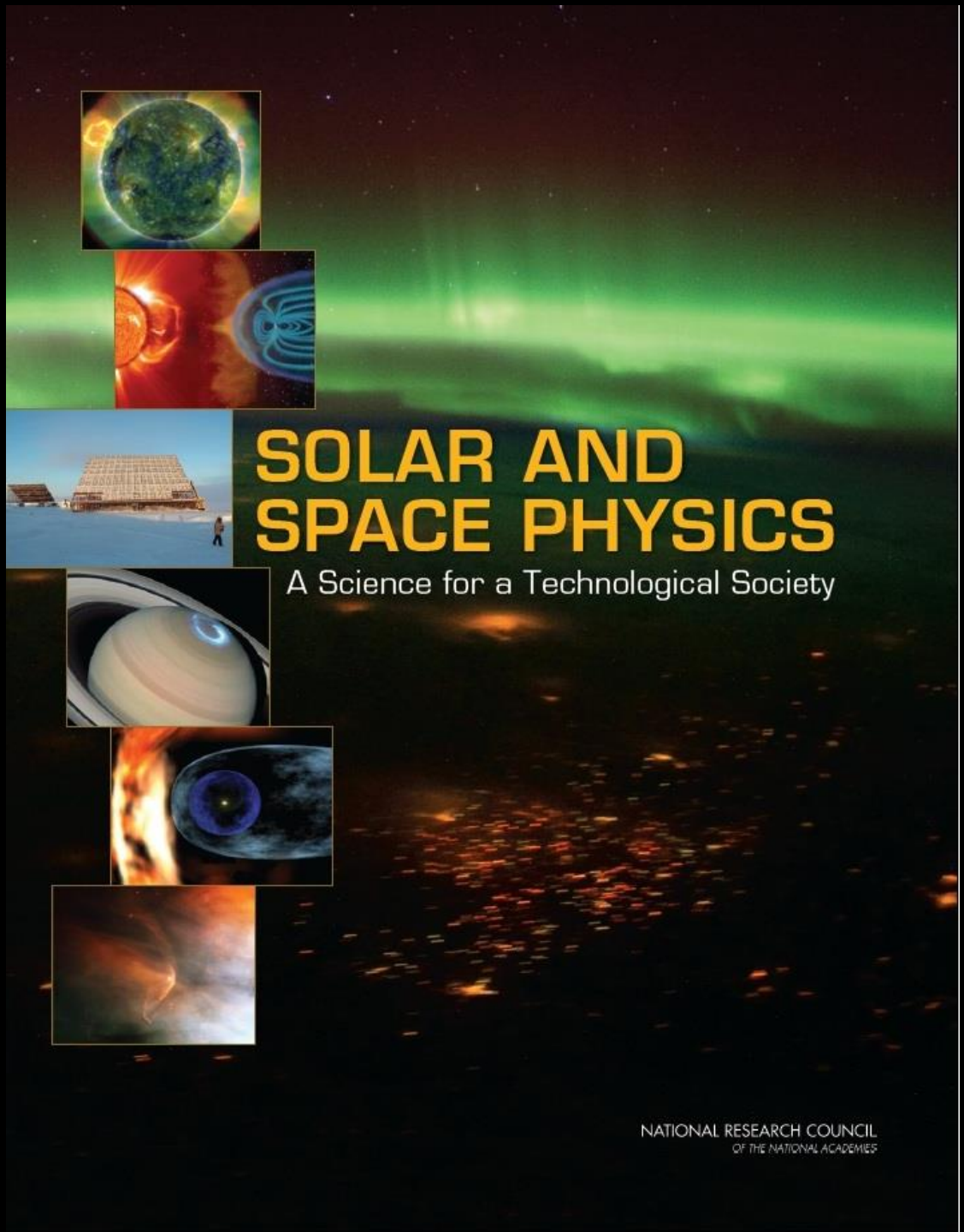


Strategic Planning:

The NRC Decadal Survey in Solar & Space Physics

Daniel N. Baker, Chair
NRC Decadal Survey
Steering Committee

Objectives of Survey

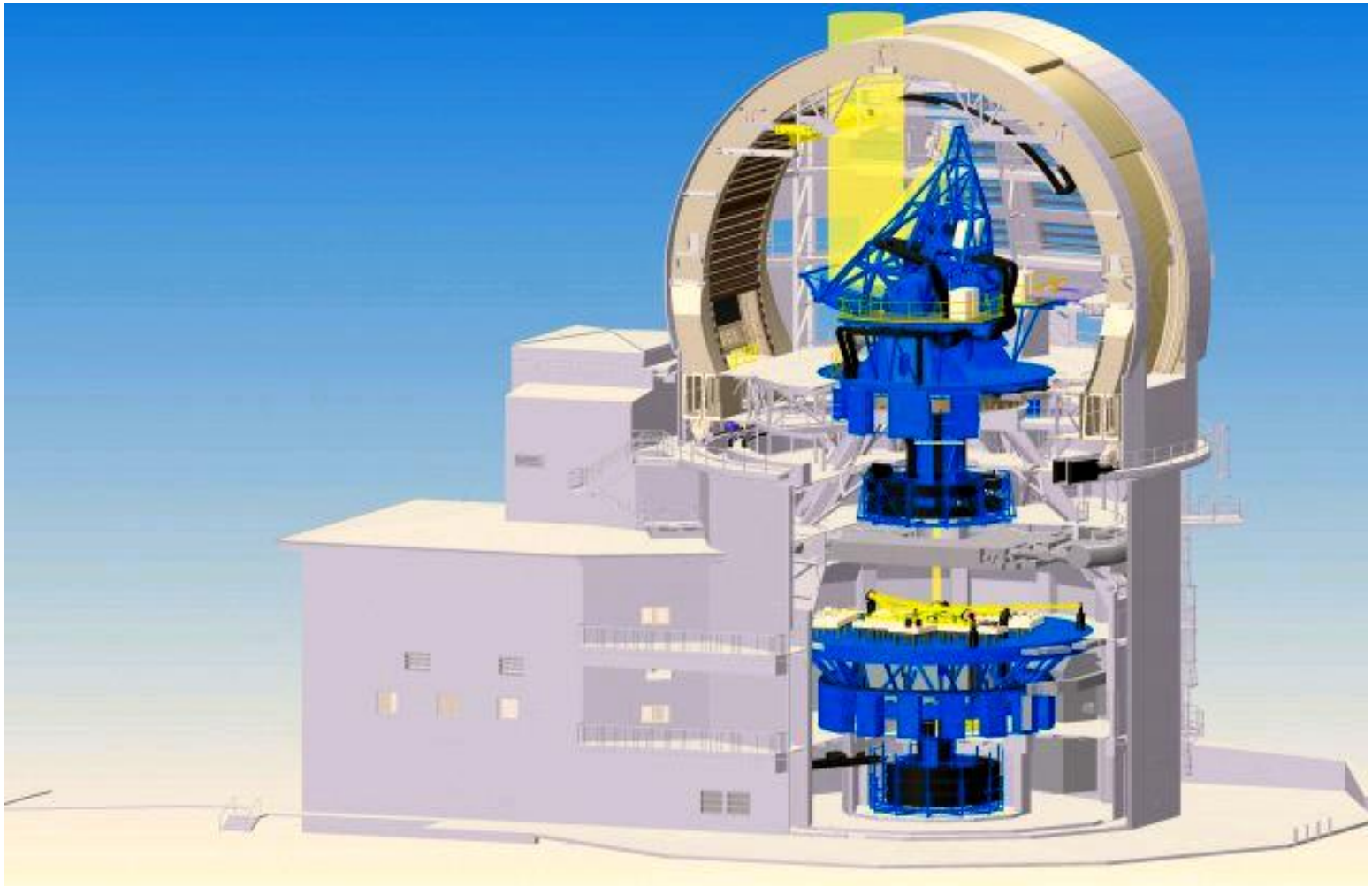
1. Provide an overview of the science and a broad survey of the current state of knowledge in the field
2. Identify the most compelling science challenges
3. Identify the highest priority scientific targets for the interval 2013-2022
4. Develop an integrated research strategy


AMISR RISR
AMISR PFISR
Sondrestrom
WSO
Millstone Hill
NSO SP/KP
SuperDARN
Super DUAL AURORAL RADAR NETWORK
SFO
NRAO
BBSO
Jicamarca
NSO ATST
Arecibo
MSO

Complete the Ongoing Program

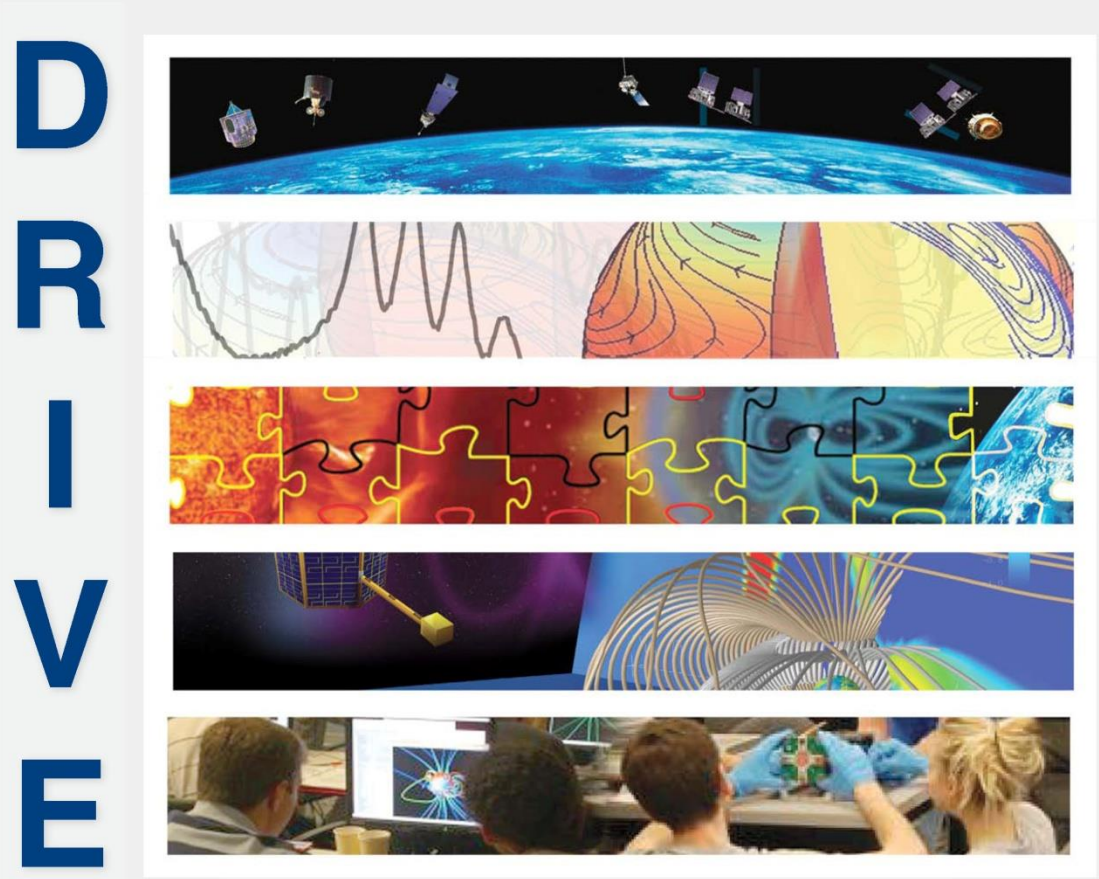
- The survey committee's recommended program for NSF and NASA assume continued support in the near-term for the key existing program
  - For NASA: complete RBSP, MMS, Solar Probe Plus, Solar Orbiter; also IRIS and Explorer selections.
  - For NSF: complete ATST.

NSF's Advanced Technology Solar Telescope



Implement the DRIVE Initiative

- **DRIVE** (Diversify, Realize, Integrate, Venture, Educate) will enable NASA, NSF and other agencies to more effectively exploit their scientific assets.



Diversify observing platforms with microsatellites and mid-scale ground-based assets

Realize scientific potential by sufficiently funding operations and data analysis

Integrate observing platforms and strengthen ties between agency disciplines

Venture forward with science centers and instrument and technology development

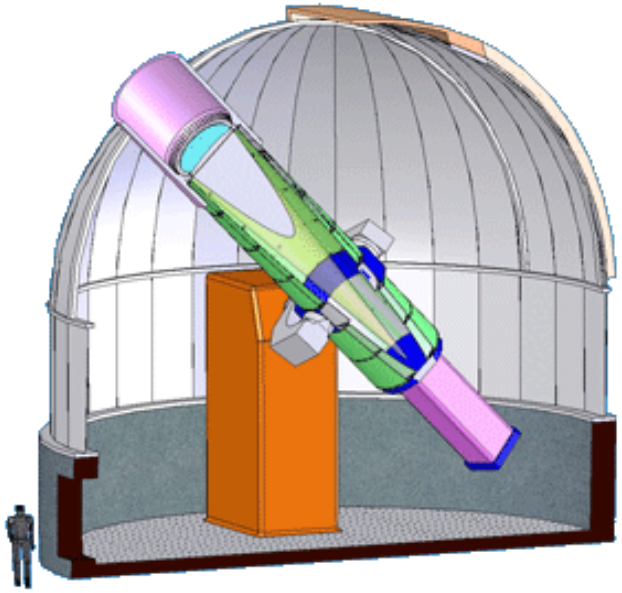
Educate, empower, and inspire the next generation of space researchers

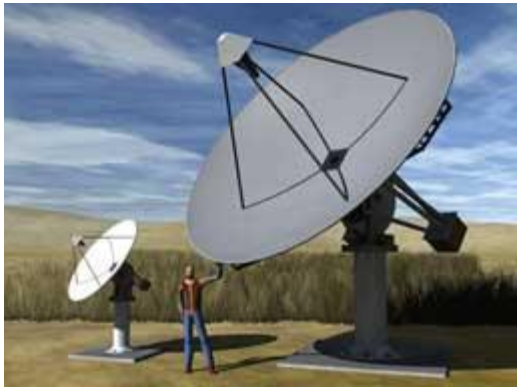
DRIVE for NSF

- **Diversity**:
  - **Recommendation: NSF's CubeSat program should be augmented to enable at least two new starts per year.** Detailed metrics should be maintained, documenting the accomplishments of the programs in terms of training, research, technology development, and contributions to space weather forecasting.
  - Create a mid-scale ($4-90M) line for ground-based projects.
- **Realize**: Provide sufficient funding for efficient and scientifically productive operation of Advanced Technology Solar Telescope.
- **Integrate**:
  - **Recommendation: NASA should join with NSF and DOE in a multi-agency program on laboratory plasma astrophysics and spectroscopy, with an expected NASA contribution ramping from $2 million per year (plus increases for inflation), in order to obtain unique insights into fundamental physical processes.**
  - **Recommendation: NSF should ensure that funding is available for basic research in subjects that fall between sections, divisions, and directorates, such as planetary magnetospheres and ionospheres, the Sun as a star, and the outer heliosphere. In particular, outer-heliospheric research should be included explicitly in the scope of research supported by the AGS section at the NSF.**

Mid-Scale Line for NSF

- A new funding line for mid-scale projects at the National Science Foundation will facilitate long-recommended ground-based projects, such as COSMO (COronal Solar Magnetism Observatory) and FASR (Frequency-Agile Solar Radio-telescope), by closing the funding gap between large and small programs.





DRIVE for NSF, Cont'd

- **Venture**: Multi-agency development of critical mass science centers.
  - **Recommendation: 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).**
- **Educate**: Promote faculty and curriculum development and visibility of solar and space physics.
  - **Recommendation: NSF Faculty Development in Space Sciences (FDSS) program should be continued and be considered open to applications from 4-year as well as PhD-granting institutions as a means to broaden and diversify the field. NSF should also support a curriculum development program to complement the FDSS program and support its faculty.**

AGS Strategic Planning?

Emphatically YES!! (DNB Opinion)

"Plans are useless—but planning is essential"

Gen. Dwight D. Eisenhower

Should be driven by AGS staff but with broad stakeholder buy-in

Strategic Plan Properties

- Clear and Accessible
- Well-Motivated and Compelling
- Achievable Goals (but Stretching!)
- Strong, Enduring Principles (~5-10 yr)
- Adaptable to Changing Externalities
- Brief! (10-15 pages at most)

Plan Elements

- Mission Statement
- Vision Statement
- Organizational Principles
- Strategic Goals
- Follow-up:
  - Implementation Plan!

Geospace Sciences: The study of the space environment of Planet Earth

- ***A document by the Geospace Section of the Division of Atmospheric and Geospace Sciences***

Geospace Section Strategic Priorities

- Basic Research
- Advanced Facilities and Instrumentation
- Integrated and Coupled Models
- Effective Education and Training
- Strengthening the Geospace Section

For NSF, the Decadal Survey Recommends:

- Complete the on-going program
  - Finish and adequately fund the Advanced Solar Telescope
- Implement DRIVE
  - Diversify
  - Realize
  - Integrate
  - Venture
  - Educate

Diversify: Diversify Observing Platforms

- ***NSF Geospace addresses the "Diversify" mandate of the Decadal Survey through its broad approach to enabling geospace research.***
- Expansion of observing facilities
  - six incoherent scatter radars, networks
  - SuperDARN
  - Consortium for Resonance and Rayleigh Lidars
  - Low-Latitude Ionospheric Sensor Network
  - Space-based capabilities (AMPERE and the Cubesat missions)

- Improved databases -- CEDAR database continues to be a repository of measurements
- Community-driven modelling efforts
- On-going efforts to fund mid-scale projects such as FASR and COSMO.
- The next decade will see new observations from AMISR sites constructed at or moved to new locations to meet emerging scientific priorities.
- Increase our efforts toward distributed sensor networks.

Realize

- ***Recommendation**: Complete the Advanced Technology Solar Telescope (ATST) and provide sufficient funding for efficient and scientifically productive operation.*
- We are in on-going discussions with the Astronomy Division to transfer the ATST to our Division.

Integrate: Integrate Observing Platforms and Strengthen Ties Between Agencies

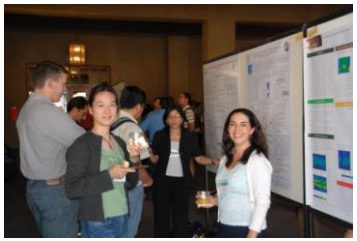
- ***Recommendation: NSF should ensure that funding is available for basic research in subjects that fall between sections, divisions, and directorates, such as planetary magnetospheres and ionospheres, the Sun as a star, and the outer heliosphere.***
- The Geospace section is involved in joint programs that cross disciplinary lines with NASA, AFOSR and DOE and within the NSF.
- We are working with the NASA Heliophysics Division to jointly develop strategic capabilities for the National Space Weather Program.
- Within NSF we are working with Plasma Physics as part of the NSF/DOE Partnership for Basic Plasma Science and Engineering
- Our Section Strategic Plan explicitly calls for participation in new Directorate and NSF-wide initiatives that cross disciplines and support investigation of the entire Sun-Earth system.
- Comparative studies of planetary magnetospheres and ionospheres are important for understand the magnetosphere and ionosphere system at the Earth and are supported under the base program

Venture: Venture Forward with Science Centers and Instrument and Technology Development

- NSF support for larger collaborative research projects, at the level recommended, on critical space science and space weather topics is currently provided through Directorate and NSF-wide initiatives, such as Frontier in Earth System Dynamics (FESD) and Hazard SEES and possibly INSPIRE.
- We will continue to pursue and inter-agency collaborations with NASA, AFOSR, DOE, and other partners to fund a new generation of coupled space weather models.
- We recognize the need to develop and exploit new technologies over a broad spectrum of instrumentation, including AMISR radar technology, CubeSats, and distributed sensor networks.
- New instrument development line?

Educate

- Continue efforts to train the next generation of space scientist through proactive efforts within the GEM, CEDAR, and SHINE Programs.
- Continue to encourage Research Experiences for Undergraduates through both formal and informal programs at universities, laboratories, centers, and facilties.
- The Cubesat program is highly successful in attracting students – Of course!
- The NSF Geospace Section supports early career scientists through the NSF CAREER program.
- Academic positions has been provided through the Faculty Development in Space Science
- A variety of informal education and outreach programs ioncluding continued support for AGU's Space Weather Journal, and sponsorship of workshops, such as Space Weather Week and the Space Weather Enterprise Forum.



GS Budget Implications