

A.3.6 SUN-EARTH CONNECTION INSTRUMENT DEVELOPMENT

1. Scope of Program

The Sun-Earth Connection (SEC) Instrument Development (SECID) program supports the development of spacecraft-based instrument technologies that shows promise for use in scientific investigations on future SEC missions. The goal of the program is to define and develop scientific instruments and/or components of such instruments to the point where complete instruments may be proposed in response to future announcements of flight opportunity without additional extensive technology development. Note that the instrument technology development proposed through this program must address specific scientific objectives of candidate SEC future missions. Wholly new measurement concepts may be proposed, as well as methods to significantly improve the performance of existing instruments and/or the development of technologies that enable the packaging of multiple instruments in order to minimize the need for spacecraft resources (e.g., volume, power, telemetry, and mass).

Instrument definition and development studies may be proposed that take place at several stages, ranging from feasibility studies of entirely new instruments, to conceptual design, to laboratory breadboarding of critical components and/or complete instruments. For immature or very complex new instruments, proposers initially may choose to propose only to define or develop only the most risky components by way of a proof-of-concept, then to follow with proposals for the next stage. However, in all cases of component-only development, one or more likely scenarios for possible follow-on instrument development should also be described. Regardless of the type of proposed effort, the scientific objectives of those instruments and future candidate missions must be discussed in the proposal; proposals that do not demonstrate how their development studies could be used to attack contemporary issues in the SEC sciences will be considered nonresponsive to this solicitation.

Proposals for the development of new instruments for missions already selected for flight or selected for Explorer Phase A study and/or development are not appropriate for this SECID program and will be returned without review.

2. SEC Future Missions

Owing to the immediacy and high priority of certain key flight mission opportunities, only proposals for instrument definition and development for the following future mission programs will be considered for funding through this SECID program.

- Explorer Program

The Explorer program seeks to provide a continuing opportunity for quickly implemented space flight mission that conduct focused investigations that complement major flight missions, prove and explore new scientific concepts, and/or make other significant

contributions to space science (reference <http://explorers.gsfc.nasa.gov/index.html>). The Explorer program is open only for investigations that study the (1) Sun, (2) the space environment of the Earth and other planets, and (3) the universe beyond our Solar System. Proposals for instrumentation necessary to address the first two of these goals are appropriate for the SECID program.

- Solar Terrestrial Probes

The Solar Terrestrial Probe (STP) program science objectives are directly tied to the quests in the SEC theme and each mission responds to one or more of the following objectives:

- To describe the system behavior of the magnetic variable star, our Sun, and its interaction with the entire solar system
- To understand the critical physics that link the Sun, Earth, and the interstellar medium
- To understand the boundary processes and dynamics of geospace, the electrical-plasma environment between the Sun and the Earth

The science investigation instruments for the first three STP missions (TIMED, Solar-B, and STEREO) have already been selected, so instrument development for these missions may not be proposed for this SECID program. In addition, owing to the anticipated near-term release of an Announcement of Opportunity (AO) for science investigations for the STP Magnetosphere MultiScale (MMS) mission, proposals for instrumentation relevant to this mission may not be proposed to this NRA. However, proposals are welcome for definition of instruments relevant to subsequent STP missions such as the Global Electrodynamics Connections (GEC) mission (reference the GEC Science and Technology Definition Team (STDT) Report at http://stp.gsfc.nasa.gov/missions/gec/gec_STDT_report.htm), the Magnetospheric Constellation (MC) mission (reference the MC STDT Report at http://stp.gsfc.nasa.gov/missions/mc/mc_news_page.htm), and other possible STP missions envisioned in the SEC Roadmap, Strategic Planning for 2000-2025, at <http://www.lmsal.com/sec/>.

- Living With a Star

The Living With a Star (LWS) program is a research program targeted to understand the cause-and-effect relationships between events at the Sun and their effects on life on Earth, and humanity's technological systems (reference <http://lws.gsfc.nasa.gov/>). The mission categories envisioned for LWS include the Solar Dynamics Observatory (SDO), a Geospace Missions Network, and the Solar Sentinels. An AO for SDO science investigations has been released, while mission definition is still in process for the Geospace and Sentinels components of this program. A separately funded LWS Instrument Development program is offered in Section A.3.8 of this NRA, therefore proposals for LWS instrumentation are not solicited for this SECID program.

3. Programmatic Information

Proposals are solicited under this NRA for instrument definition and development only for the missions or classes of missions described in Section 2 above. All proposals submitted to the SECIDP program must specify the science objectives of the proposed instrumentation. The relationship between the science objectives and the instrumental capabilities must be clearly demonstrated. For those instruments applicable to many missions or capable of meeting multiple science objectives, examples of science objectives for the proposed mission or missions should be given.

It is anticipated that the scientific payloads on most future Sun-Earth Connection missions will be limited to small, low mass, low power consumption, and low cost instruments. For this reason, proposals for instrument definition and development satisfying these general specifications are especially solicited. Proposals should clearly demonstrate what technical advances would result (e.g. instrument sensitivity, resource requirements, survivability) and what new science might be enabled relative to current instrumentation, if funded.

It should be noted that the contemplated sequence of missions described in this NRA is a best current estimate and is subject to change. NASA reserves the right to make a determination of relevance based on the contemplated sequence of missions, as it is understood at the time of proposal evaluation and selection.

4. Programmatic Information

Proposals may specify periods of performance of up to three years. It is expected that there will be approximately \$1M available in Fiscal Year 2003 to support up to about five proposals of acceptable merit.

IMPORTANT INFORMATION

As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) is now using a single, unified set of instructions for the submission of proposals. This material is contained in the document entitled *NASA Guidebook for Proposers Responding to NASA Research Announcement – 2001* (or *NASA Guidebook for Proposers* for short) that is accessible by opening URL <http://research.hq.nasa.gov>, and linking through the menu item "Helpful References," or may be directly accessed online at URL <http://www.hq.nasa.gov/office/procurement/nraguidebook/>. This NRA's Summary of Solicitation also contains the schedule and instructions for the electronic submission of a *Notice of Intent* (NOI) to propose and a proposal's *Cover Page/Proposal Summary*, which now also includes the required *Budget Summary*, and the mailing address for the submission of a proposal.

As a modification to the default specification in the *Summary of Solicitation* of this NRA, 18 copies of the proposal are required instead of 15, plus the signed original.

Questions about this program element may be directed to either of the cognizant Discipline Scientists:

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