

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)
HEADQUARTERS
OFFICE OF SPACE SCIENCE
300 E STREET SW
WASHINGTON, DC 20546-0001**

**RESEARCH OPPORTUNITIES IN SPACE SCIENCE – 2004
(ROSS-2004)**

**NASA RESEARCH ANNOUNCEMENT (NRA)
SOLICITING BASIC RESEARCH PROPOSALS**

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CATALOG OF FEDERAL DOMESTIC ASSISTANCE (CFDA) NUMBER: 00.000

ISSUED: JANUARY 30, 2004

**PROPOSALS DUE
STARTING MARCH 26, 2004,
THROUGH MARCH 11, 2005**

SYNOPSIS

This NASA Research Announcement (NRA), entitled *Research Opportunities in Space Science (ROSS) – 2004*, solicits basic research in support of the space science missions of the Office of Space Science (OSS), National Aeronautics and Space Administration. This NRA's programs cover all aspects of basic and applied supporting research and technology, including, but not limited to: theory, modeling, and analysis of OSS science data; suborbital rocket and stratospheric balloon investigations; development through the brass-board stage of experiment techniques suitable for space missions of all types; development of techniques for, as well as the laboratory analysis of, extraterrestrial samples returned by spacecraft; laboratory determination of atomic and composition parameters needed to analyze space data and returned samples; ground-based observations that directly support OSS space science missions; development of concepts for future OSS space missions; technology development for nuclear and electric propulsion and energy conversion systems suitable for OSS science missions; and the development of applied information systems applicable to OSS objectives and data.

Awards range from under \$100K per year for focused, limited efforts to more than \$1M per year for extensive activities. The total funds available for each solicited program range from less than one to several million dollars, which allow selection from a few to as many as several dozen proposals depending on the program objectives and the submission of proposals of merit.

Awards will be made as grants, cooperative agreements, contracts, or inter- or intra-Government transfers depending on the nature of the proposing organization and/or program requirements. The typical period of performance for an award is three years, although a few programs may specify shorter or longer (up to five years) periods. Organizations of every type, domestic and foreign, Government and private, for profit and nonprofit, may submit proposals without restriction on the number or teaming arrangements. Cost sharing is encouraged but not required.

Education and Public Outreach (E/PO) is an important objective of NASA and OSS.

Therefore, every proposer selected for an award through this NRA is invited and encouraged to submit an ancillary proposal for a modest (=\$15K/year) E/PO activity to be carried out during the award's period of performance.

Details of the solicited programs are given in Appendices A, B, C, and D of this NRA, and the proposals due dates are given in its *Summary of Solicitation*. Proposals submitted after these dates will be considered late and handled in accordance with NASA FAR Supplement 1852.235-72(g). If such proposals are not accepted for review they may be submitted for appropriate future solicitations. Interested proposers should monitor the Web address http://research.hq.nasa.gov/code_s/open.cfm for this solicitation for additional programs that may be added as amendments anytime during the period from its release date through January 2005, by which a new ROSS NRA is planned for release.

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**RESEARCH OPPORTUNITIES IN SPACE SCIENCE – 2004
(ROSS–2004)**

SUMMARY OF SOLICITATION

I. FUNDING OPPORTUNITY DESCRIPTION

(a) Introduction and Background

The National Aeronautics and Space Administration’s (NASA) Vision,

To improve life here, to extend life to there, and to find life beyond,
and its Mission,

To understand and protect our home planet,

To explore the Universe and search for life, and

To inspire the next generation of explorers

...as only NASA can,

allow the objectives and goals of the NASA Space Science Enterprise to be clearly defined as the orderly pursuit of two key strategic goals (see Table 1 below): (i) To understand the Earth system and apply Earth system science to improve prediction of climate, weather, and natural hazards, and (ii) To explore the solar system and the Universe beyond, understand the origin and evolution of life, and search for evidence of life elsewhere. Further valuable, in depth insight into these objectives may be found in the following documents:

- NASA Policy Directive (NPD) 1000.1, “NASA 2003 Strategic Plan,” at http://ifmp.nasa.gov/codeb/docs/2003_Strategic_Plan.pdf, and
- *Space Science Enterprise 2003 Strategy*, accessed through the links “Administration → Publications” from the OSS homepage at <http://spacescience.nasa.gov>.

With the concentrated assistance of members of the science communities and its advisory committees, these strategic goals have been further defined by a series of Science Objectives and Research Focus Areas (RFAs) as shown in Table 1 below. (Note: these Science Objectives and RFAs are also used to assess NASA’s research progress for compliance with the *Government Performance Review Act* (GPRA) of 1993). Therefore, proposers to this NRA are expected to provide a short statement in their proposals that shows how their proposed research activities support one or more of these Science Objectives and their related RFAs (further instructions concerning this issue are provided in the first section of every program given in Appendices A, B, C, and D of this solicitation).

In order to pursue these research goals, NASA’s Office of Space Science (OSS) focuses on four defined Science Themes:

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- *Astronomical Search for Origins and Planetary Systems* (ASO) that addresses the origins of galaxies, stars, proto-planetary and extra-solar planetary systems, Earth-like planets, and the origin of life;
 - *Exploration of the Solar System* (ESS) that seeks to understand all aspects of our Solar System, including the planets, satellites, small bodies, and Solar System materials, and the search for possible habitats of life beyond Earth, especially on Mars;
 - *Structure and Evolution of the Universe* (SEU) that involves the study of cosmology, the large scale structure of the Universe, the evolution of stars and galaxies, including the Milky Way and objects with extreme physical conditions, and an examination of the ultimate limits of gravity and energy in the Universe; and
 - *The Sun-Earth Connection* (SEC) that concerns the Sun as a typical star and as the controlling agent of the space environment of the Solar System, especially the Earth.

OSS pursues these Themes using a wide variety of both space flight programs that enable the execution of remote-sensing and *in situ* investigations, as well as ground-based research activities. This current NASA Research Announcement (NRA), entitled *Research Opportunities in Space Science (ROSS)-2004*, solicits proposals for the second of these two, in particular, Supporting Research and Technology (SR&T) investigations that seek to understand naturally occurring space phenomena, and space science-related technologies. Proposals in response to this NRA should be submitted to the most relevant science programs given in Appendices A, B, C, and D (see also the *Table of Contents* that prefaces this NRA). Table 3 below lists these programs in the order of their deadlines for the submission of proposals, while Table 4 lists them in the order in which they appear in the Appendices. Tables 3 and 4 also cross-reference these programs to the four OSS Science Themes noted above. Questions about these programs may be directed to the Program Officer(s) identified in the *Programmatic Information* section that concludes each one.

For management of these research programs, OSS is organized into three scientific Divisions,

- Astronomy and Physics (ASO and SEU Science Themes),
- Solar System Exploration (ESS Science Theme), and
- The Sun-Earth Connection (SEC Science Theme),

plus a Nuclear Systems Program whose goal is the technology development of the advanced nuclear and electric power systems needed to enable a future Project Prometheus ESS Jupiter Icy Moons Orbiter (JIMO) mission.

Appendices A, B, and C are managed by these three Science Divisions, respectively, while Appendix D contains interdisciplinary programs relevant to two or more of these science Divisions, including those for Project Prometheus programs. Each of these four Appendices is

prefaced with an *Overview* section that provides an introduction to its program content that all interested applicants to this NRA are encouraged to read.

(b) Opportunity for Education/Public Outreach

As noted in Section I(a) above, one of the three core missions of NASA is “...to inspire the next generation of Explorers as only NASA can.” As part of its response to this mandate, OSS is committed to fostering the broad involvement of the space science research community in Education and Public Outreach (E/PO) with the goal of enhancing the nation’s formal education system and contributing to the broad public understanding of science, mathematics, and technology. Progress towards achieving this goal has become an important part of the broad justification for the public support of space science. In addition, an enhanced, coordinated Agency-level education program is now being undertaken through the new NASA Office of Education that constitutes the Agency’s sixth enterprise. NASA’s Education objectives, and the OSS areas of emphasis in E/PO directed towards meeting those objectives, are given in Table 2 below.

As a consequence of the plans and policies that have been established and implemented over the past several years, a significant national OSS E/PO program is now underway as described in the OSS E/PO *Newsletters* and the *Annual Reports* that may be accessed by opening the “Education” link on the OSS homepage at <http://spacescience.nasa.gov>. This site also provides access to the two key documents that establish the basic policies and guidance for all OSS E/PO activities:

- *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA’s Space Science Programs* (March 1995), and
- *Implementing the Office of Space Science Education/Public Outreach Strategy* (October 1996).

Additional information concerning NASA Education and Public Outreach may be found in the *NASA Education Enterprise Strategy* (October 2003) at http://education.nasa.gov/education_strategy.pdf and the *Space Science Enterprise Strategy* (October 22003) at <http://spacescienc.nasa.gov/admin/pubs/index.html>. These documents may also be obtained in hard copy from Dr. Jeffrey D. Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington DC 20546; E-mail: Jeffrey.D.Rosendhal@nasa.gov. The policies given below, first implemented in 2001, have proven successful in decreasing the overall workload on the space science community, increasing the likelihood that more E/PO proposals of merit will be funded, and more effectively encouraging successful science proposers to add an E/PO component to their “parent” research investigations selected through OSS NRAs. In addition, OSS has worked to open up new avenues for E/PO participation for space scientists and to develop a variety of approaches that allows such contributions to be

recognized and acknowledged (details may be accessed through the Education web site indicated above).

The key elements of the current OSS E/PO program that apply to this NRA are as follows:

- An E/PO proposal may be submitted only by a proposer whose research proposal is selected for funding through this NRA (hereafter called the “parent award”), as well as those who hold a parent award selected through any previous OSS NRA that has >15 months remaining in its period of performance at the time of submission of the E/PO proposal;
- The cost cap for an E/PO proposal by an individual NRA investigator is \$15K/year;
- An "Institutional E/PO Proposal" option is available that allows several OSS-funded researchers located at the same institution to collectively carry out a more ambitious, expansive E/PO program, with a cap of = \$50K/year, not to exceed \$125K over the nominal three-year lifetimes of the parent awards;
- To ease the burden of NASA’s administration of such small supplemental awards, the total period of performance for any E/PO award is limited to that of its parent award (for an institutional award, this limit applies to the last expiring award involved in the consortium of proposing investigators); and
- A selected investigator has two windows of opportunity to submit an E/PO proposal: (i) no later than 60 days after the date of the letter of selection for the new award (which anticipates starting the E/PO activity early in the first year of the parent award); or (ii) not less than 90 days in advance of the yearly anniversary date of the parent award (which anticipates starting the E/PO activity at the time of the next yearly funding supplement for the parent award).

For further details and specific guidance and information on preparing and submitting a proposal for E/PO funding under this or any previous OSS NRA, access the Web site at <http://spacescience.nasa.gov/education/scientists/guidelines/index.html>. Questions and/or comments and suggestions about this OSS E/PO program are welcome and may be directed to the appropriate individuals designated below.

OSS Science Division (see <i>Table of Contents</i> for this NRA)	Name of E/PO Point of Contact at NASA HQ	Telephone	E-mail
Astronomy and Physics	Dr. Anita Krishnamurthi	(202) 358-3795	Anita.Krishnamurthi@nasa.gov
Solar System Exploration	Dr. Marilyn Lindstrom	(202) 358-1254	Marilyn.Lindstrom-1@nasa.gov
Sun-Earth Connection	Dr. Larry Cooper	(202) 358-1531	Larry.P.Cooper@nasa.gov
Interdisciplinary	Dr. Larry Cooper	(202) 358-1531	Larry.P.Cooper@nasa.gov

(c) NASA Safety Policy

All prospective proposers to this NRA are advised that the highest priority in all of NASA's programs is safety. Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA's safety priority is to protect: (i) the public, (ii) astronauts and pilots, (iii) the NASA workforce (including employees working under NASA award instruments), and (iv) high value equipment and property.

(d) Availability of Funds for Awards

Prospective proposers are advised that, in general, funds are not available for awards for all of the programs solicited through this NRA at the time of its release. The Government's obligation to make awards is contingent upon the availability of appropriated funds from which payment can be made and the receipt of proposals that NASA determines are acceptable for award under this NRA.

II. AWARD INFORMATION

(a) Funding Policies

- The amount of funds expected to be available for new awards for proposals submitted in response to this NRA is given in the subsection entitled *Programmatic Information* that concludes each program description in Appendices A, B, C, and D. Given the submission of proposals of merit, the number of awards that may be made for each program is also given in this location, as well as the typical maximum duration for awards (usually three years, although a few programs may specify less than one year for activities of limited scope to as long as five years for extensive, comprehensive studies).

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- In all cases, NASA’s “metric” goal is to initiate new awards within 46 days after the selection of proposals is announced for each program. However, this number may be longer based on the workload experienced by NASA, the availability of funds, and any necessary post-selection negotiations with the proposing organization(s) needed for the award(s) in question. In this latter regard, every proposer is encouraged to submit full and detailed explanations of the requested budget (see further below) to help expedite the processing of the award should their proposal be selected.
 - Principal Investigators holding previous awards selected through any of the programs offered through this NRA are encouraged and welcome to submit “successor proposals” that seek to continue a previously-funded line of research. However, it is OSS policy that successor proposals will compete without advantage or prejudice with new proposals that are submitted for that same program. Likewise, proposals that were submitted but not selected for a previous OSS solicitation may be submitted either as revised or in their original form; however, such submissions will compete without advantage or prejudice with new proposals that are received by NASA.
 - Awards made through this NRA may be in the form of grants, cooperative agreements, contracts, or intra- or inter-Government transfers depending on the nature of the submitting organization and/or the specific requirements for awards given in the *Programmatic Information* subsection of each program in the Appendices A, B, C, and D. A NASA awards officer will determine the appropriate award instrument for the selections resulting from this solicitation. Grants and cooperative agreements will be subject to the provisions of the *NASA Grants and Cooperative Agreement Handbook* (hereafter referred to as the *Handbook*, found at <http://ec.msfc.nasa.gov/hq/grcover.htm>). Contract awards will be subject to the provisions of the Federal Acquisition Regulations (FAR) and the NASA FAR Supplement (see <http://ec.msfc.nasa.gov/hq/library/v-reg.htm>)

III. ELIGIBILITY INFORMATION

(a) Eligibility of Applicants

Participation in this program is open to all categories of U.S. and non-U.S. organizations, including educational institutions, industry, nonprofit institutions, as well as NASA Centers, and other U.S. Government agencies. Historically Black Colleges and Universities (HBCUs), other minority educational institutions, and small businesses and organizations owned and controlled by socially and economically disadvantaged individuals or women are particularly encouraged to apply. Participation by non-U.S. organizations in this program is encouraged subject to NASA’s policy of no-exchange-of-funds. Further information on foreign participation is provided in Section (I) of Appendix B in the *NASA Guidebook for Proposers* (see Section IV(a) below for location reference). There is no restriction on the number of proposals that an organization may submit to this solicitation, or on the teaming arrangements for any one

proposal, including teaming with employees of NASA's Centers and the Jet Propulsion Laboratory.

(b) Cost Sharing or Matching

If an institution of higher education or other nonprofit organization wants to receive a grant or cooperative agreement, cost sharing is not required. However, NASA can accept cost sharing if it is voluntarily offered (see the *Handbook*, Section B, Provision 1260.123, "Cost Sharing or Matching," which describes the acceptable forms of cost sharing). If a commercial organization wants to receive a grant or cooperative agreement, cost sharing is required unless the commercial organization can demonstrate that they do not expect to receive substantial compensating benefits for performance of the work. If this demonstration is made, cost sharing is not required, but may be offered voluntarily (see Section D, Provision 1274.204, of the *Handbook* for more information).

IV. PROPOSAL AND SUBMISSION INFORMATION

(a) Source of Application Materials

All information needed to apply to this solicitation is contained in this announcement and in the companion document entitled *NASA Guidebook for Proposers Responding to a NASA Research Announcement – 2004* (hereafter referred to that the *NASA Guidebook for Proposers*) located at <http://www.hq.nasa.gov/office/procurement/nraguidebook/>. By reference, this 2004-edition of this *NASA Guidebook for Proposers* is incorporated into this NRA, and proposers are responsible for understanding and complying with its procedures for the preparation and submission of their proposals. Proposals that do not conform to its standards may be declared noncompliant and returned without review.

Note that both the introductory material and appendices of this *NASA Guidebook for Proposers* provide additional information about the entire NRA process, including NASA policies for the solicitation of proposals, guidelines for writing complete and effective proposals, and NASA's general policies and procedures for the review and selection of proposals, as well as for issuing and managing the awards to the institutions that submitted selected proposals. A group of *Frequently Asked Questions* (FAQs) provides additional miscellaneous information about a variety of the NASA proposal and award processes and procedures. The NASA policy for proposals involving non-U.S. participants is given in Section (I) of Appendix B of this *NASA Guidebook for Proposers*.

Comments and suggestions of any nature about this *NASA Guidebook for Proposers* are encouraged and welcome and may be directed at any time to Ms. Rita Svarcas, Office of Procurement, Code H, NASA Headquarters, Washington, DC 20546-0001; E-mail: Rita.Svarcas@nasa.gov.

(b) Content and Form of the Application Submission

(i) NASA Proposal Data System

This NRA requires that the proposer register key data concerning their intended submission with NASA's master proposal data base system located at the Web site <http://research.hq.nasa.gov>. Therefore, potential applicants are urged to access this site well in advance of the proposal due date(s) of interest (see further below) and familiarize themselves with its structure. It is especially important to note that every individual named on the proposal's *Cover Page* (see further below) must be registered in this NASA proposal data system and that such individuals must perform this registration themselves, i.e., no one may register a second party, even the Principal Investigator of a proposal in which that person is committed to participate. Note that the data entered into this data site are strictly for NASA's use only.

Requests for assistance in accessing and/or using this Web site may be directed by E-mail to <proposals@hq.nasa.gov>, Monday through Friday, 8:00 AM – 6:00 PM Eastern Time, or by telephone to (202) 479-9376. Frequently Asked Questions (FAQs) may be accessed through the Proposal Online Help site at <http://proposals.hq.nasa.gov/help/html>.

(ii) Notice of Intent to Propose

A Notice of Intent (NOI) to propose is encouraged but not required for the submission of proposals to this solicitation. The information contained in an NOI is used to help expedite the proposal review activities and, therefore, is of considerable value to NASA. To be of maximum value, NOIs should be submitted to NASA's master proposal data base located at <http://research.hq.nasa.gov> by the dates given in Tables 3 or 4 below for each program in Appendices A, B, C, and D (Note: interested proposers must register at this site before it can be accessed for use; see Section IV(b)(i) above). This site is open for the submission of NOIs typically from ~90 to ~60 days in advance of due date for the proposals themselves (see Tables 3 and 4 below). NOIs submitted after these deadlines are still useful and may be submitted as directed in Section 3.1 of the *NASA Guidebook for Proposers*.

(iii) Cover Page, Proposal Summary, and Budget Summary

All proposals submitted in response to this NRA must be prefaced with a required, contiguous proposal *Cover Page/Proposal Summary/Budget Summary* form that is accessed at <http://research.hq.nasa.gov>. This form may be accessed and submitted starting ~90 days in advance of the proposal due dates given in Tables 3 and 4 below and remains open until midnight Eastern Time on the due date for each program. After the requested data are electronically entered and submitted, the entirety of this form is to be printed and then signed by the designated personnel for submission with the required hard copies of the proposal. No

other formal forms are required for proposal submission. See the *NASA Guidebook for Proposers*, Chapter 2, for further details.

Prospective proposers are advised that the *Cover Page* requires that all applicants must provide the Dun and Bradstreet (D&B) Data Universal Numbering System (DUNS) number for their employing organization. This requirement applies to successor awards as well as to prospective new awards. The DUNS number is a unique nine-character identification number provided by the commercial company Dun and Bradstreet (D&B). Applicants may call D&B at 1-866-705-5711 to register and obtain a DUNS number, or access the D&B Website at <http://www.dnb.com/us/>. Requesting a DUNS number takes ~10 minutes by telephone or ~14 days through the Web site; both are free of charge. Organizations will use the same DUNS number with every proposal submitted for a Federal grant or cooperative agreement so that this registration need only be done one time. Note that the DUNS number is site-specific.

The *Cover Page* also requires a Commercial And Government Entity (CAGE) code that the applicant's organization obtains by registering in the Central Contractor Registration (CCR) database. This requirement centralizes information about grant recipients and provides a central location for grant recipients to change organizational information. Information for registering in the CCR and online documents can be found at <http://www.ccr.gov>. Before registering, applicants and recipients should review the *Central Contractor Registration Handbook* that is also located at the same site. The process for obtaining a CAGE code is incorporated into the CCR registration. (Note: The Office of Procurement at NASA Headquarters can also answer questions about the DUNS number and CCR registration; contact Ms. Rita Svarcas at (202) 358-0419 or by E-mail to <Rita.Svarcas@nasa.gov>.)

(iv) Proposal Format and Contents

Chapter 2 of the *NASA Guidebook for Proposers* provides detailed discussions of the content and organization of proposals suitable for all programs in this NRA, as well as the default page limits of a proposal's constituent parts. Note that a few of the programs in Appendices A, B, C, and D specify different page limits for the main body of the proposal; if so, these page limits will be prominently mentioned in the *Programmatic Information* subsection that concludes each program. In the event the information in this NRA is different or contradictory to the information in the *NASA Guidebook for Proposers*, the information in this NRA takes precedence.

(c) Proposal Submission Dates, Time, and Location

Regardless of the method of delivery, for each program in Appendices A, B, C, and D of this NRA the signed original proposal plus 15 printed copies (unless otherwise specified in the program of application) must be physically received by 4:30 PM Eastern time on the

appropriate Proposal Due Date given in Tables 3 or 4 below. Unless otherwise specified, the address for the delivery of proposals is:

Name of Program as it appears in Appendices A, B, C, or D

ROSS-2004 NRA

Office of Space Science

NASA Peer Review Services

Suite 200

500 E Street, SW

Washington, DC 20024

Telephone: (202) 479-9030

Proposals that are late will be handled in accordance with NASA's policy as given in Section (g) of Appendix B of the *NASA Guidebook for Proposers* (see also its Sections 3.2 and F.23). Proposals received after the due date may be returned without review. If a late proposal is returned, it is entirely at the discretion of the proposer to decide whether or not to submit it in response to a subsequent, appropriate solicitation.

(d) Proposal Funding Restrictions

- The *Programmatic Information* that concludes each program in Appendices A, B, C, and D provides an estimate of the funds expected to be available for competition through this NRA, as well as the approximate number of awards these funds are expected to support.
- The construction of facilities is not an allowed activity unless specifically stated so in the program description. For further information on the allowability of costs, refer to the cost principles cited in the *Handbook*, Section 1260.127.
- Travel, including foreign travel, is allowed as may be necessary for the meaningful completion of the proposed investigation, as well as for publicizing its results at an appropriate professional meeting.
- U.S. research award recipients may directly purchase of supplies and/or services that do not constitute research from non-U.S. sources, but award funds may not be used to fund research carried out by non-U.S. organizations. However, subject to possible export control restrictions, foreign nationals may conduct research while employed by a U.S. organization.
- Indirect, facilities, and administrative costs, including profit for commercial organizations, are allowed under contract awards only.
- Regardless of whether functioning as a team lead or as a team member, personnel from NASA Centers must propose budgets based on Full Cost Accounting (FCA). Non-NASA U.S. Government organizations should propose based on FCA unless no such

standards are in effect; in that case such proposers should follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board (for further information, see <http://www.hq.nasa.gov/fulcost/>).

V. PROPOSAL REVIEW INFORMATION

(a) Evaluation Criteria

Evaluation by peers of the proposing personnel will be used to assess each proposal's intrinsic scientific and technical merit, its relevance to NASA's stated objectives, and its cost realism and reasonableness. See Appendix C.2 of the *NASA Guidebook for Proposer* for further discussion of these criteria and their relative weights. Note the following specific points:

- Some of the Programs discussed in Appendices A, B, C, and D will give specific factors, based on the solicited research objectives, that will be considered when evaluating a proposal's science and technical merits.
- As discussed in Section I(a) above, relevance will be judged in part by the proposal's focus on specific *Science Objectives* and *Research Focus Areas* for OSS, as given in Table 1 below.
- Cost sharing is not part of the evaluation criteria; however, cost sharing may affect NASA's evaluation of the intrinsic merit of the proposal.

(b) Review and Selection Processes

Proposals submitted to this NRA will be reviewed and selected consistent with the policies and provisions given in Appendix C.3 and C.4 of the *NASA Guidebook for Proposers*. Selection procedures will be consistent with Section C.5 of the *NASA Guidebook for Proposers*. Unless otherwise specified, the OSS Division Director responsible for the program is its Selection Official. For some of the programs solicited in this NRA, a balance of efforts across the stated program objectives may play a role in the selections, taking into account not only the newly proposed efforts of merit that are suitable for selection but also those that are already in progress from earlier selections.

(c) Selection Announcement and Award Dates

NASA's stated goal is to announce selections within 150 days of the proposal due date. However, OSS does not usually announce new selections until the funds needed for awards are approved through the Federal budget process. Therefore, a delay in this process for NASA usually results in a delay of the selection date(s). After 150 days past the Proposal Due Date for which a proposal was submitted, proposers may contact the responsible Program Officer

listed at the conclusion of that program description in the Appendices for the status of the selection activity.

Those proposers not selected will be notified by mail and offered a debriefing consistent with the policy in Section C.6 of the *NASA Guidebook for Proposers*.

VI. AWARD ADMINISTRATION INFORMATION

(a) Notice of Award

Awards made through this NRA will be administered in accordance with the general policies given in Appendix D of the *NASA Guidebook for Proposers* and the *Handbook*. In the case of any conflict, the *Handbook* takes precedence. The type of award to be offered to selected proposers will generally follow the policies in Section D.1 of the *NASA Guidebook for Proposers*, although in a few cases, only contracts may be offered as specified in the Appendices.

Both the selected, as well as the nonselected proposers, will be notified consistent with the policy given in Section C.5.3 of the *NASA Guidebook for Proposers*. For selected proposers, the offeror's business office will be contacted by a NASA Awards Officer, who is the only official authorized to obligate the Government. Any costs incurred by the offeror in anticipation of an award will not be reimbursed.

(b) Administrative and National Policy Requirements

This solicitation does not invoke any special administrative or National policy requirements, nor do the awards that will be made involve any special terms and conditions that differ from NASA's general terms and conditions as given in the *Handbook*.

(c) Award Reporting Requirements

The reporting requirements for awards made through this NRA will be consistent with Exhibit G of the *Handbook*. Any additional requirements will be stated in the subsection entitled *Programmatic Information* that concludes each program in the Appendices.

VII. POINTS OF CONTACT FOR FURTHER INFORMATION

- General questions and comments about the policies of this NRA may be directed to:

Dr. J. David Bohlin
Deputy Associate Administrator for Science
Code S
Office of Space Science

National Aeronautics and Space Administration
Washington, DC 20546

Telephone: (202) 358-0880
E-mail: J.David.Bohlin@nasa.gov

- Questions about a specific program in the Appendices of this NRA should be directed to the Program Officer(s) listed in the subsection entitled *Programmatic Information* that concludes each program description.
- Inquiries about accessing or using the NASA proposal data base located at <http://proposals.hq.nasa.gov> should be directed by an E-mail that includes a telephone number to <proposals@hq.nasa.gov> or by calling (202) 279-9376. This help center is staffed Monday through Friday, 8:00 AM – 6:00 PM Eastern Time.

VIII. ANCILLARY INFORMATION

(a) Announcement of Updates/Amendments to Solicitation

Because this NRA is released far in advance of many of the deadlines given in Tables 3 and 4, additional programmatic information for any of its programs may develop before their Proposal Due Dates. If so, such information will be added as a formal Amendment to this NRA as posted at its home Web site no later than 30 days before the Due Date, or if this is not possible, the Due Date will be extended to allow 30 days. Although NASA OSS will also send an electronic notification of any such amendments to all subscribers of its electronic notification system (see item (c) below), it is the responsibility of the prospective proposer to check this NRA's Web site for updates concerning the program(s) of interest.

(b) Electronic Submission of Proposal Information

The electronic submission of the combined *Cover Page/Proposal Summary/Budget Summary* is required over the World Wide Web (see also Section IV(b)(iii) above). While every effort is made to ensure the reliability and accessibility of this Web site and to maintain a help center via E-mail and telephone, difficulty may arise at any point on the Internet, including the user's own equipment. Therefore, prospective proposers are urged to familiarize themselves with this site and to submit the required proposal materials well in advance of the deadline(s) of the program(s) of interest.

(c) Electronic Notification of OSS Research Solicitations

OSS maintains an electronic notification system to alert interested researchers of its research program announcements. Subscription to this service is free and is accomplished through the

menu item “*To subscribe to the OSS electronic notification system*” found on the OSS research page at http://research.hq.nasa.gov/code_s/code_s.cfm. Owing to the increasingly multidisciplinary nature of OSS programs, this E-mail service will notify subscribers of (i) all NASA OSS research program solicitations regardless of their type or science objectives; (ii) amendments to solicitations that have been released for which the proposal due dates have not passed; and (iii) special news that OSS wishes to communicate to those interested in proposing to its sponsored research programs. Altogether, a subscriber may receive 40 to 50 notifications per year. OSS maintains this subscription list in confidence and does not attempt to discern the identity of its subscribers. Regardless of whether or not this service is used, all OSS research announcements may be accessed from the menu listing *Current (Open) Solicitations* at the Web site above as soon as they are posted (typically by ~8:30 AM Eastern Time on their release date).

(d) Archives of Past Selections

For more information about the types of research supported by the Programs solicited in previous editions of this series of this ROSS NRA, refer to the abstracts for selected investigations available through the menu listing *Past/Archive Solicitations & Selections* at http://research.hq.nasa.gov/code_s/code_s.cfm.

IX. CONCLUDING STATEMENT

The interest and cooperation of the space science community of researchers in responding to this ROSS-2004 NRA for the Office of Space Science's Supporting Research and Technology programs are encouraged and welcome. These programs, while quite diverse in objectives and types, in fact form the foundation of both the basic and applied research that allows NASA's space science programs to be properly planned and carried through to the successful interpretation of data. In addition, comments about the inclusive nature and/or structure of this NRA are welcome and may be directed to the point of contact for general questions and comments identified in Section VII above.

Orlando Figueroa
Director
Solar System Exploration Division

Richard R. Fisher
Director
The Sun-Earth Connection Division

Anne L. Kinney
Director
Astronomy and Physics Division

Alan R. Newhouse
Director
Nuclear Systems Program

TABLE 1. OFFICE OF SPACE SCIENCE (OSS) STRATEGIC GOALS, SCIENCE OBJECTIVES, AND RESEARCH FOCUS AREAS (adapted From The *OSS Strategic Plan – 2003* and supporting OSS “Roadmaps”)

• **Mission Statement: *To Understand and Protect our Home Planet***

Strategic Goal I: Understand the Earth system and apply Earth system science to improve prediction of climate, weather, and natural hazards.

OSS Theme	Science Objectives	Research Focus Areas
Sun-Earth Connection	1. Understand the origins and societal impacts of variability in the Sun-Earth Connection.	(a) Develop the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect the Earth. (b) Specify and enable prediction of changes to the Earth’s radiation environment, ionosphere, and upper atmosphere. (c) Understand the role of solar variability in driving space climate and global change in the Earth’s atmosphere.
Solar System Exploration	1. Catalog and understand potential hazards to Earth from space.	(a) Determine the inventory and dynamics of bodies that may pose an impact hazard to Earth. (b) Determine the physical characteristics of comets and asteroids relevant to any threat they may pose to Earth.

• **Mission Statement: *To Explore the Universe and Search for Life***

Strategic Goal II: Explore the Solar System and the Universe beyond, understand the origin and evolution of life, and search for evidence of life elsewhere.

OSS Theme	Science Objectives	Research Focus Areas
Sun-Earth Connection	1. Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.	(a) Understand the structure and dynamics of the Sun and solar wind and the origins of magnetic variability. (b) Determine the evolution of the heliosphere and its interaction with the galaxy. (c) Understand the response of magnetospheres and atmospheres to external and internal drivers.

(Continued next page)

OSS Theme	Science Objectives	Research Focus Areas
(Continued) Sun-Earth Connection	2. Understand the fundamental physical processes of space plasma systems.	(a) Discover how magnetic fields are created and evolve and how charged particles are accelerated. (b) Understand the coupling across multiple scale lengths and its generality in plasma systems.
Solar System Exploration	1. Learn how the Solar System originated and evolved to its current diverse state.	(a) Understand the initial stages of planet and satellite formation. (b) Study the processes that determine the characteristics of bodies in our Solar System and how these processes operate and interact. (c) Understand why the terrestrial planets are so different from one another. (d) Learn what our Solar System can tell us about extra-solar planetary systems.
	2. Determine the characteristics of the Solar System that led to the origin of life.	(a) Determine the nature, history, and distribution of volatile and organic compounds in the Solar System. (b) Identify the habitable zones in the Solar System.
	3. Understand how life begins and evolves.	(a) Identify the sources of simple chemicals that contribute to prebiotic evolution and the emergence of life. (b) Study Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere.
	4. Understand the current state and evolution of the atmosphere, surface, and interior of Mars.	(a) Characterize the present climate of Mars and determine how it has evolved over time. (b) Investigate the history and behavior of water and other volatiles on Mars. (c) Study the chemistry, mineralogy, and chronology of martian materials. (d) Determine the characteristics and dynamics of the interior of Mars.
	5. Determine if life exists or has ever existed on Mars.	(a) Investigate the character and extent of prebiotic chemistry on Mars. (b) Search for chemical and biological signatures of past and present life on Mars.
	6. Develop an understanding of Mars in support of possible future human exploration.	(a) Identify and study the hazards that the martian environment will present to human explorers. (b) Inventory and characterize martian resources of potential benefit to human exploration of Mars.

– Continued –

Theme	Science Objectives	Research Focus Areas
Astronomical Search for Origins	1. Understand how today's Universe of galaxies, stars, and planets came to be.	(a) Learn how the cosmic web of matter organized into the first stars and galaxies and how these evolved into the stars and galaxies we see today. (b) Understand how different galactic ecosystems of stars and gas formed and which ones might support the existence of planets and life.
	2. Learn how stars and planetary systems form and evolve.	(a) Learn how gas and dust become stars and planets. (b) Observe planetary systems around other stars and compare their architectures and evolution with our own.
	3. Understand the diversity of other worlds and search for those that might harbor life.	(a) Characterize the giant planets orbiting other stars. (b) Find out how common Earth-like planets are and see if any might be habitable. (c) Trace the chemical pathways by which simple molecules and dust evolve into the organic molecules important for life. (d) Develop the tools and techniques to search for life on planets beyond our Solar System.
Structure and Evolution of the Universe	1. Discover what powered the Big Bang and the nature of the mysterious dark energy that is pulling the Universe apart.	(a) Search for gravitational waves from the earliest moments of the Big Bang. (b) Determine the size, shape, and matter-energy content of the Universe. (c) Measure the cosmic evolution of the dark energy, which controls the destiny of the Universe.
	2. Learn what happens to space, time, and matter at the edge of a black hole.	(a) Determine how black holes are formed, where they are, and how they evolve. (b) Test Einstein's theory of gravity and map space-time near event horizons of black holes. (c) Observe stars and other material plunging into black holes.

	<p>3. Understand the development of structure and the cycles of matter and energy in the evolving Universe.</p>	<p>(a) Determine how, where, and when the chemical elements were made, and trace the flows of energy and magnetic fields that exchange them between stars, dust, and gas.</p> <p>(b) Explore the behavior of matter in extreme astrophysical environments, including disks, cosmic jets, and the sources of gamma-ray bursts and cosmic rays. Discover how the interplay of baryons, dark matter, and gravity shapes galaxies and systems of galaxies.</p>
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TABLE 2. NASA EDUCATION AND PUBLIC OUTREACH STRATEGIC GOALS, OBJECTIVES, AND FOCUS AREAS.

NASA Mission Statement: To Inspire the Next Generation of Explorers

NASA Strategic Goal 6: Inspire and motivate students to pursue careers in science, technology, engineering, and mathematics.

NASA Objectives	OSS Areas of Emphasis
1. Increase the number of elementary and secondary students and teachers who are involved in NASA-related education opportunities.	a) Provide opportunities for students to work directly with NASA space science missions, facilities, and data. b) Take advantage of the advanced-technology nature of the space Science Enterprise’s programs to develop new materials and new programs in technology education
2. Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers.	Continue to contribute to the professional training of scientists by supporting research assistantships and postdoctoral opportunities offered through Space Science Enterprise research awards and through other NASA research and higher education programs.
3. Increase the number and diversity of students, teachers, faculty, and researchers from underrepresented and underserved communities in NASA-related science, engineering, mathematics, and technology (STEM) fields.	Increase opportunities of diverse populations to participate in space science missions, research, and education and outreach programs: a) Continue and expand our efforts to develop space science capabilities at minority institutions. b) Develop and enhance partnerships with special interest organizations such as professional societies of minority scientists. c) Develop working partnerships and coordinate with the diversity initiatives of scientific professional societies. d) Extend the accessibility of space science E/PO programs and products to an increasingly broad population, including girls, residents of rural areas, and persons with disabilities.
4. Increase student, teacher, and public access to NASA education resources via the establishment of e-Education as a principal learning support system.	Improve the coherence of NASA space Science materials for educators by building a framework that will show the appropriate standards-aligned sequencing of space science topics throughout the K–12 years for the materials being produced by individual missions.

–Continued–

NASA Strategic Goal 7: Engage the public in shaping and sharing the experience of exploration and discovery.

NASA Objectives	OSS Areas of Emphasis
<p>1. Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.</p> <p>a) Improve science literacy by engaging the public in NASA missions and discoveries, and their benefits, through such avenues as public programming, community outreach, mass media, and the Internet.</p>	<p>a) Build on strong mutual interests between the Space Science Enterprise and the science center, museum, and planetarium communities by continuing to provide space science content, materials, and technical expertise to support the development of exhibitions and programs.</p> <p>b) Seek out and capitalize on special events and particularly promising opportunities in our scientific program to involve the public in the process of scientific discovery and to use space science to improve STEM education at all levels.</p> <p>c) Enrich the science, mathematics, engineering, and technology education efforts of community groups such as the Girl Scouts, 4-H Clubs, and Boys and Girls Clubs through the introduction of space science.</p>

**TABLE 3. SCIENCE PROGRAM ELEMENTS SOLICITED IN THE ROSS-2004 NRA
(IN ORDER OF PROPOSAL DUE DATES)**

NRA Appendix	Science Program Element (see Appendices A, B, C, and D)	NOI Due Date [M/D/Y]	Proposal Due Date [M/D/Y]	Relevant OSS Science Themes [1]			
				ASO	SEU	ESS	SEC
B.16	Mars Instrument Development	Not solicited this year.				X	
C.6	Sun-Earth Connection Instrument Development	Not solicited this year.					X
B.17	Discovery Data Analysis	2/20/04	3/26/04			X	
B.15	Mars Fundamental Research [2]	2/25/04	4/09/04			X	
A.5	Astronomy and Physics Research and Analysis	2/27/04	4/16/04	X	X		
A.9	GALEX Guest Investigator – Cycle 1	3/12/04	4/16/04	X	X		
B.9	Planetary Atmospheres [2]	3/05/04	4/23/04			X	
C.4	Sun-Earth Connection Theory	3/05/04	4/28/04				X
B.19	Outer Planets Research	3/05/04	4/30/04	X		X	
D.2	Critical Issues in Electric Propulsion	3/05/04	4/30/04			X	X
B.3	Planetary Geology and Geophysics [2]	3/10/04	5/07/04			X	
B.14	Astrobiology Science and Technology for Exploring Planets	3/16/04	5/12/04	X		X	
C.5	Sun-Earth Connection Guest Investigators	3/19/04	5/14/04				X
B.2	Cosmochemistry [2]	3/26/04	5/21/04	X		X	
B.4	Origins of Solar Systems [2]	4/02/04	5/28/04	X		X	
A.12	Terrestrial Planet Finder/Foundation Science	4/02/04	5/28/04	X		X	
B.8	Near Earth Object Observations [2]	4/09/04	6/04/04	X		X	
B.6	Sample Return Laboratory Instruments & Data Analysis	4/09/04	6/04/04	X		X	
B.7	Planetary Astronomy [2]	4/16/04	6/11/04	X		X	
A.2	Astrophysics Data Analysis	4/30/04	6/25/04	X	X		
A.3	Long-Term Space Astrophysics	4/30/04	6/25/04	X	X		

C.3	Geospace Sciences	5/28/04	7/23/04				X
B.10	Astrobiology: Exobiology and Evolutionary Biology [2]	6/04/04	8/06/04	X		X	
B.18	Planetary Protection	6/04/04	8/06/04			X	
B.11	Planetary Instrument Definition and Development	6/04/04	8/06/04			X	
B.5	Mars Data Analysis	6/11/04	8/13/04			X	
A.10	ASTRO-E2 Guest Observer - Cycle 1	6/16/04	8/18/04	X	X		
A.4	Astrophysics Theory	6/25/04	8/27/04	X	X		
A.6	Beyond Einstein Foundation Science	6/25/04	8/27/04	X	X		
A.8	RXTE Guest Investigator - Cycle 10	7/09/04	9/10/04	X	X		
C.7	Living With a Star Targeted Research & Technology	7/09/04	9/10/04			X	X
A.11	FUSE Guest Investigator - Cycle 6	8/06/04	9/17/04	X	X		
B.13	Astrobiology Science and Technology Instrument Development and Mission Concept Studies	9/03/04	11/05/04	X		X	
C.2	Solar and Heliospheric Physics	12/10/04	2/11/05				X
A.7	SWIFT Guest Investigator - Cycle 2	1/07/05	3/11/05		X	X	
B.12	Planetary Major Equipment [2]	See ESS Program Element of interest. [2]		X		X	

Notes:

[1] ASO: Astronomical Search for Origins; SEU: Structure and Evolution of the Universe; ESS: Exploration of the Solar System; SEC: Sun-Earth Connection.

[2] The proposals for Program Element B.12: *Planetary Major Equipment* may be submitted in conjunction with Program Elements B.2: *Cosmochemistry*; B.3: *Planetary Geology and Geophysics*; B.4: *Origins of Solar Systems*; B.7: *Planetary Astronomy*; B.8: *Near Earth Objects*; B.9: *Planetary Atmospheres*; B.10 *Exobiology*; and B.15 *Mars Fundamental Research*.

TABLE 4. SCIENCE PROGRAM ELEMENTS SOLICITED IN THE ROSS-2004 NRA
(IN ORDER OF APPENDICES A, B, C, AND D)

NRA Appendix	Science Program Element (see Appendices A, B, C, and D)	NOI Due Date [M/D/Y]	Proposal Due Date [M/D/Y]	Relevant OSS Science Themes [1]			
				ASO	SEU	ESS	SEC
A.2	Astrophysics Data Analysis	4/30/04	6/25/04	X	X		
A.3	Long-Term Space Astrophysics	4/30/04	6/25/04	X	X		
A.4	Astrophysics Theory	6/25/04	8/27/04	X	X		
A.5	Astronomy and Physics Research and Analysis	2/27/04	4/16/04	X	X		
A.6	Beyond Einstein Foundation Science	6/25/04	8/27/04	X	X		
A.7	SWIFT Guest Investigator - Cycle 2	1/07/05	3/11/05		X	X	
A.8	RXTE Guest Investigator - Cycle 10	7/09/04	9/10/04	X	X		
A.9	GALEX Guest Investigator – Cycle 1	3/12/04	4/16/04	X	X		
A.10	ASTRO-E2 Guest Observer– Cycle 1	6/16/04	8/18/04	X	X		
A.11	FUSE Guest Investigator - Cycle 6	8/06/04	9/17/04	X	X		
A.12	Terrestrial Planet Finder/Foundation Science	4/02/04	5/28/04	X		X	
B.2	Cosmochemistry [2]	3/26/04	5/21/04	X		X	
B.3	Planetary Geology and Geophysics [2]	3/10/04	5/07/04			X	
B.4	Origins of Solar Systems [2]	4/02/04	5/28/04	X		X	
B.5	Mars Data Analysis	6/11/04	8/13/04			X	
B.6	Sample Return Laboratory Instruments & Data Analysis	4/09/04	6/04/04	X		X	
B.7	Planetary Astronomy [2]	4/16/04	6/11/04	X		X	
B.8	Near Earth Object Observations [2]	4/09/04	6/04/04	X		X	
B.9	Planetary Atmospheres [2]	3/05/04	4/23/04			X	
B.10	Astrobiology: Exobiology and Evolutionary Biology [2]	6/04/04	8/06/04	X		X	

B.11	Planetary Instrument Definition and Development	6/04/04	8/06/04			X	
B.12	Planetary Major Equipment [2]	See ESS Program Element of interest. [2]		X		X	
B.13	Astrobiology Science and Technology Instrument Development and Mission Concept Studies	9/03/04	11/05/04	X		X	
B.14	Astrobiology Science and Technology for Exploring Planets	3/16/04	5/12/04	X		X	
B.15	Mars Fundamental Research [2]	2/25/04	4/09/04			X	
B.16	Mars Instrument Development	Not solicited this year.				X	
B.17	Discovery Data Analysis	2/20/04	3/26/04			X	
B.18	Planetary Protection	6/04/04	8/06/04			X	
B.19	Outer Planets Research	3/05/04	4/30/04	X		X	
C.2	Solar and Heliospheric Physics	12/10/04	2/11/05				X
C.3	Geospace Sciences	5/28/04	7/23/04				X
C.4	Sun-Earth Connection Theory	3/05/04	4/28/04				X
C.5	Sun-Earth Connection Guest Investigators	3/19/04	5/14/04				X
C.6	Sun-Earth Connection Instrument Development	Not solicited this year.					X
C.7	Living With a Star Targeted Research & Technology	7/09/04	9/10/04			X	X
D.2	Critical Issues in Electric Propulsion	3/05/04	4/30/04			X	X

Notes:

[1] ASO: Astronomical Search for Origins; SEU: Structure and Evolution of the Universe; ESS: Exploration of the Solar System; SEC: Sun-Earth Connection.
[2] The proposals for Program Element B.12: *Planetary Major Equipment* may be submitted in conjunction with Program Elements B.2: *Cosmochemistry*; B.3: *Planetary Geology and Geophysics*; B.4: *Origins of Solar Systems*; B.7: *Planetary Astronomy*; B.8: *Near Earth Objects*; B.9: *Planetary Atmospheres*; B.10 *Exobiology*; and B.15 *Mars Fundamental Research*.