NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL
DIVISION ON ENGINEERING AND PHYSICAL SCIENCES

A Decadal Strategy for Solar and Space Physics (Heliophysics)

STATEMENT OF TASK

The Space Studies Board shall establish a Heliophysics Survey Committee to develop a comprehensive science and mission strategy for heliophysics research for a 10-year period beginning in approximately 2013. The survey committee, informed by up to 5 study panels that will also be established by the Board, will broadly canvas the field of solar and space physics and:

1. Provide an overview of the science and a broad survey of the current state of knowledge in the field, including a discussion of the relationship between space- and ground-based science research and its connection to other scientific areas;
2. Identify the most compelling science challenges that have arisen from recent advances and accomplishments;
3. Identify—having considered scientific value, urgency, cost category and risk, and technical readiness—the highest priority scientific targets for the interval 2013-2022, recommending science objectives and measurement requirements for each target rather than specific mission or project design/implementation concepts; and
4. Develop an integrated research strategy that will present means to address these targets.

Scope

This "decadal survey" follows the NRC's previous survey in solar and space physics, *The Sun to the Earth--and Beyond: A Decadal Research Strategy in Solar and Space Physics,* which was completed in 2002 and published in final form in 2003. The scope of the study will include:

- The structure of the Sun and the properties of its outer layers in their static and active states;
- The characteristics and physics of the interplanetary medium from the surface of the Sun to interstellar space beyond the boundary of the heliosphere; and
- The consequences of solar variability on the atmospheres and surfaces of other bodies in solar system, and the physics associated with the magnetospheres, ionospheres, thermospheres, mesospheres, and upper atmospheres of the Earth and other solar system bodies.

In order to ensure consistency with other advice developed by the NRC for NASA, the following additional scope guidance is provided:

- With the exception of interactions with the atmospheres and magnetospheres of solar system bodies, which are within scope, planetary phenomena are out of scope (these other topics are being addressed by an ongoing decadal survey in planetary science);
- Basic or supporting ground-based laboratory and theoretical research in solar and space physics are within scope, noting that the findings and recommendations in the present survey should be harmonized with those developed and reported by the ongoing astronomy and astrophysics decadal survey; and

- Consistent with the current astronomy and astrophysics decadal survey, recommendations related to ground-based implementations (e.g., ground-based solar observatories) will be directed to the NSF.

Without undertaking a detailed analysis of operational space weather user or provider requirements, the survey committee will describe the value of these services to society and examine the role of NASA and NSF research in underpinning and improving these services. In addition to an integrated review of the current state of scientific knowledge and recommendations for future basic research directions to advance our understanding, the survey will provide implementation recommendations separately for NASA and NSF.

For each science target, the committee will establish criteria on which its recommendations depend and identify developments of sufficient significance that they would warrant an NRC reexamination of the committee's recommendations. The Committee will also make recommendations to the agencies on how to rebalance programs within budgetary scenarios upon failure of one or more of the criteria.

PLAN OF ACTION

The Space Studies Board will establish a Survey Steering Committee ("Committee") of approximately 16 members. The Committee will be responsible for the overall organization and execution of the new study, as well as the production of a final consensus report that will undergo the usual NRC review processes. The final report will represent a comprehensive and authoritative analysis of the subject domain and a broad consensus among research community stakeholders. To do so, it is anticipated that the Committee will utilize specialized study subpanels, with allocation of the domain of study among them to be determined by the Committee and the Space Studies Board.

The operation of the panels will be supplemented by informal working groups involving panel members and experts from the research community working as unpaid consultants to the survey. The specific structure of the Survey will be determined following the appointment of the survey chair who will present a plan to the Committee for its approval at its first meeting. An important role of the survey will be to solicit broad input from the research community about issues of scientific and programmatic priorities in the field. The work of the study subpanels and working groups will not result in separate, independent reports. The subpanels' internal reports, conclusions, and recommendations will be considered by the Committee in its preparation of a single final report.

The survey will solicit and aggregate inputs from across the solar and space physics community via town hall meetings, sessions at geographically dispersed professional meetings, solicitation of white papers, and aggressive use of electronic communications and networks. The Committee may also convene focused workshops on special topics of interest.

In proposing a decadal research strategy, the Committee will make recommendations within the boundaries of expected future budgets and address choices which may be faced, given a range of budget scenarios. To that end, it is anticipated that NASA and NSF will provide an up-to-date understanding of these limitations during the course of the survey.