

## B.7 LIVING WITH A STAR TARGETED RESEARCH AND TECHNOLOGY: NASA/NSF PARTNERSHIP FOR COLLABORATIVE SPACE WEATHER MODELING

**Amended on November 17, 2011. This Amendment presents the revised version of Appendix B.7 Living with the Star Strategic Capability Program, which for this year is renamed NASA/NSF Partnership For Collaborative Space Weather Modeling. The due date for notices of intent is December 15, 2011 and for proposals is March 15, 2012.**

### 1. Scope of Program

#### 1.1 Overview

Space weather refers to conditions on the sun and in the solar wind, interplanetary medium, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems that can endanger human life or health. Mitigation of these adverse effects requires understanding of the fundamental physical processes that affect the state of the Sun, solar wind, interplanetary medium, magnetosphere, ionosphere, and upper atmosphere. This understanding is being achieved by a variety of ongoing programs that address research, observations, and modeling of the space environment.

The National Space Weather Program (NSWP) is a multiagency Federal research initiative seeking to mitigate the adverse effects of space weather. Its ultimate goal is to achieve timely, accurate, and reliable space environment observations, specifications, and forecasts. Information about the NSWP can be obtained from the National Space Weather Program Strategic Plan, available at <http://www.ofcm.gov/nswp-sp/fcm-p30.htm>. A description of national Federal science and technology investment priorities for space weather can also be found in the Implementation Plan for Space Weather that was developed in support of the Grand Challenges for Disaster Reduction by the Subcommittee on Disaster Reduction of the President's National Science and Technology Council. This document is available at: [http://www.sdr.gov/185820\\_Space\\_FINAL.pdf](http://www.sdr.gov/185820_Space_FINAL.pdf)

The Geospace Sciences Section of the Division of Atmospheric and Geospace Sciences of the National Science Foundation (NSF), in collaboration with the NSF Office of Polar Programs, the Air Force Office of Scientific Research (AFOSR), and the Office of Naval Research (ONR), funds basic research in support of national space weather objectives. This includes the development of space weather models for specification and forecast of conditions throughout the space environment.

Similarly, a primary goal of NASA's Living With a Star (LWS) Program is the development of first-principles-based models for the coupled Sun-Earth and Sun-Solar System, similar in spirit to the first-principles models for the lower terrestrial atmosphere. Such models can act as tools for science investigations, as prototypes and test beds for prediction and specification capabilities, as frameworks for linking disparate data sets at vantage points throughout the Sun-Solar System, and as strategic planning aids for enabling exploration of outer space and testing new mission concepts.

Because of the common goals among the agency programs described above, NASA and NSF have agreed to renew their partnership to support a new round of Strategic Capabilities, large-scale research projects that are more ambitious than those typically supported by a single grant by either organization. Descriptions of previously developed Strategic Capabilities can be found at [http://lws-trt.gsfc.nasa.gov/trt\\_stratcap.htm](http://lws-trt.gsfc.nasa.gov/trt_stratcap.htm).

This is a joint NASA and NSF call, and points of contact from both Agencies are listed below. Though this solicitation is being issued by NASA, the proposal requirements include the standard NSF statement of mentoring activities (see Section 2.1) the evaluation of proposals will include consideration of the "broader impacts" as part of the evaluation of relevance (see Section 2.2).

### 1.2 Strategic Capabilities Addressed by this Solicitation

The objective of a Strategic Capability (SC) within the TR&T program is development of one or more deliverables that address a significant and specific need for achieving the LWS and NSWP goals. It is expected that SCs will incorporate the latest scientific results from LWS Focus Science Teams as well as other research. This current call is intended to allow flexibility in the proposed science focus and approach to achieving this objective. Two possible approaches are acceptable for this solicitation:

1. Strategic Capability proposals that address a science focus that has reached a level of maturity whereby investment in teams of theorists, computational physicists, and observers can lead to rapid and transformational progress, and deliver models for use by the scientific and/or operational communities. Examples of this approach are the bringing together of multiple mature physics-based modules to form a new critically needed capability, the development and implementation of fundamental science and/or novel computational algorithms in a comprehensive model, or the development of methods for constructively utilizing vast amounts of data towards a predictive capability.
2. Strategic Capability proposals that use innovative ways to address vital inter-disciplinary scientific needs in potentially transformational ways, i.e., integration of multiple systems, traditionally treated as different disciplines and/or by separate models, by coherent coupling between them. Examples of this possible approach include System Science investigations covering multiple regimes or more speculative, potentially high-payoff ideas in Solar-Terrestrial Physics and Space Weather.

All proposed Strategic Capabilities must address the goals of the LWS and NSWP programs described above, and must demonstrate that they constitute a major advance from previous Strategic Capabilities. Within these broad goals, proposers are responsible for specifying science focus of their proposed Strategic Capability, justifying the transformative nature of the project, and showing how it will make a unique contribution to LWS and NSWP.

Specifically, all proposals must fulfill the following requirements:

- The science focus should address a problem poised for major advance. The deliverables to be developed must provide a transformative step toward achievement of LWS and

NWSP goals. The possible approaches to achieving the SC should yield the development of a model(s) used by a wide community and/or a deliverable clearly demonstrated to have a long term impact.

- A development and management plan must demonstrate how the deliverables will be developed and specifically how the results of current research, including that of LWS Focus Science Teams will be assimilated.
- The proposed development must integrate the science into one or more deliverables (e.g. models or tools) broadly useful to the larger community and that will be delivered to an appropriate repository or server site within the term of the project. The proposal must demonstrate the need and importance for the deliverable(s) by the scientific and operational communities.

## 2. Programmatic Information

Given the unique nature of the NASA/NSF Partnership for Collaborative Space Weather Modeling, proposal reviewers will include both scientific peers and knowledgeable representatives from the LWS/Space Weather user community. Proposals will be evaluated based on their relevance to the goals described in Section 1.2, feasibility, intrinsic scientific merit, and compliance with requirements listed in Section 1.2, including providing public access to the models, tools, and value-added products developed.

The total funding available in fiscal year (FY) 2013 for new proposals submitted in response to this solicitation is expected to be about \$4.0M. This funding is expected to support approximately *five to eight* awards. Proposals for efforts up to five years duration are allowed. It is anticipated that such proposals will be funded initially for three years; funding beyond 3 years will be contingent on demonstrated progress, and the proposals should outline a clear plan for the first three years and the final two.

NASA and NSF intend to fund appropriate proposals received from collaborations involving institutions that span the community including universities, Federally funded research and development centers, NASA centers, and others; collaborations between institutions of different types are encouraged.

The recommendation for funding will be based on the peer evaluation and the scientific and technical merit of each proposal, as well as the broader impacts of the activity, and relevance to LWS and NSWSP goals. NASA and NSF will jointly manage the review process, the selection process, and the administration of the program.

The NASA and NSF program officers will recommend for selection the proposals that best address the objectives of this solicitation within the resource constraints. The NASA and NSF program officers will also recommend the division of funding responsibilities between the two agencies. NASA and NSF intend to issue separate funding instruments for the research efforts that each agency supports. NASA and NSF reserve the option of funding co-investigator institutions either as a subaward of the principal investigator institution's award or as a separate award directly to the co-investigator institution. The NASA and NSF selections will be coordinated so that together they fund the selected research efforts through an appropriate

combination of awards. For NSF awards to be issued, selected proposals will be required to be resubmitted electronically through the NSF Fastlane system. Directions for this will be provided to affected investigators by NSF Program Officers following selection.

To facilitate the issuance of separate funding instruments by NASA and NSF, for each institutional partner that proposes a budget of \$100K or more within a multi-institutional collaboration, the proposal should identify a lead co-investigator, provide a statement of work, and provide a separate budget for that institutional partner.

The NASA Selection Official is the Director, Heliophysics Division, Science Mission Directorate. The NSF Selection Official is the Head, Geospace Sciences Section, Division of Atmospheric and Geospace Sciences, Directorate for Geosciences.

## 2.1 Proposal Requirements

Proposals to this solicitation are expected to satisfy the following requirements:

- The total award size for any proposal will not exceed \$1M per year, including NASA civil servant salaries, for a period of performance of up to five years. However, it is anticipated that, pending sufficient proposals of merit, five to eight new awards will be made at \$500-\$800k per year for a period of performance of up to five years.
- For each institutional partner that proposes a budget of \$100K or more within a multi-institutional collaboration, the proposal should identify a lead co-investigator, provide a statement of work, and provide a separate budget for that institutional partner.
- Proposals should provide a detailed (~1 page) description of how the proposed work will benefit the goals and objectives described in Section 1.2 and the timetable over which these benefits will accrue.
- The proposal must provide a set of clearly defined milestones and a description how and when these milestones will be accomplished.
- All models and software modules produced as a result of an NSF/NASA Partnership award must be submitted to an appropriate NSF and/or NASA modeling center, such as the Community Coordinated Modeling Center (<http://ccmc.gsfc.nasa.gov>). Other tools and products resulting from an NSF/NASA Partnership award should be considered for inclusion in NASA's Integrated Space Weather Analysis System (<http://iswa.gsfc.nasa.gov>).
- The proposal must include a description of how the resulting model(s) or other deliverables will be validated, documented, and made available to potential users.
- Proposals that request funding to support postdoctoral researchers must include a detailed (~1 page) description of the mentoring activities that will be provided for such individuals.

The program will provide links to the abstracts of all selected proposals and their annual progress reports, including developed and tested software and/or refined data products, at <http://lws-trt.gsfc.nasa.gov/>.

In addition to the regularly scheduled annual reports expected for any proposal selected in response to this opportunity, the Program Officers in the NASA LWS TR&T program and the NSF Geospace Sciences Section will conduct a comprehensive review of the milestones accomplished about two years after award initiation. At that time, and as directed by NASA HQ and NSF, each principle investigator will submit a detailed report to the LWS TR&T Program Officer (copy to the NSF/AGS Cognizant Officer) describing (1) progress to date, (2) problems encountered, and (3) plans for the remaining project period. Each principle investigator will present these results either on site or during a visit to NASA HQ and/or NSF. Consistent with their policy of routinely seeking council of the scientific community, NASA and NSF will invite appropriate members of the research and user community to review and comment upon this mid-term report. With the findings from these reviews, NASA and NSF will then provide opportunity to the PI teams to revise their plans when requesting continued funding for the continuation of the project.

## 2.2 Evaluation Criteria

Proposers are reminded that the evaluation criteria for this solicitation are given in the NASA [Guidebook for Proposers](#). These criteria are intrinsic merit, and cost realism and reasonableness. In addition to the factors given in the NASA Guidebook for Proposers, the evaluation criterion "intrinsic merit" specifically includes the intellectual merit of the proposed activity including consideration of the following questions: How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project including, if appropriate, the quality of prior work? To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to the necessary resources?

In addition to the factors given in the NASA Guidebook for Proposers, the evaluation criterion "relevance" specifically includes the broader impacts of the proposed activity, including consideration of the following questions: How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.). To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

### 3. Summary of Key Information

Expected total program budget for new awards:	~\$4.0 M
Number of new awards, pending sufficient proposals of merit:	~5-8
Maximum duration of awards	5 years
Supplemental EPO Eligibility	Yes, for awards >1 year; see Appendices E.5 and E.6
Due Date for Notice of Intent to Propose:	December 15, 2011
Due Date for Proposals:	March 15, 2012
Start Date for new Awards:	October 1, 2012 (required)
Page length for the central Science-Technical-Management section of proposal:	20 pp; see also Chapter 2 of Guidebook for Proposers Responding to NASA Research Announcements
Relevance	See section 2.2
Detailed instructions for the preparation and submission of proposals	See the <i>NASA Guidebook for Proposers</i> at <a href="http://www.hq.nasa.gov/office/procurement/nraguidebook/">http://www.hq.nasa.gov/office/procurement/nraguidebook/</a> .
Submission medium	Electronic proposal submission is required; no hard copy is required or permitted. See also Section IV of the <i>ROSES Summary of Solicitation</i> and Chapter 3 of the <i>2008 NASA Guidebook for Proposers</i>
Web site for submission of proposal via NSPIRES	<a href="http://nspires.nasaprs.com/">http://nspires.nasaprs.com/</a> (help desk available at <a href="mailto:nspires-help@nasaprs.com">nspires-help@nasaprs.com</a> or (202) 479-9376)
Web site for submission of proposal via Grants.gov	<a href="http://grants.gov">http://grants.gov</a> (help desk available at <a href="mailto:support@grants.gov">support@grants.gov</a> or (800) 518-4726)
Funding opportunity number for downloading an application package from Grants.gov	NNH11ZDA001N-LWSCSW

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