3 years**
  - Nominal center **lifetime** is **10 years**
  - Allowed to **re-compete** ⇒ need to reinvent themselves if so

Discussion informing Heliophysics Science Centers Report

- **NSF Physics Frontiers Center: Lessons Learned**
  - Center mode brings together scientists - **ideas emerge that would not otherwise have**
  - Centers need **flexibility to respond** if a **discovery** is made
  - It takes **~two years** for a center to **form an identity**
  - When successful, there is a powerful difference in the **educational experience** for postdocs and grad students

Discussion informing Heliophysics Science Centers Report

- **NASA Astrobiology Institute** (NAI; Boston)
  - **12 teams** contributing to program led by NASA Ames with programmatic direction from HQ
  - All teams **highly interdisciplinary consortia** of institutions, led by NASA center/university
  - **~$1M per year for 5 years** (varies) ; competition **every 2.5 years**
  - Nominal center **lifetime** is **5 years** (1 year no-cost extension)
  - On average about half immediately **re-compete**

Discussion informing Heliophysics Science Centers Report

- **NASA Astrobiology Institute: Lessons Learned**
  - Give **autonomy to teams**; don't predetermine topics beyond high level
  - **Constant communication is critical**; multiple virtual meetings between and among teams
  - **Integrating research themes** group subsets of research that bring teams together
  - **Value-added programs** – minority-institute research support; early-career support; meeting/workshop support; EPO; IT enthusiasts; "Workshops without walls"

Heliophysics Science Centers Report Procedure and Status

- Split up into writing groups 3/30 → draft findings/conclusions
- Report compiled, sent to committee 4/7
- Committee telecom 4/10
- Further revisions, new draft sent to committee 4/17
- Small changes in response to comments from committee, then sent to reviewers April 24
- Reviews due May 2
- Expected release second half of May

- Overall – positive experience
- Might be easier during non-Space-Science-Week meeting