Overview of the NSF Geospace Section Portfolio Review

- Committee charge
- NSF investments in geospace science: Past, current and future
- Science goals and challenges recommended by the Decadal Survey (*Solar and Space Physics – A Science for a Technological Society)*
- Survey's recommendations for NSF

  → Aspirations for new capabilities to advance science
- Mapping the Survey's science goals to critical capabilities and investments
- PR Committee membership, guiding principles, timeline

http://www.nsf.gov/geo/ags/geospace-portfolio-review-2015/

Charge: GS Portfolio Review

1. Recommend the *critical capabilities* needed from 2016 to 2025 that would enable progress on the science program articulated in Chapter 1 of the Decadal Survey

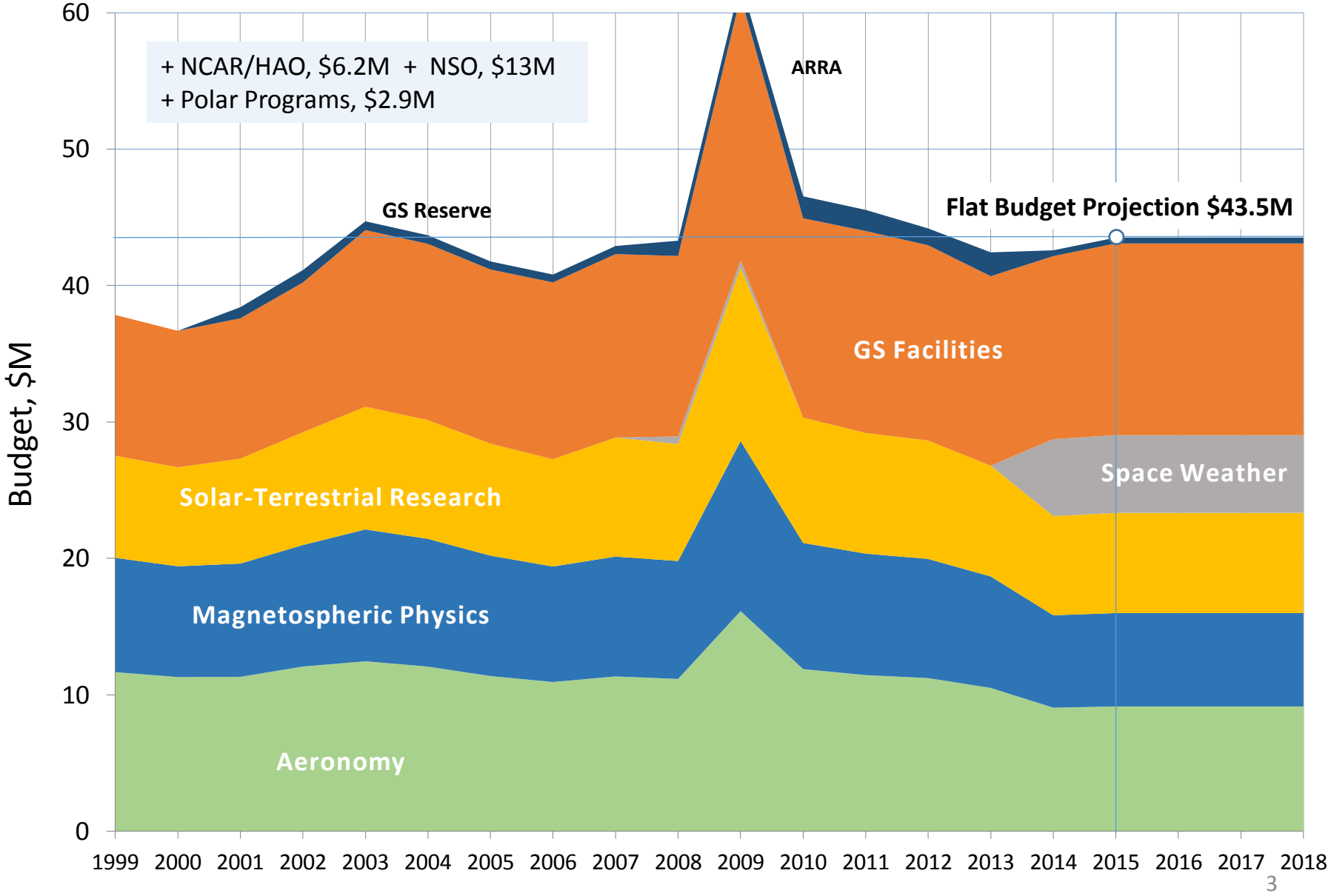
2. Recommend the balance of *investments* in new and existing facilities, grants programs, and other activities that would optimally implement the Survey recommendations and achieve the goals of the Geospace Section (See: AGS Draft Goals and Objectives, including NRC/BASC Review, 2014; and GEO/Advisory Committee's "Dynamic Earth: GEO Imperatives & Frontiers 2015-2020")

Recommendations should encompass not only observational capabilities, but also theoretical, computational, and laboratory capabilities, as well as capabilities in research support, workforce, and education.

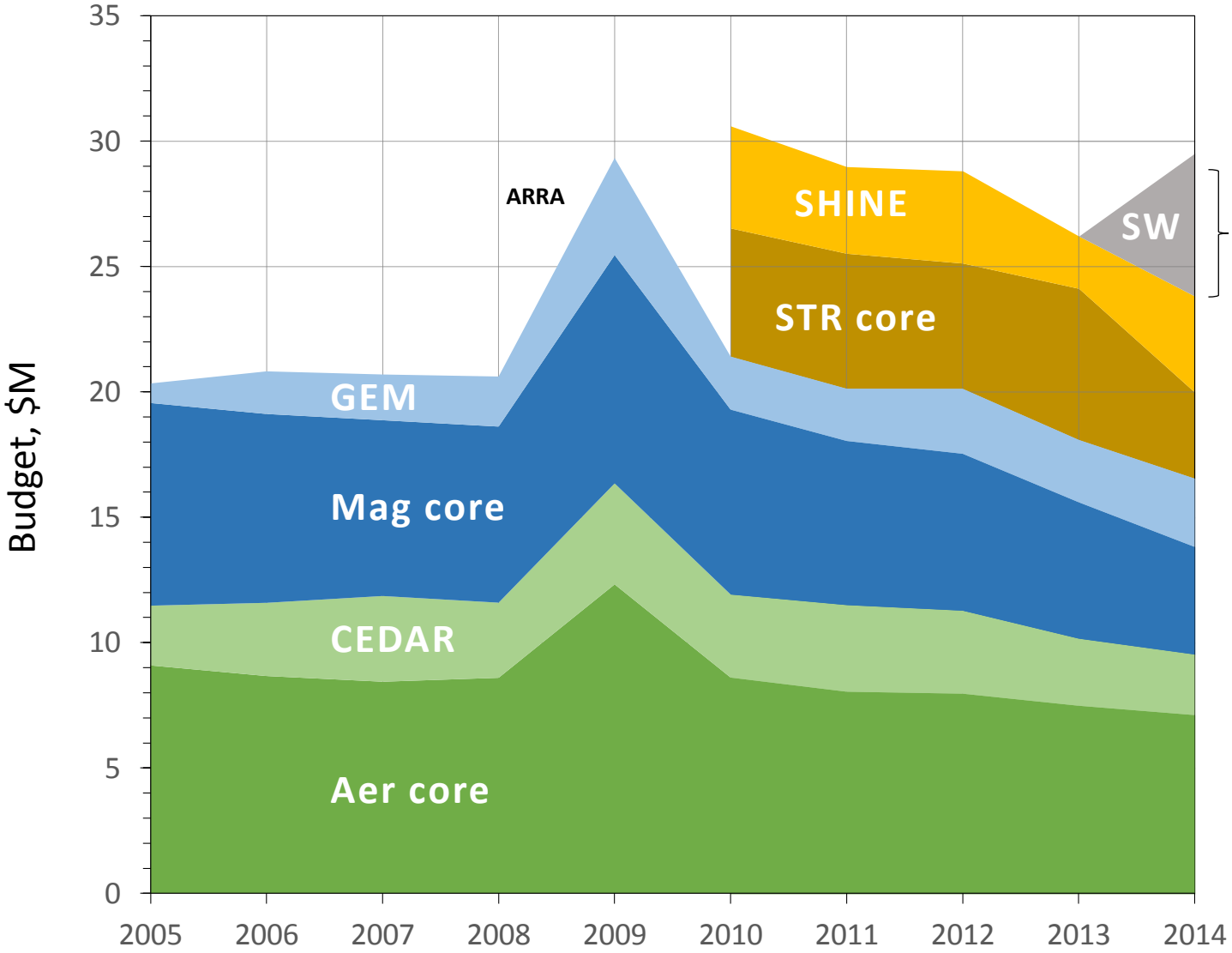
Recommendations may include closure or divestment of some facilities, as well as termination of programs and other activities, and/or new investments enabled as a result. The overall portfolio must fit within the budgetary constraints provided to the Committee (flat in 2015 dollars).

All GS-funded activities should be considered together with the Survey recommendations.

Geospace Section Budget Profile 1999-2015 (2015 $)



GS Core and Targeted Program Budgets (2015 $)



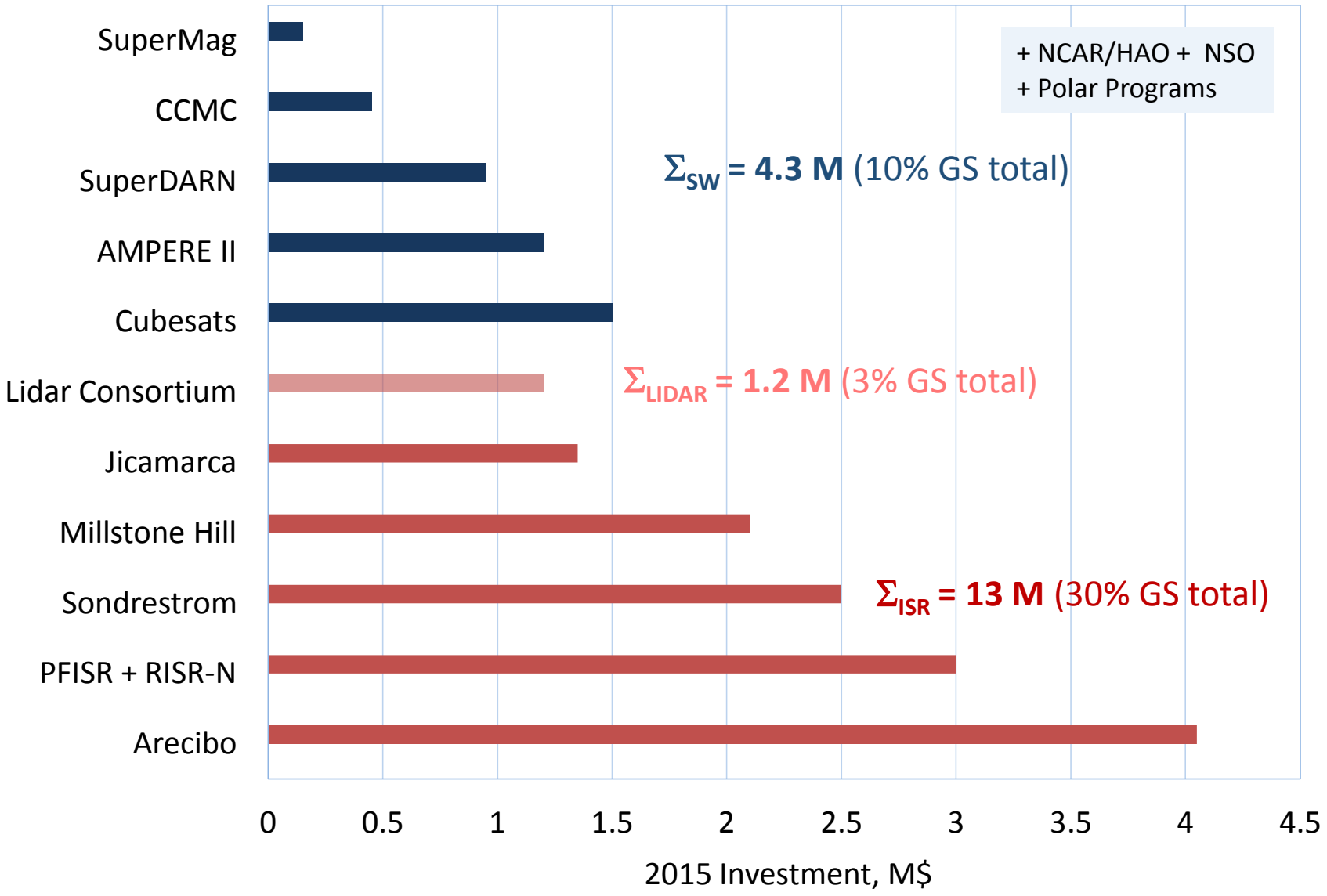
2013 →

$5M line in Aer/Mag/STR supporting

- AMPERE
- CCMC
- SuperDARN
- SuperMag
- NASA/NSF Collaborative SW Modeling

began migrating to the newly established SW Program.

GS Facilities Investments (2015)



Key Science Goals of the Decadal Survey

Overarching Themes

Understand “coupled” system | Space weather and climatology

Key Science Goals

KS-1. Determine the origins of the Sun’s activity and predict the variations in the space environment.

KS-2. Determine the dynamics and coupling of Earth’s magnetosphere, ionosphere and atmosphere and their response to solar and terrestrial inputs.

KS-3. Determine the interaction of the Sun with the solar system and the interstellar medium.

KS-4. Discover and characterize fundamental processes that occurs both within the heliosphere and throughout the universe.

Decadal Science Challenges

Table 2.1

The Sun and Heliosphere

SHP-1 Understand how the Sun generates the quasi-cyclical magnetic field that extends throughout the heliosphere.

SHP-2 Determine how the Sun's magnetism creates its hot, dynamic atmosphere.

SHP-3 Determine how magnetic energy is stored and explosively released and how the resultant disturbances propagate through the heliosphere.

SHP-4 Discover how the Sun interacts with the local interstellar medium.

Decadal Science Challenges

Table 2.1

Solar Wind-Magnetosphere Interactions

SWMI-1 Establish how magnetic reconnection is triggered and how it evolves to drive mass, momentum, and energy transport.

SWMI-2 Identify the mechanisms that control the production, loss, and energization of energetic particles in the magnetosphere.

SWMI-3 Determine how coupling and feedback between the magnetosphere, ionosphere, and thermosphere govern the dynamics of the coupled system in its response to the variable solar wind.

SWMI-4 Critically advance the physical understanding of magnetospheres and their coupling to ionospheres and thermospheres by comparing models against observations from different magnetospheric systems.

Decadal Science Challenges

Table 2.1

Atmosphere-Ionosphere-Magnetosphere Interactions

AIMI-1 Understand how the ionosphere-thermosphere system responds to, and regulates, magnetospheric forcing over global, regional, and local scales.

AIMI-2 Understand the plasma-neutral coupling processes that give rise to local, regional, and global-scale structures and dynamics in the AIM system.

AIMI-3 Understand how forcing from the lower atmosphere via tidal, planetary, and gravity waves influences the ionosphere and thermosphere.

AIMI-4 Determine and identify the causes for long-term (multi-decadal) changes in the AIM system.

Decadal Survey Recommendations for NSF

R0.0 Maintain and complete the current research program

R1.0 Implement the DRIVE initiative

Cubesats; *midscale ground-based projects*; vigorous DKIST and synoptic program support; science centers; cross-cutting grants programs; instrument development; FDSS, summer schools

A1.0 Recharter the NSWP

A2.0 Work in a multiagency partnership to achieve continuity of solar and solar wind observations

Evaluate new observations, platforms and locations

Develop and maintain distinct funding lines for basic space physics research and for space weather specification and forecasting

Illustrative Mapping of Capabilities and Investments onto the Survey's Science Challenges

Science Challenge (Aer)	Capabilities	Investments
AIMI-1. Understand how the ionosphere-thermosphere system responds to, and regulates, magnetospheric forcing over global, regional, and local scales.		
AIMI-2. Understand the plasma-neutral coupling processes that give rise to local, regional, and global-scale structures and dynamics in the AIM system.		
AIMI-3. Understand how forcing from the lower atmosphere via tidal, planetary, and gravity waves influences the ionosphere and thermosphere.		
AIMI-4. Determine and identify the causes for long-term changes in the AIM system.		
SWMI-3. Determine how coupling and feedback between the magnetosphere, ionosphere and thermosphere govern the dynamics of the coupled system in its response to the variable solar wind.		
SWMI-4. Advance the physical understanding of magnetospheres and their coupling to ionospheres and thermospheres by comparing models against observations from different magnetospheric systems.		

Portfolio Review

Committee Dan Baker, Koki Chau, Christina Cohen, Sarah Gibson, Joe Huba, Mona Kessel, Delores Knipp, Lou Lanzerotti, Bill Lotko (*chair*), Pat Reiff, Alan Rodger, Josh Semeter (*GEO Advisory Committee),* Howard Singer

Present at CEDAR

Guiding Principles

- Consider the balance across the entire portfolio of activities.
- All funded activities of the Geospace Section will be considered together with the Survey recommendations.
- Recommend investment priorities according to science goals.
- Maintain a flexible system of capabilities.
- Strive for a balance between investments in facilities and people.
- Value the role of peer-reviewed competition.
- Value openness in the availability of data.
- Provide excellent training and career opportunities.
- Fulfill a mission to educate and inform.

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Progress and Timeline *(ambitious for 7 months!)*

- **18 Feb** Committee appointed and charged
- **Every other week** Webcon (Committee + GS staff + guest presentation)
- **6-7 Apr** 1st In-person meeting
- **Ongoing** Data collection on GS programs, facilities
- **Ongoing** Gather community input (emails, CEDAR, GEM, SHINE ++)
- **Jun-Aug** Gather information from facility PIs
- **12-14 Aug** 2nd In-person meeting
- **Sep** Complete draft, submit to GEO/Advisory Committee
- **Oct** GEO/Advisory Committee reviews the GS/PR Report
- **Nov** GS programs respond to the PR Committee Report
- **Dec** Final (revised if necessary) GS/PR Report released

Community Input

Questions? Comments?

Recommendations?

Tell us what programs and facilities in the existing or *possible future* portfolio of NSF's Geospace Section ***would enable your research to achieve DS goals***.

32 comments have been received via email.

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