

A.3.3 GEOSPACE SCIENCE

1. Scope of Program

Proposers interested in submitting in response to this program element are encouraged to also read Section A.3.1 for an overview of the Sun-Earth Connection (SEC) Division of the NASA Office of Space Science.

The Geospace Sciences program element seeks to understand the region of space that surrounds and is influenced by the Earth and its magnetic field, beginning with the terrestrial neutral upper atmosphere, through the mesosphere and thermosphere, and extending outwards through the ionosphere and into and beyond the magnetosphere. This program also supports studies of similar phenomena and processes at other solar system bodies.

These studies enable the achievement of NASA's strategic goals and objectives to which all NASA research proposals are expected to demonstrate relevance, in particular the NASA Goals and Research Focus Area's (RFA's) as stated in the latest version of its Strategic Plan (see also the discussion in Section 1 of the *Summary of Solicitation* of this NRA). In the case of the Geospace Sciences program, proposals are expected to address one or more of the RFA's under Goal II for Sun Earth Connection (SEC) theme Science Objectives as given in Table 3 of the *Summary of Solicitation*, namely, to (1) Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments, and (2) Explore the fundamental physical processes of space plasma systems. These RFA's are:

- Goal II: SEC 1.c: Understand the response of magnetospheres and atmospheres to external and internal drivers;
- Goal II: SEC 2.a: Discover how magnetic fields are created and evolve and how charged particles are accelerated; and
- Goal II: SEC 2.b: Understand coupling across multiple scale lengths and its generality in plasma systems.

Therefore, all proposers to this program element are asked to state their perception of the relevance of their proposal in terms of the Goals, Science Objectives, and RFA's given in Table 3. The appropriate place for this statement of relevancy is in the introduction to the proposal's "Scientific/Technical/Management" section (see Section 2.3.5 in the *Guidebook for Proposers*). The index numbers in this table may be used to identify a specific RFA, for example, "Goal I, Sun-Earth Connection Theme, RFA 1(c)" or "Goal II, Astronomical Search for Origins, RFA 3(b)."

Priority for selection is given to those proposals that most clearly demonstrate the potential for making significant contributions in these areas, especially those demonstrating direct benefit to NASA future mission planning. It should be noted in this regard that the next two Solar Terrestrial Probes with Geospace focus are:

- the Magnetospheric MultiScale mission, whose primary objective is the understanding the fundamental processes of reconnection, and
- the Geospace Electrodynamic Connections mission, with a primary objective of understanding the coupling between the ionosphere/thermosphere system and the magnetosphere.

There are two components of the Geospace Science program element, Supporting Research and Technology (SR&T) and the Geospace Low Cost Access to Space (G/LCAS) programs. In Fiscal Year (FY) 2002, approximately two-thirds of the total funding supported SR&T investigations and one-third was invested in the G/LCAS program.

The Geospace Science SR&T component supports individual research tasks that employ a variety of research techniques in pursuit of Geospace program goals. Specifically, the Geospace Science SR&T program supports theoretical research, the development and exercise of models and simulations, and the analysis and interpretation of data for the purposes of identifying and understanding the physical processes important to geospace structure and dynamics. The development and testing of new instrument concepts, new observing techniques, new models, and/or new data analysis techniques that are pertinent to discipline goals are also supported. However, proposals for such efforts must provide an explanation of the relationship between such proposed efforts and clearly defined Geospace Science goals. The Geospace SR&T program supports the development of laboratory instrument prototypes, but not of flight hardware. The program does not support the routine, long-term gathering of observational data. The Geospace Science SR&T program annually supports ~100 awards, with an average annual funding of \$80K per award.

The G/LCAS program supports research in magnetospheric, ionospheric, thermospheric, and mesospheric physics that requires the space-flight of instrumentation. The program offers a variety of methods for providing low cost access to space, including standard and long-duration balloons, sounding rockets, Shuttle-based carriers, the International Space Station, and sounding rocket-class payloads flown as secondary payloads or on other flights of opportunity. The G/LCAS program annually supports approximately 15 investigations, each with an average annual funding of \$250-300K per investigation.

It is equally important to note the types of research not covered by this program element, as follows:

- Efforts focused on the science of those particular aspects of the Sun-Earth system that directly affect life and society are not appropriate for the Geospace Sciences program, but may be submitted to the Living with a Star program (see Appendix A.3.6 of this NRA).
- Proposals for efforts intended to maximize the return from ongoing SEC missions that heavily utilize mission specific data from operating spacecraft are more appropriate for the SEC Guest Investigator program (see Appendix A.3.5).

- Proposals with the intent of extending or supplementing investigations selected for current approved space flight missions are not appropriate for this NRA.
- Some areas of study within the Sun-Earth Connection theme overlap with research objectives supported by other OSS disciplines. In particular, proposals dealing with the following disciplines are outside the purview of the Geospace program: the interaction of the solar wind and/or magnetospheric plasmas with solid body surfaces, the neutral components of planetary toruses, rings, and/or atmospheres of extra-terrestrial planets; and the chemistry and/or dynamics of the lower, neutral terrestrial atmosphere (i.e., below the mesosphere).

2. Programmatic Information

2.1 Geospace Supporting Research and Technology

In past years, SR&T programs have permitted grants to be made separately to the Principal and Co-Investigators of the same investigation, but at different institutions, in order to avoid the overhead costs associated with subcontracts. However, this practice has been discontinued except in those unique cases where a Co-Investigator is affiliated with a U.S. Government Laboratory (see the *Guidebook for Proposers*), in which case NASA separately funds that Co-Investigator through a direct transfer of funds. Separate Co-Investigator awards are also permitted in the LCAS program discussed below. In all other cases the PI institution is expected to fund any participating Co-I(s).

2.2 Geospace/Low Cost Access to Space (LCAS)

Proposers may submit budgets for up to three years to cover a complete suborbital investigation, including payload construction, launch phase, and data analysis.

It is necessary to minimize the operational costs to NASA for payload preparation and field operations for its Research Carriers programs. Investigators are, therefore, strongly encouraged to propose investigations that minimize these operational factors, especially with regard to payload complexity and nontraditional launch sites. Therefore, all those who intend to propose to the G/LCAS program are strongly urged to discuss prospective investigations with operations personnel at the NASA Wallops Flight Facility to ensure that probable operational costs are properly anticipated. Questions concerning sounding rockets may be addressed to:

Mr. Philip Eberspeaker
Sounding Rocket Program Office
Code 810
Wallops Flight Facility
National Aeronautics and Space Administration
Wallops Island, VA 23337
Telephone: (757) 824-2202
E-mail: Philip.J.Eberspeaker@nasa.gov

Proposers anticipating the use of balloon payloads should be aware that the balloon operations budget is under severe pressure and has recently been able to support only a fraction of anticipated flights. It is therefore particularly important that prospective balloon PI's contact balloon operations personnel. Questions concerning balloon operations may be addressed to:

Mr. I. S. Smith
Code 820
Wallops Flight Facility
National Aeronautics and Space Administration
Wallops Island, VA 23337
Telephone: (757) 824-1453
E-mail: Ira.S.Smith@nasa.gov

Sounding Rocket Launch Sites. The two standard U.S. launch sites for sounding rockets are White Sands Missile Range (WSMR), New Mexico, and Wallops Island, Virginia. Although launches from Poker Flat Rocket Range (PFRR) in Alaska require support from mobile launch crews, they do not require separate "campaign" proposals (see below). However, prospective proposers should be aware that PFRR is not open for operations every year; current plans call for PFRR to be open during the winter of 2002-03 and then closed in the winter of 2003-2004. Also, campaign proposals are not required for the use of the established non-U.S. launch sites at Andoya and Svalbard, Norway, or Kiruna, Sweden. Finally, prospective investigators should note that NASA sounding rocket flights from WSMR require the payment by NASA of significant fees. While the current operations budget contains sufficient funds to support a small number of flights from WSMR every year, it is difficult to accommodate investigations with extended launch windows at WSMR.

Campaigns for Multiple Launches. In addition to flights from WSMR, Wallops Island, and PFRR, the G/LCAS program has historically been able to support up to one campaign per year consisting of a series of rockets flown from a common but nonstandard launch location. Campaigns are usually planned several years in advance. The currently scheduled campaigns are for PFRR during the winter of 2002-2003 and for Punta Lobos, Peru, in the spring of 2004.

In proposing for a campaign, the following protocol must be followed:

- A Campaign Scientist must submit a "Campaign Summary" proposal describing the overall effort and listing prospective investigations that address the rationale for requesting the proposed launch site; the desired launch time, and/or other special launch conditions (Moon-down, night time, etc.); any expected non-U.S. involvement; required ground and/or airplane support; and any other information that defines the overall scope of the proposed campaign.
- Each investigator who wishes to participate in a campaign must submit a separate investigation proposal, each of which will be independently reviewed. Clear cross-reference must be made to the Campaign proposal on the proposal Cover Page .

Proposals from Multiple Institutions. Proposals to this program often involve the development of payloads that require collaboration among several institutions. In such cases, the lead PI may propose a direct subcontracting arrangement between the PI institution and the Co-I institutions. In some cases, it may be more appropriate for NASA to provide separate awards to each institution involved in such multiple institutional investigations, with an investigator from each Co-Investigator institution serving as the Institutional PI for the award to that institution (see the *NASA Guidebook for Proposers*, Chapter 1). The following applies to proposals involving such separately funded contributions from multiple institutions.

- Only the primary proposal for the overall investigation, submitted by the single Principal Investigator, will be reviewed. This primary proposal must include the PI's work statement and budget, plus appended task statements and budgets from all other collaborating Co-I institutions. The Cover Page of the primary proposal must show separately the dollar amounts requested by the leading institution and each Co-I institution, plus the yearly total requests for the total investigation.
- The appended task statement(s) from Co-I collaborating institution(s), not to exceed five pages, must describe that institution's contribution to the investigation, the roles of the Co-I(s) at that institution (if more than one, a single investigator to serve as the Institutional PI for that institution must be identified), and a Budget Summary for the task following the formats specified in the *NASA Guidebook for Proposers*.
- Each Co-I institution must additionally submit a formal, signed proposal incorporating the task statement noted above, all prefatory materials indicated in the *NASA Guidebook for Proposers*, and a full institutional budget. Such Co-I proposals must be clearly cross-referenced on the *Cover Page* to the lead PI proposal and must have the same title as the PI proposal.

G/LCAS program proposals selected under this NRA will be phased into the program as rapidly as resources permit. As a rule, new investigations are awarded definition-level funding in their first year, full funding for development in their second year, leading to flight early in their third year, which concludes with data analysis.

Owing to the larger scope and personnel involvement in G/LCAS proposals, the page limit for the Science/Technical/Management Section given in the *NASA Guidebook for Proposers* is revised from the default standard of 15 pages to 20 pages.

3. Programmatic Information

Total funding for the Geospace Sciences program is nominally \$12M per year. It is anticipated that approximately one third of this funding will be available for competition in FY 2004.

IMPORTANT INFORMATION

- As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) now uses a unified set of instructions for the preparation and submission of proposals given in the document entitled *NASA Guidebook for Proposers Responding to NASA Research Announcement - 2003* (or *NASA Guidebook for Proposers* for short) that may be accessed by opening <http://research.hq.nasa.gov/> and linking through "Helpful References," or by direct access at <http://www.hq.nasa.gov/office/procurement/nraguidebook/> (note that the updated 2003-edition of the *Guidebook* is used for this solicitation).
- Section 6 of this NRA's *Summary of Solicitation* contains the Web address relevant to the electronic submission of a Notice of Intent (NOI) to propose and a proposal's *Cover Page/Proposal Summary/Budget Summary*, as well as the mailing address for the submission of the hard copies of a proposal.

Questions about this program element may be directed to the cognizant Program Officer:

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