



**National Aeronautics
and Space Administration**

**October 23, 1998
NRA 98-OSS-10**

NASA Research Announcement

TECHNOLOGY DEVELOPMENT FOR NASA EXPLORER MISSIONS AND STRATOSPHERIC OBSERVATORY FOR INFRARED ASTRONOMY (SOFIA)

**Notice of Intent Due:
Proposals Due:**

**November 23, 1998
January 22, 1998**

OMB Approval No. 2700-0087

Technology Development for
NASA Explorer Missions and
Stratospheric Observatory for Infrared Astronomy (SOFIA)

NASA Research Announcement
Soliciting Basic Research Proposals

NRA 98-OSS-10
Issued: October 23, 1998

Proposals Due: January 22, 1998

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

TECHNOLOGY DEVELOPMENT FOR
NASA EXPLORER MISSIONS AND
STRATOSPHERIC OBSERVATORY FOR INFRARED ASTRONOMY (SOFIA)

NASA's Office of Space Science (OSS) releases this NASA Research Announcement (NRA) to solicit proposals for investigations for two main objectives. The first objective is to develop multimission technologies to enhance the scientific capabilities for future Explorer missions while reducing mission costs. Proposals to enhance any aspect of overall scientific capability are welcome, but preference will be given to investigations in instruments, optical systems, on-board data systems, and guidance, navigation, and control. The program goals are not mission specific, and the proposed work may also support other OSS goals and priorities, such as the technology goals of the OSS science themes. The second objective of this NRA provides a special opportunity to propose detector development for the Stratospheric Observatory for Infrared Astronomy (SOFIA) program.

Appendix A of this NRA contains a detailed description of the program for which proposals are solicited. Appendix B provides the standard NASA guidance for responding to NASA Research Announcements. Appendix C includes amendments to Appendix B for specific proposal format and submission procedures for this particular NRA. Note that Appendix C incorporates many formats and/or procedures that are anticipated to be standard for future OSS NRA's. Therefore, interested proposers are advised to read Appendix C in its entirety before writing their proposals. Special attention is also directed to the requirement for electronic submissions to a World Wide Web site of both a *Notice of Intent (NOI)* to propose and a combined *Cover Page/Proposal Summary*. Since transmission difficulties may arise anywhere through the Internet, starting at the proposer's institution, at any of its intermediate nodes, and/or at NASA's receiving sites, proposers are encouraged to submit these items well in advance of their respective due dates to allow for resolution of any difficulties (Note: an "edit" function is provided at the Web site to allow changes after the original submissions but before their respective due dates).

OSS policy now strongly encourages participation by the space science community in education and public outreach activities with the goal of contributing to the broad public understanding of science. Therefore, proposers to this NRA are encouraged to propose an optional Education/Public Outreach (E/PO) activity as an addition to any proposal submitted in response to this NRA. See the last section in Appendix A for details.

Recommendations for funding will be based on the evaluation of each proposal's science and technical merit, its relevance to the objectives as described in Appendix A of this NRA, and its requested budget. A proposed E/PO activity of merit will be used to discriminate between proposals of otherwise nominally equal scientific, technical, and programmatic merit. In all cases, 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.

Participation in this program is open to all categories of organizations, domestic and foreign, including educational institutions, profit and nonprofit organizations, NASA Centers, and other Government agencies. Historically Black Colleges and Universities (HBCU's), 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.

The entirety of this NRA may be found and downloaded in a variety of standard formats by opening "Research Opportunities" from the menu at the OSS home page on the World Wide Web at URL <http://www.hq.nasa.gov/office/oss/research/open.htm>.

The following information applies to this NRA:

- NASA Identifier: NRA 98-OSS-10
- Date of Issue: October 23, 1998
- Notice of Intent (NOI) to propose:
 - Due date November 23, 1998
 - Address for electronic submission <http://props.oss.hq.nasa.gov>
(contact <deb.tripp@hq.nasa.gov> for assistance)
- Address for electronic submission of proposal *Cover Page/proposal Summary:*
<http://props.oss.hq.nasa.gov>
(contact <deb.tripp@hq.nasa.gov> for assistance)
- Submission of Proposal:
 - Required number 15 copies plus signed original.
 - Due date By close of business on January 22, 1998
 - Address for delivery by U.S. Postal Service, personal courier, or commercial service:
ET Program Office
Jorge Scientific Corporation
Suite 700
400 Virginia Avenue, SW
Washington, DC 20024
Tel: 202-554-2775

- Selecting Official: Director
Advanced Technology
and Mission Studies Division
Office of Space Science
- Announcement of selection: About 4 months after proposal due date
- Initiation of funding: About 1 month after selection
- Program Executive for further information: Mr. Glenn Mucklow
Advanced Technology and Mission
Studies Division
Code SM
Office of Space Science
NASA Headquarters
Washington DC 20546
E-mail: gmucklow@hq.nasa.gov

Your interest and cooperation in participating in the ET Program are appreciated.

Alan N. Bunner
Science Program Director
Structure and Evolution of the Universe

Edward J. Weiler
Science Program Director
Astronomical Search for Origins
and Planetary Systems

George L. Withbroe
Science Program Director
The Sun-Earth Connection

APPENDICES

- A. DESCRIPTION OF PROGRAM OPPORTUNITY
- B. GUIDELINES FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS FOR SOLICITED RESEARCH PROPOSALS
- C. SPECIFIC GUIDANCE FOR PROPOSAL PREPARATION AND SUBMISSION

DESCRIPTION OF PROGRAM OPPORTUNITY

Technology Development for NASA Explorer Missions and
Stratospheric Observatory for Infrared Astronomy (SOFIA)

1. Program Description and Goals

A. Technology Development for NASA Explorer Missions

Explorers are astronomy and space physics space flight missions intended to study the Sun, to investigate the space environment of the Earth and other planets, and to observe the Universe beyond our Solar System. The Explorer program seeks to conduct scientific investigations of modest programmatic scope and to provide a continuing opportunity for rapid and high-quality implementation of flights that conduct focused investigations to complement major OSS flight missions or to prove new scientific concepts. The scientific goals of Explorers are consistent with those of three scientific themes within the Office of Space Science (OSS) at NASA Headquarters, namely, Astronomical Search for Origins and Other Planetary Systems, Structure and Evolution of the Universe, and The Sun-Earth Connection. This NRA is an OSS cross-theme effort to identify and support investigations that are likely to enhance the scientific capabilities and reduce cost of future Explorer missions, including Long Duration Balloon (LDB) flights.

The Explorer Technology (ET) program is a new initiative sponsored by OSS. Its primary goal is to identify and support technological investigations that enable or enhance the scientific capabilities of possible future Explorer missions while reducing their development time and life cycle cost. The intention is to accelerate advances in technologies in a cost effective manner and to share these advances with the science theme communities that are likely to respond to future Explorer opportunities such that the technology developed under the ET program may be reasonably proposed to future Explorer Announcements of Opportunity. (Note that proposed investigations in response to this NRA may also have application to non-Explorer missions, but such proposals must also clearly demonstrate their relevance to the Explorer program.)

Application(s) of technologies proposed to this ET program that are being developed in the commercial sector are welcome, but proposals should not request Government support for new infrastructure. Although this opportunity is not mission-specific, it is strongly advised that the proposal identify plausible future missions that might be proposed in response to Explorer opportunities, including Long Duration Balloon (LDB) missions. The potential for application of a proposed technology for a possible future spacecraft with minimal effort, as well as possible commercial applications, will also be considered positively in the review process. Collaborative programs among proposing institutions are encouraged, including non-U.S. as well as U.S. institutions.

Investigations that primarily involve theoretical studies, observational programs, or archival research are not solicited by this NRA. It is the intention of OSS to repeat this NRA annually.

Proposals in response to this NRA may request periods of performance for up to two years. Over \$2M per year is expected to be available to support this program, and it is expected that awards in the range of \$100-300K per year will be made.

Technology areas that are solicited by this NRA include but are not limited to:

- Instrument detectors/sensors and support systems. Examples include detectors over the wavelength from the high-energy regime to the submillimeter; uncooled detectors at any wavelength that currently require cooling; cryogenic support systems; thermal transport devices and control systems; superconducting tunneling Josephson junction (STJ) detectors: solar-blind, low voltage imaging UV and EUV detectors; UV microchannel detectors; low energy solid state particle detectors; miniaturized particles and fields detectors; integrated sensor electronics; and stable optical benches and instrument structures.
- Optical systems for instruments. Examples include x-ray mirrors and filters; precision mechanisms; infrared beam splitters; UV reflective optics; active optics, including digital multimirror techniques for integral field spectroscopy at visual and IR wavelengths; and lightweight, high-quality mirrors.
- Data systems, hardware, and software. Examples include advanced flight software architecture and development tools; optical communications systems; onboard data analysis and compression techniques; phased arrays; onboard data management and electronics; radiation-hard and space-qualified, workstation class processor architectures utilizing commercial hardware and software development systems, array processors; and smart memory.
- Guidance, Navigation, and Control (GN&C): Examples include autonomous onboard space-qualified GN&C systems for multiple satellite constellations and formation flying; advanced ground system automation, autonomous/optical navigation; and higher performance attitude control (especially if at lower cost).

Other technologies than those above may be proposed but will be considered of lower priority in this NRA.

Note that since Explorer missions are cost capped, an important objective of this program is that of reducing total life-cycle costs for Explorer Missions. Therefore, in addition to technology that leads to lower mission costs by directly lowering mission element costs, technology development that lowers development cost by lowering risk will also be evaluated favorably. Finally, demonstration of a possible commercial application and/or application to future non-Explorer OSS missions will also be considered positively.

Proposers are encouraged to seek separate arrangements to demonstrate the technical maturity of their investigations via high-fidelity test environments such as demonstration flights through the New Millennium Program (NMP), suborbital missions (sounding rockets, balloons, or aircraft such as SOFIA), and/or instrumentation for ground-based astronomical observations. A representative model or prototype which would go well beyond *ad hoc*, 'patch-cord,' or discrete component level bread boarding should be tested in a relevant environment. This demonstration might represent an actual system application or might only be similar to the planned application using the same technologies.

NASA reserves the right to make any scientific data taken under this NRA public as stated in Appendix C, Section 1.1. Therefore, winning proposers will be required to submit an annual report that describes program accomplishments and technical status, the final results of the investigation must be published in recognized professional journals, and the investigators are expected to participate in an appropriate NASA Technology Workshop. Summary descriptions of the investigations selected by NASA will be posted on the World Wide Web and in conjunction with future Announcements of Opportunity for space flight mission investigations.

B. Detector Systems for the Stratospheric Observatory for Infrared Astronomy (SOFIA)

Proposals in response to this NRA may also seek to develop instrument subsystem and system concepts, which enhance the scientific productivity, efficiency, and/or capability of SOFIA's science program. This opportunity especially solicits detectors and detector systems, but may also include optics, cryogenics, and data planning and analysis architectures. This funding is primarily intended to support laboratory development, but a modest fraction may be used for astronomical observations at an existing observatory facility for final operational verification. A description of the SOFIA program may be found on the World Wide Web at <<http://sofia.arc.nasa.gov/>>.

Approximately \$300K per year is available from the SOFIA project for this objective, which will be used to fund proposals of merit that are directly relevant to SOFIA. However, additional resources, up to a matching amount, may be made available from the ET program (Section A) to share in supporting proposals that also demonstrate relevance to potential future Explorer missions. Hence, the total annual funding available for this part of the program could be in excess of the above figure. Where appropriate, proposers are, therefore, strongly encouraged to submit proposals that clearly explain the benefits of the proposed SOFIA work to the overall Explorer program, using the criteria for selection as described in Section A. In some cases, additional effort will be required to extend the SOFIA technology to produce a result that is also of relevance to the ET program; the proposal should clearly identify this additional work.

The electronic form for the *Cover Page* for proposals (see Section 5.3 in Appendix C) provides a place for indicating that a proposal is responding to this special additional SOFIA opportunity. However, proposals to this special opportunity will not be precluded from consideration by the general Explorer technology competition, unless the proposal explicitly requests such exclusion in an accompanying letter.

2. Education/Public Outreach (E/PO) Proposals

Scope of E/PO Program

The Office of Space Science (OSS) has developed a comprehensive approach for making education at all levels (with a particular emphasis on precollege education) and the enhancement of public understanding of space science integral parts of all of its missions and research programs. The two key documents that establish the basic policies and guide all OSS Education and Outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995) and an implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (October 1996). Both may be obtained either from the World Wide Web (select *Education and Public Outreach* from the menu on the OSS home page at <http://www.hq.nasa.gov/office/oss/>), or from Dr. Jeffrey Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington, DC 20546-0001, USA.

In accord with these established OSS policies, proposers to this NRA are strongly encouraged to include an Education/Public Outreach (E/PO) component as part of their scientific research proposal. The proposed E/PO activities should have some degree of intellectual linkage with the objectives of that parent research proposal and/or the science expertise of its Principal Investigator. Up to \$10K per year may be proposed for an E/PO program, although larger budgets will be considered based on the merits of the proposed activity. E/PO proposals will be funded using the available budget of about \$1.5M per year for E/PO support of OSS NRA's.

E/PO proposals will be evaluated (see criteria below) by appropriate scientific, education, and outreach personnel, and the results of these reviews will be provided to the cognizant Program Scientist in time for use in the selection process. The OSS Selecting Official will specifically take into account proposed E/PO tasks and their review ratings when deciding on final selections and funding levels. Results of these E/PO reviews will be used to aid in discriminating between research proposals having otherwise comparable merits. The reviews of E/PO proposals will be conveyed to the proposers as part of their debriefings.

In order to ensure that the goals and objectives of the OSS E/PO strategy are realized in practice, proposals will be evaluated using the following specific criteria:

- The establishment of effective, long-duration partnerships with institutions and/or personnel in the fields of educational and/or public outreach as the basis for and an integral element of the proposed E/PO program;
- The potential of the proposed E/PO activity to have a “multiplier effect” (e.g., prospects for broad dissemination or replication of an E/PO product);
- For proposals dealing with the formal education system, the degree to which the proposed E/PO effort promotes nationally recognized and endorsed education reform efforts and/or reform efforts at the state or local levels;
- The degree to which the proposed E/PO effort contributes to the training of, involvement in, and broad understanding of science and technology by underserved and/or underutilized groups; and
- The prospects for building on, taking advantage of, and leveraging existing and/or ancillary resources beyond those directly requested in the proposal;

It is recognized that not all proposals can (or even should) address all of these factors and only the relevant subset will be considered in evaluating each individual proposal. In addition, the following general criteria also will be considered in evaluating all proposals:

- The quality, scope, and realism of the proposed E/PO program;
- The capability and commitment of the proposer to carry out the proposed E/PO program;
- The adequacy of plans for evaluating the effectiveness and impact of the proposed education/outreach activity;
- The linkage of the proposed E/PO task with existing NASA science and/or education programs and activities; and
- The adequacy and realism of the proposed budget (including any additional resources outside those requested from NASA).

Note that originality of the proposed effort is not a criterion. Rather, NASA OSS seeks assurance that the PI is committed to carrying out a meaningful, effective, credible, and appropriate E/PO activity.

Assistance for the Preparation of E/PO Proposals

To directly aid space science personnel in identifying and developing high quality E/PO opportunities, and establishing partnerships between the space science and E/PO communities, NASA OSS has established a national space science education/outreach infrastructure. The purpose of this infrastructure is to provide the coordination, background, linkages, and services needed for a vital national, coordinated, long-term E/PO program. Of particular interest to proposers to this NRA are two elements of this system (which is described in more detail in the OSS education/outreach implementation plan referred to above):

- Four OSS science theme-oriented “E/PO Forums” have been established to help orchestrate and organize in a comprehensive way the education/outreach aspects of OSS space science missions and research programs and provide ready access to relevant E/PO programs and products to both the space science and education communities; and
- Five regional E/PO “Broker/Facilitators” have also been selected to search out and establish high leverage opportunities, arrange alliances between educators and OSS-supported scientists, and help scientists turn results from space science missions and programs into educationally-appropriate activities to be disseminated regionally and nationally.

Prospective proposers are strongly encouraged to make use of these infrastructure resources to help identify suitable E/PO opportunities and arrange appropriate alliances. Points of contact and addresses for all of these E/PO Forums and Broker/Facilitators may be found by opening “Education and Public Outreach” from the menu of the OSS home page at <<http://www.hq.nasa.gov/office/oss/>>.

E/PO Proposal Information

The guidelines for the preparation and submission of the E/PO component of a research proposal submitted in response to any program element in this NRA are:

- The body of an E/PO proposal should be restricted to five pages and include the following information: A brief abstract of the proposed program; an expanded description of the objectives and planned activities; a description of the intended involvement of the Principal Investigator of the “parent” research proposal, as well as that of any additional personnel who are proposed to be responsible for the E/PO effort and/or the respective institutional responsibilities if a partnership is proposed; and a brief statement and explanation of the requested E/PO budget.
- The budget for the E/PO activity should be integrated into that for the parent research proposal, which is finally summarized on the specified *Budget Summary* form (see Section 6 of Appendix C). The period of performance of an E/PO activity is restricted to that of the parent proposal.

Submission procedures:

- The E/PO proposal should be bound as part of the total proposal in the order specified in Section 5.3 of Appendix C. In addition, the proposal *Cover Page* (see also Section 5.3) must indicate that an E/PO proposal is included as part of the total research proposal.
- E/PO proposals are also to be submitted electronically by uploading its text to the secure Web site at URL <<http://cass.jsc.nasa.gov/panel/>>. This site will provide complete instructions for accomplishing this activity using a wide variety of formats. Proposers without access to the Web or who experience difficulty in using this site may contact the Lunar and Planetary Institute by E-mail at <panel@lpi.jsc.nasa.gov> or by phone at (281) 486-2156 or -2166 for assistance.

Questions about an E/PO program in response to this NRA may be directed to:

Dr. David Bohlin
Research Program Management Division
Code SR
Office of Space Science
NASA Headquarters
Washington DC 20546-0001
Telephone: (202) 358-0880
E-mail: david.bohlin@hq.nasa.gov

Finally, attention is also called to the Initiative to Develop Education through Astronomy and Space Science (IDEAS) program administered by the Space Telescope Science Institute (STScI) on behalf of OSS. This program, which currently selects proposals yearly, provides awards of up to \$10K (with a few up to \$40K) to enable the participation of space scientists in E/PO activities. Annual solicitations for the IDEAS program are usually released in July with proposals due in October. The IDEAS program is open to any U.S.-based space scientist regardless of whether or not they hold an award from NASA OSS. The current request for proposals is posted on the World Wide Web at <<http://opposite.stsci.edu/pubinfo/edugroup/ideas.html>>. Inquiries about IDEAS may be directed by E-mail to <IDEAS@stsci.edu> or by mail to:

IDEAS Program
Office of Public Outreach
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, MD 21218.

**INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS _
FOR SOLICITED BASIC RESEARCH PROPOSALS**

NASA Federal Acquisition Regulations (FAR) Supplement (NFS) Version 89.90
Part 1852.235-72 (January 1997)

(accessible by opening “Part 1852.228 to 1852.241” from the menu at URL
<<http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>>)

(a). General.

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a preaward synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRA's contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRA's.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRA's are subject to the Federal Acquisition Regulation (FAR) and the NASA FAR Supplement (NFS). Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRA's; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b). NRA-Specific Items. Several proposal submission items appear in the NRA itself: the unique NRA identifier, when to submit proposals, where to send proposals, number of copies required, and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c). Proposal Content. The following information is needed to permit consideration in an objective manner. NRA's will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) *Transmittal Letter or Prefatory Material*.

- (i) The legal name and address of the organization and specific division or campus identification, if part of a larger organization;
- (ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;
- (iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;
- (iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
- (v) Identification of other organizations that are currently evaluating a proposal for the same efforts;
- (vi) Identification of the NRA, by number and title, to which the proposal is responding;
- (vii) Dollar amount requested, desired starting date, and duration of project;
- (viii) Date of submission; and
- (ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) *Restriction on Use and Disclosure of Proposal Information*. Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following Notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the Notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the Notice.

Notice

Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract(or other agreement) is awarded on the basis of this proposal, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract(or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) *Abstract.* Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) *Project Description.*

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance, relation to the present state of knowledge, and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) *Management Approach.* For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) *Personnel.* The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications, and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) *Facilities and Equipment.*

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non research purposes should be explained.

(8) *Proposed Costs.*

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages, fringe benefits, equipment, expendable materials and supplies, services, domestic and foreign travel, ADP expenses, publication or page charges, consultants, subcontracts, other miscellaneous identifiable direct costs, and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

- (ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired, purpose and estimated number and lengths of trips planned, basis for indirect cost computation(including date of most recent negotiation and cognizant agency), and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.
 - (iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831(and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).
- (9) *Security.* Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.
- (10) *Current Support.* For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.
- (11) *Special Matters.*
- (i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.
 - (ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d). Renewal Proposals

- (1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.
- (2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e). Length. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f). Joint Proposals.

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

(g). Late Proposals. A proposal or modification received after the date or dates specified in an NRA may be considered if doing so is in the best interests of the Government.

(h). Withdrawal. Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

(i). Evaluation Factors

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

- (i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.
- (ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.
- (iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.
- (iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(j). Evaluation Techniques. Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases, proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k). Selection for Award.

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l). Cancellation of NRA. NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

SPECIFIC GUIDANCE FOR PROPOSAL PREPARATION AND SUBMISSION

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1. Introduction

1.1 General Provisions and Policies

- *Relationship of Appendices B and C.* The material in Appendix C augments and supplements the material in Appendix B of this NRA. In case of conflict, the material in Appendix C takes precedence.
- *Unrestricted Freedom to Propose to this NRA.* NASA OSS welcomes proposals in response to this NRA from all qualified proposers. Participation in this program is open to all categories of U.S. and non-U.S. organizations, including educational institutions, industry, nonprofit institutions, NASA Centers, and other Government agencies. Historically Black Colleges and Universities (HBCU's), 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. In accordance with Federal statutes and NASA policy, no eligible applicant shall be excluded from participation in, denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NASA on the grounds of race, color, creed, age, sex, national origin, or disability.
- *Opportunity to Propose Educational/Public Outreach Activities.* K-12 Educational/Public Outreach (E/PO) activities are now considered vital and integral parts of all NASA space science missions and research programs. Therefore, NASA OSS encourages proposers to this NRA to submit an E/PO proposal as a supplement to their research proposal in accordance with the guidelines given in the last section of Appendix A. Note that originality is not a criterion for such E/PO tasks; rather the important factor is that a tenable task of merit be proposed. Additionally, any Principal Investigator already holding an existing multiple year OSS research award whose a period of performance extends for at least a year beyond the release date of this NRA, and that can serve as a "parent proposal," is encouraged to propose an E/PO supplement.
- *Anticipated Level of Competition for Selection.* Prospective proposers are advised that OSS program solicitations have traditionally been extremely competitive. Because of funding limitations, typically as few as one out of four to five proposals have been selected for funding in the last several years.
- *Public Access to Data.* As a matter of NASA policy, all data taken in the performance of a NASA research award are considered to be public domain. In addition, NASA may judge that new data obtained through an investigation selected through this NRA may be of value to the science community at large. If so, NASA reserves the right to direct that these data be deposited in an approved public data archive and, if so, will negotiate appropriate funding to enable the reduction and calibration of the data into a format amenable for use by peer scientists.

- *NASA-Provided Data and Computational Infrastructure.* OSS provides data and computational infrastructure to support its research community. Information on current science data centers and services can be found on the World Wide Web at <<http://ssds.nasa.gov>>. Any need for high performance computing resources for the proposed research should be explicitly described in the proposal, including the computing system, its location, and an estimate of the amount of computing time needed.

NASA high performance computing resources may be made available to successful investigations from facilities at either the NASA Jet Propulsion Laboratory (JPL) and the NASA Goddard Space Flight Center (GSFC):

- Resources at the JPL include a Cray J-90 system with a peak speed of 24 GFLOP's and a 256 processor Hewlett-Packard Exemplar parallel computer with a peak speed of 184 GFLOP's. For more information about JPL resources, contact Mr. Larry Eversole at telephone (818) 353-2786, or E-mail at <eversole@galaxy.jpl.nasa.gov>.
- High performance computing resources at GSFC include a Cray J-90 system with a peak speed of 19.2 GFLOP's and a 512 processor Cray T3E parallel computer with a peak speed of 305 GFLOP's. More information is available on the World Wide Web at <<http://nccsinfo.gsfc.nasa.gov/NCCS>> and <<http://nccsinfo.gsfc.nasa.gov/ESS>>.

1.2 Types of Proposing Institutions

NASA OSS accepts proposals in response to its NRA's from all types of U.S. and non-U.S. institutions (proposals from non-U.S. institutions should adhere to the provision of Section 4 of this Appendix). As an aid to NASA in deciding on the appropriate funding instrument in the event that the proposal is selected for funding, one of the categories listed below must be indicated at the appropriate line on the *Cover Page* (see Section 5.3 of this Appendix):

- *Educational institution.* A university or two- and four-year college (including a U.S. community college) accredited to confer degrees beyond that of the K-12 grade levels (all such institutions are considered by NASA as nonprofit).
- *Nonprofit, nonacademic organization.* A private or Government supported research laboratory, university consortium, museum, observatory, or similar organization that supports advanced research but whose central charter is not for training of students.
- *Commercial organization.* An organization of any size that operates for profit (i.e., on a fee basis) with appropriate capabilities and interests to conduct basic research in science.
- *NASA Center.* All NASA field Centers and the Jet Propulsion Laboratory.
- *Other Federal Agency* -- Any non-NASA, U.S. Federal Executive agency or Federally Funded Research and Development Center (FFRDC) sponsored by a Federal agency.
- *Unaffiliated U.S. resident.* Any person residing in the U.S., whether a U.S. citizen or resident alien, who has the capabilities and access to facilities for carrying out the proposed project and who, if selected, agrees to fiscal arrangements that, in NASA's opinion, ensures responsible management of appropriated Federal funds.
- *Non-U.S. Organizations* -- Institutions outside the U.S. that propose on the basis of a policy of no exchange of funds; consult Section 4 of this Appendix.

1.3 Proposal Personnel

Every organization submitting a proposal in response to this NRA must designate a single *Principal Investigator* (PI) who will be responsible for the quality and direction of the entire proposed investigation and for the use of all awarded funds. Note that NASA does not accept the designation of a "Co-Principal Investigator."

In addition to the PI, a critically important person needed for the execution of a proposal through the contribution of unique expertise and/or capabilities and who serves under the direction of the PI may be identified as a *Co-Investigator* (Co-I). Regardless of whether he/she receives compensation directly through the award, a Co-I must have a well-defined role in the investigation that is explicitly defined in the *Management* section of the proposal (see Section 5.3 below). Except for certain cases of a Co-I being identified as an "Institutional PI" (see below), any Co-I at an institution other than that of the PI is to be funded by subcontract through the proposing institution. Finally, written commitment of each Co-I to participate in the proposed investigation is required by way of a brief letter from him/her even if they are from the proposing PI institution (see Section 5.3 below).

Owing to unique circumstances, there are two special designations for a Co-I that a proposal may make in its Management section (see Section 5.3 below) as appropriate:

- A Co-I may be designated as the *Science PI* for those cases where the proposing institution does not permit that individual to formally serve as the PI as defined above (e.g., nontenure faculty, research associates, and/or postdoctoral personnel). In such a case, the *Science PI* will be understood by NASA to be in charge of the scientific direction of the proposed work, although the formally designated PI is still held responsible for the overall direction of the effort and the use of funds.
- A Co-I may be designated as an *Institutional PI* if he/she is from an institution other than the proposing organization that is making a major contribution to the proposal (e.g., a substantial portion of an experimental investigation), and to which NASA may choose to issue a separate award rather than expecting the PI institution to provide a subcontract. In this case, the *Institutional PI* serves as the point of contact for that separate award to his/her institution but the proposal PI is still responsible for the overall scientific direction of the effort. Funding a single proposal by such multiple awards is allowed only if explicitly noted in the program description of this NRA or if explicitly approved by the Discipline Scientist.

In addition to Co-I's, proposals in response to this NRA may also identify *Collaborators*, who are individuals that are less critical to the overall proposal than a Co-I but who are committed to provide a focused though unfunded contribution to a specific task relevant to the proposal. As noted above for Co-I's, proposals submitted to this NRA must include a brief letter of commitment from each Collaborator that describes their specific, intended contribution to the investigation.

1.4 Proposal Evaluation

Although OSS secures scientific and technical evaluations from appropriately qualified peers of the proposers, proposers are expected to provide sufficient detail to enable evaluation by persons who are knowledgeable of but not necessarily specialists in the proposed research. The evaluation criteria in Appendix B, part (i), as amended below, applies to this NRA:

(i) Evaluation Factors.

(1) Unless otherwise specified in the NRA, the principal criteria (in descending order of importance) that apply in evaluating a proposal are its intrinsic merit, its relevance to NASA's objectives, and its cost.

(2) Evaluation of intrinsic merit includes consideration of the following factors listed in approximate order of decreasing importance:

- The overall scientific and/or technical merit of the proposal and/or unique and innovative methods, approaches, concepts, or advanced technologies demonstrated by the proposal, and the potential impact of the proposed research to its field;
- The qualifications, capabilities, and experience of the proposing Principal Investigator and all other personnel who are proposing to help achieve the proposal's objectives;
- The proposing institution's capabilities, related experience, facilities, techniques, or unique contributions of these that are integral factors for achieving the proposal objectives; and
- The overall standing of the proposal against the known state of the art.

(3) Relevance to NASA's objectives shall mean relevance to the specific objectives and goals as described in this NRA for which the proposal is submitted, as well as more generally to the NASA OSS science themes and goals as defined in the most current OSS strategy documents.

(4) Evaluation of the cost of a proposed effort shall include the realism and reasonableness of the proposed cost, and the comparison of that proposed cost to available funds.

1.5 Proposal Selection and Implementation

Following peer evaluation, the cognizant Discipline Scientist will further review the scientifically and technologically top rated proposals against the programmatic objectives, program balance, and available financial resources. Based on the entirety of these factors, including judgment of the comparison of the scope and importance of the proposed investigation to its cost, the Discipline Scientist then will present a recommendation for selection to the NASA Selecting Official (identified in this NRA's covering summary letter). The Selecting Official will select for funding those proposals judged worthy with respect to all of the evaluation criteria and for which financial resources are available. The Selecting Official will also decide on the selection of Education/Public Outreach (E/PO) proposals of merit that are associated with those proposals being considered for selection. Note that an E/PO proposal of merit will also be used as an additional factor to discriminate between proposals of otherwise equal merits.

Each proposer will be notified by postal or electronic mail of their selection or nonselection and offered a debriefing to explain that decision. Note that NASA reserves the right to offer selection of only a portion of a proposed investigation; in such a case the proposer will be given the opportunity to accept or decline the offer. Those recommended for selection will be informed of the recommended amount of their award and that their organization will be contacted by a NASA Procurement Office to arrange for an appropriate funding instrument (normally a grant or contract). In all cases, awards are made to the proposing institution, not directly to the proposal PI. Note that no financial commitment on the part of NASA or the Government may be inferred from any communication, even if in writing, from the NASA Discipline Scientist or Selecting Official. Only a NASA Procurement Office can make financial commitments, obligations, or awards on behalf of the Agency and authorize the expenditure of funds.

2. Notice of Intent to Propose

In order to plan for a timely and efficient peer review process, a *Notice of Intent* (NOI) to propose is requested by the deadline in the Cover Letter for this NRA. NASA understands that the submission of a NOI is neither a commitment to submit a proposal nor is information contained therein considered binding on the submitter. NOI's are to be submitted electronically by entering the requested information through the World Wide Web site identified in the Cover Letter (a telephone point of contact is also provided for anyone without access to the Web or who experiences difficulty in using the specified site). As a rule, the NOI Web site will request at least the following information:

- reference to this NRA by its alpha-numeric identifier (this may be included on the Web site template);
- the Principal Investigator's name, physical mailing address, phone number, and E-mail address;
- the name(s) and institution(s) of any Co-Investigator(s) and/or Collaborator(s) known by the NOI due date;
- a Yes/No indication of the intent to submit an E/PO proposal;
- a descriptive title of the intended investigation; and,
- a brief description of the investigation to be proposed.

A separate NOI must be submitted for each intended proposal. Note that this NOI may take the form of being the preliminary version of the proposal *Cover Page/Proposal Summary* (see Section 5.3 below). If so, the Web site will provide a password to the user for future use in updating this information for the final *Cover Page/Proposal Summary* as the deadline for submission of the final proposal approaches (see further discussion in Section 5.3 below).

3. “Renewal” Proposals

[Reference: Appendix B.(d)]

The term “renewal proposal” has ambiguous meanings. Various it has been used to mean either (i) a proposal that seeks to extend to its next logical phase an existing NASA award that is concluding its period of performance; or (ii) to request the next phase of funding needed to complete an existing multiple year award. To avoid this ambiguity, OSS wishes to discontinue use of this term. Instead, all proposals in response to this OSS NRA will be considered “new” regardless of the previous funding history by the PI, even if the new proposal seeks extension of an existing line of research, whereas the continued funding of an existing, selected multiple year award will be called its “annual funding allotment.” Directions for the submission of the Progress Report required for an annual funding allotment may be obtained directly from the relevant Discipline Scientist.

Proposers who seek to extend an existing NASA research activity that is relevant to this NRA, and which will otherwise expire in the first year during which awards for this NRA will be implemented, must identify and document their achievements in their new proposal two ways (see Section 5.3 for further discussion of these proposal elements):

- (i) the existing NASA grant or contract number must be entered in the indicated place on the new proposal’s *Cover Page*; and
- (ii) a separate, short *Progress Report*, including citations to published papers derived from the existing task, must be included as part of the proposal’s ancillary material.

Such follow-on proposals must otherwise fully comply with all guidelines for preparation, content, and submission for proposals as outlined in this NRA, and they will be reviewed on an equal basis with all other submitted proposals. If such a follow-on proposal is selected, NASA reserves the right to fund the investigation either by amendment of the existing award that is expiring or by a totally new award. In either case, the starting date of the new award must follow expiration of the existing one.

4. Guidelines for International Participation

NASA welcomes proposals from institutions from outside the U.S., as well as proposals from U.S. institutions that include collaboration with Co-Investigators at non-U.S. institutions. In either case, however, investigators working outside the U.S. are not eligible for funding from NASA. Therefore, proposals from non-U.S. institutions should not include a cost plan unless the proposal involves a Co-Investigator working in the U.S., in which case a budget for just that participation must be included. Proposals from non-U.S. institutions, and U.S. proposals that include non-U.S. participation, must be endorsed by the government agency or sponsoring institution in that country from which the non-U.S. participant is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and, that if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

In addition to sending the specified number of copies of the proposal to the address designated in this NRA, one copy of the proposal, along with a Letter of Endorsement from the sponsoring non-U.S. agency, must be forwarded to:

Ms. Bettye Jones
NRA 98-OSS-10
Space Science and Aeronautics Division
Code IS
NASA Headquarters
Washington, DC 20546-0001
USA

All non-U.S. proposals must be typewritten in English and conform to all other standards for format and content specified in this NRA and will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established proposal due date; those received after the closing date will be treated in accordance with NASA's standard policy for late proposals (see Appendix B). The sponsoring non-U.S. agencies may, in exceptional situations, forward a proposal to NASA without endorsement if endorsement is not possible before the announced closing date. In such cases, however, NASA's Space Science and Aeronautics Division should be advised when a decision on endorsement can be expected.

Successful and unsuccessful non-U.S. proposers will be contacted directly by the NASA Research Program Management Division concerning the selection or nonselection for their proposals, and copies of these letters will also be sent to the sponsoring organization. Should a non-U.S. proposal or a U.S. proposal with non-U.S. participation be selected, NASA's Space Science and Aeronautics Division will arrange with the non-U.S. sponsoring organization for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring organization will each bear the cost of discharging their respective responsibilities. Depending on the nature and extent of the proposed cooperation, this arrangement will entail a letter of notification by NASA and either an exchange of letters between NASA and the sponsoring organization, or a Memorandum of Understanding (MOU).

5. Guidelines for Preparation of Proposals

5.1 Standard Formats for Proposals

Unless otherwise directed, the standard, default formats for proposals submitted in response to this NRA are as follows:

- Typewritten, English text using an easily read type font having no more than ~15 characters per inch on white 8.5x11 inch paper (or A4 stock for non-U.S. proposals), in single or double columns with at least 2.5 cm margins all around.
- Double-sided printing preferred but not required.
- Bound only with metal staples, i.e., no cardboard or plastic covers, or permanent binders (to facilitate recycling), and with an easily disassembled original copy (to enable NASA to make additional copies if needed).
- No fold out pages, colored illustrations, or photographs unless critical for the unique display of important proposal data.
- No material submitted on any type of electronic media, nor reference to sites on the World Wide Web for material needed to complete or review the proposal.
- Use of only metric and standard astronomical units.
- Strict adherence to the page limits given in Section 5.3 below, where each side of a sheet containing text or illustration counts as a page, each “n-page” fold-out counts as n-pages, and the page limit for the Science/Technical/Management section includes references and illustrations.

5.2 Checklist For Proposal Preparation and Submission

PRESUBMISSION ACTIVITIES

_____ ***Notice of Intent to Propose.*** Electronically submitted to the World Wide Web site by the due date given in the cover letter of this NRA.

_____ ***Cover Page/Proposal Summary.*** Electronically submitted to the World Wide Web site given in the cover letter of this NRA (note: this should be done in time to secure the specified original signatures on a printed hard copy of this item as required for submission with copies of the proposal itself by the proposal Due Date given in this NRA’s cover letter).

CONSTITUENT PARTS OF A PROPOSAL

[All proposals are to include the following materials in the order and with titles as given;
details for each part are given in the same order in Section 5.3.]

	<u>Page Limits</u>
• <u>MAIN PROPOSAL</u>	
_____ <i>Cover Page/Proposal Summary</i> (as printed from Web site)	as req'd
_____ <i>Table Of Contents</i> (optional)	1
_____ <i>Summary Of Personnel Commitments and Costs</i>	1
_____ <i>Scientific/Technical/Management Section</i>	~15*
_____ <i>Facilities and Equipment</i> (as needed and appropriate)	~2
_____ <i>Education/Public Outreach (E/PO) Proposal</i> (optional)	~5
• <u>ANCILLARY INFORMATION:</u>	
_____ <i>Curriculum Vitae</i>	f or the PI: ~3 optional for each Co-I: 1
_____ <i>Current and Pending Support</i>	as req'd
_____ <i>Co-I and/or Collaborator Letter(s) of Commitment</i>	as req'd
_____ <i>Budget Summary</i> (one for <u>each</u> year of proposed effort)	as req'd
_____ <i>Budget Details</i>	as req'd
_____ <i>Progress Report</i> (if proposal is follow-on to an existing task)	~2
_____ <i>Reprints/Preprints</i> (optional; ~2 only if relevant to proposal)	not applicable
_____ <i>Proposing Institution Budget</i> (optional, in format of choice)	as req'd

* including references and illustrations

SUBMISSION ACTIVITIES

_____ *Cover Page/Proposal Summary*. Print out final and complete version from Web site in time to secure the Principal Investigator and Authorizing Institutional Official signatures, to serve as the preface to the proposal (the *Cover Page/Proposal Summary* with original signatures must preface the original copy of the proposal).

_____ Deliver required number of proposal hard copies to the specified address by close of business on the Due Date (see summary cover letter of this NRA for specifications).

5.3 Details of Proposal Contents

All proposals in response to this OSS NRA should be assembled with the following parts and in the order listed. Proposals that omit required or appropriate parts, or whose constituent parts exceed the page limits specified in section 5.2 may be returned without review. For completeness, each of the items below is cross-referenced to the corresponding part of Appendix B of this NRA by notations in brackets [...]. Note that several parts of Appendix B are not specifically cited but should also be considered for a complete understanding of all applicable policies and provisions.

- *Cover Page/Proposal Summary* [Reference: Appendix B.(c)(1) and (3)]. All proposals must be prefaced by an integrated *Cover Page/Proposal Summary* that contains important, required information (see below). This item is produced by electronically entering the requested information through the World Wide Web site specified in the summary cover letter of this NRA and then printing out a hard copy of the final material (Note: a telephone and/or E-mail point of contact is also identified for any proposer without access to the Web or who experiences difficulty in using the specified Web site). This printed hard copy is then used to obtain original signatures of the PI and an official from the proposing institution to submit with the original copy of the proposal. In addition, reproductions of this original *Cover Page/Proposal Summary* are used to preface the required printed copies of the proposal.

Upon accessing the specified Web site, at least the following information for the *Cover Page* will be requested (Note: additional programmatic information may be requested as specified in Appendix A of this NRA):

- The alpha-numeric identifier and name of this NRA (Note: these may already be included on the electronic form on the Web site).
- The proposing Principal Investigator's name and full physical, institutional mailing address, telephone and facsimile numbers, and E-mail address.
- An open block for the PI signature and date on the printed hard copy.
- A descriptive title of proposed investigation.
- The Grant or Contract Number of any existing NASA award for which the newly proposed work is a logical, justified follow-on activity.
- The name(s), institutional affiliation(s), and E-mail address(es) of any Co-Investigator(s) (Note: all Co-I's listed must also be functionally identified in the proposal).
- The physical mailing address, telephone number, and E-mail address of the office of sponsored programs at the proposing institution.
- The institutional endorsement, which requires the name and title of the Authorizing Institutional Official, the name of the proposing institution, and, for the hard copy submitted with proposal, a block for a signature and date.

- The designation of the type of proposing institution (using the definitions in Section 1.2 above).
- A “Yes/No” indication whether an Education/Public Outreach proposal is submitted.
- The proposed costs both by year and for the total proposed period of performance.

A block of space (about one page in length) will be provided in the electronic *Cover Page/Proposal Summary* form for a self-contained *Proposal Summary* of the proposed research activity. This *Summary* should include the following key information:

- A description of the key, central objectives of the proposed research in terms that allow a nonspecialist to grasp its essence, and a concise statement of the methods proposed to accomplish those proposed objectives.
- A statement of the perceived significance of the proposed work to NASA OSS interests and programs.
- If the proposed research is considered to be a continuation of work performed under a previous NASA award, a statement of the key accomplishments and citations to published and/or in-press articles derived from that award.
- If the proposal contains an E/PO proposal, a two or three sentence summary of the intended activity.

Note: NASA intends to publish the proposal title, the PI’s name and institution, and the *Proposal Summary* of every selected investigation in a public data base. Therefore, the *Proposal Summary* should not include proprietary information that would preclude its unrestricted release (see also Appendix B, (a)(2) and (c)(2)).

Changes (such as whiteout or strikethrough) to the printed *Cover Page/Proposal Summary* that is submitted with the proposal are not permitted. Any needed changes to the information that has been submitted electronically may only be made by editing the electronic submission using the instructions of the Web page, after which the revised *Cover Page/Proposal Summary* is then printed for securing the necessary signatures.

Note two special features of the *Cover Page/Proposal Summary*: (i) the authorizing institutional signature now certifies that the proposing institution has read and is in compliance with the three required certifications printed in full (for reference only) at the end of this Appendix), and, therefore, it is not necessary to separately submit these certifications with the proposal; and (ii) electronic submission of only a *Cover Page/Proposal Summary* does not satisfy the deadline for proposal submission; the required number of copies of the proposal, one with original signatures, must be received at the indicated address by the proposal Due Date.

- *Table of Contents.* This item is optional but desirable.
- *Summary of Personnel Commitments and Costs.* The proposal must contain a one page summary that shows, in simple tabular form, the intended work commitment of the PI (and of every Co-I, if any) of their work effort for the proposed investigation both in time (rounded to the nearest 0.01 Work Year) and salary (rounded to the nearest \$1K) for each year of the proposed period of performance.
- *Scientific/Technical/Management Section* [Reference: Appendix B.(c)(4), (5), and (6)]. This section is the main body of the proposal and should cover the following topics in the order given, all within the page limit noted above:
 - The objectives and expected significance of the proposed research, including the perceived impact of the proposed work to the state of knowledge in the field and, if the proposal is a direct extension of an existing OSS award, how the proposed work is expected to build on and otherwise extend previous accomplishments by the proposer or others in the field;
 - If the proposed activity requires the construction of experimental hardware, a complete description of that hardware and the plans for its procurement;
 - The technical approach and methodology to be employed in conducting the proposed research, including any special facilities of the proposing institution(s) and/or capabilities of the proposer(s) for carrying out the work (Note: it may be appropriate to further elaborate on this topic in the separate *Facilities and Equipment* section as described below);
 - The relevance of the proposed work to past, present, and/or future NASA OSS programs and interests or to the specific objectives given in this NRA;
 - An outline of the general management plan for the proposed task, including anticipated key milestones for accomplishments and the management structure for the proposal personnel; and
 - A clear statement of the expected contribution by the PI and by each Co-I identified for the proposed task, regardless of whether or not they derive support from the proposed budget.

This *Section* must include a list of references to citations in the main text; such citations must use standard, easily understood abbreviations of journals and/or books. This section may also contain illustrations that amplify and demonstrate key points of the proposal (including milestone schedules, as appropriate). Such illustrations should be of publication quality, of an easily viewed size, and have self-contained captions that do not contain critical information not provided elsewhere in the proposal.

- *Facilities and Equipment* [Reference: Appendix B.(c)(7)]. If appropriate, this section should describe any major facilities (including any U.S. Government owned facilities) and/or major test or experiment equipment that is critical for carrying out the proposed project that is already available or would need to be purchased in order to carry out the proposed investigation. In the latter case, these costs must be entered in the proposal *Budget Summary* and described in the *Budget Details* (see further below).

- *Education and Public Outreach (E/PO) Proposal*. Although optional, proposals for K-12 E/PO efforts are encouraged as an addition to proposals submitted in response to this NRA. An E/PO Co-Investigator may be identified for this portion of the proposal who will carry the prime responsibility for completing the E/PO work (e.g., a qualified colleague from the PI's institution or educational institution such as a public school, museum, planetarium, etc.). The concluding section of Appendix A contains detailed information about the criteria and submission procedures for this program. Note: A separate NASA OSS budget exists to fund such efforts, so an E/PO award will be in addition to the budget for the proposed "parent" research investigation.

- *Curriculum Vitae* [Reference: Appendix B.(c)(6)]. The PI must include a *Vitae*, not to exceed three pages, that includes his/her professional background and a bibliography of publications relevant to the proposal. A one page *Vitae* for each Co-I may be included.

- *Current and Pending Support* [Reference: Appendix B.(c)(10)]. Information must be provided for all ongoing and pending projects and proposals that involve the proposing PI and any Co-I's who are expected to perform a major share of the proposed work. In particular, provide the following information,

- Project Title,
- Sponsoring agency or institution (including point of contact),
- Proposed period of performance and budget, and
- Commitment by PI in terms of Full Time Equivalent (FTE) Work Year,

for each such individual and for each of the two categories of awards, namely,

- A. Current Awards (for any of the period that overlaps with the submitted proposal), and
- B. Pending Awards (including the submitted proposal).

In addition, provide the name of any other institution, including the point of contact with telephone number, to which the proposal (or any part thereof) submitted to this NRA has been or will be submitted for consideration of funding. For such pending research, the PI must notify the Program Scientist identified for this NRA immediately of any proposals that are awarded anytime after the proposal Due Date for this NRA until the time of NASA's selections.

- *Co-I and Collaborator Letter(s) of Commitment.* Every Co-Investigator and/or Collaborator identified as a participant in the proposal's *Scientific/Technical/Management Section* must submit a brief, signed letter of commitment that acknowledges his/her participation. In the case of more than one Co-I and/or Collaborator, a single, multiply-signed letter is preferred to minimize proposal size. In any case, each letter should be addressed to the PI, may be a facsimile, and is required even if the Co-I or Collaborator is from the PI's own institution. The text of this letter should contain the following, or approximately similar, language:

“I(we) acknowledge that I(we) am(are) identified by name as Co-Investigator(s) [or Collaborator(s)] to the investigation entitled <name of proposal> that is submitted by <name of Principal Investigator> to the NASA Research Announcement <alpha-numeric identifier> and that I(we) intend to carry out all responsibilities identified for me(us) in this proposal.”

- *Progress Report.* In accordance with the provisions of Section 3 above, if the proposal is considered to be a logical, follow-on extension of an existing award, a *Progress Report* for the final year of that existing award must be included before a new award will be implemented (assuming that this new proposal is selected).
- *Budget Summary* [Reference: Appendix B.(c)(8)]. Using the form given at end of this Appendix, a proposal must contain a *Budget Summary* for each year of the proposed effort filled out in accordance with the *Instructions for Budget Summary* on the page that follows this form (Note: special attention is directed to the discussion of the item 2. *Equipment* on the *Instructions* sheet regarding the proposed purchase of personal computers and/or commercially available software, both of which are considered to be “general purpose equipment.” In the event that a proposal is selected for award, failure to adequately address the provisions of the *Instructions* for item 2.c will require that the NASA awards office contact the proposing institution for the required information, which may delay the award until the purchase is either justified as a direct charge for general purpose equipment or is rebudgeted as an indirect expense.)

- *Budget Details.* In addition to the *Budget Summary* discussed above and in accordance with the *Instructions for Budget Summary* given in Section 6 of this Appendix, the proposing institution must append sufficient details in narrative format to allow a full understanding of and justification for the proposed budget.
- *Institutional Budget.* The proposing institution may append their proposed budget in their format of choice and without page limit. Note: By 2000, NASA is expected to be operating on the basis of full cost accounting; until then, NASA Center proposals should use the accounting practices that are specified at the time proposals are due.
- *Reprints/Preprints.* Up to two reprints and/or preprints for peer-reviewed publication that are considered critical to the proposal's understanding and/or background may be appended. Nevertheless, note that reviewers will be asked to base their judgments of the merits of a proposal only on its *Scientific/Technical/Management Section*; therefore, proposers should ensure the self consistency and completeness of that *Section*.

6. Forms and Certifications

The following pages contain the required *Budget Summary* form, the *Instructions for Budget Summary*, and, for reference only, copies of the three currently required *Certifications*. A reasonable facsimile of this *Budget Summary* form may be generated by the proposer for submission so long as it contains all the indicated information and lines.

BUDGET SUMMARY

For period from _____ to _____

- Provide a complete Budget Summary for year one and separate estimated for each subsequent year.
- Enter the proposed estimated costs in Column A (Columns B & C for NASA use only).
- Provide as attachments detailed computations of all estimates in each cost category with narratives as required to fully explain each proposed cost. See *Instructions For Budget Summary* on following page for details.

	A	 NASA USE ONLY 	
		B	C
1. <u>Direct Labor</u> (salaries, wages, and fringe benefits)	_____	_____	_____
2. <u>Other Direct Costs:</u>			
a. Subcontracts	_____	_____	_____
b. Consultants	_____	_____	_____
c. Equipment	_____	_____	_____
d. Supplies	_____	_____	_____
e. Travel	_____	_____	_____
f. Other	_____	_____	_____
3. <u>Facilities and Administrative Costs</u>	_____	_____	_____
4. <u>Other Applicable Costs:</u>	_____	_____	_____
5. <u>SUBTOTAL--Estimated Costs</u>	_____	_____	_____
6. <u>Less Proposed Cost Sharing</u> (if any)	_____	_____	_____
7. <u>Carryover Funds</u> (if any)			
a. Anticipated amount : _____			
b. Amount used to reduce budget	_____	_____	_____
8. <u>Total Estimated Costs</u>	_____	_____	XXXXXX
9. APPROVED BUDGET	XXXXXX	XXXXXX	_____

INSTRUCTIONS FOR BUDGET SUMMARY

1. **Direct Labor (salaries, wages, and fringe benefits):** Attachments should list the number and titles of personnel, amounts of time to be devoted to the grant, and rates of pay.

2. **Other Direct Costs:**
 - a. **Subcontracts:** Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
 - b. **Consultants:** Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay (not to exceed the equivalent of the daily rate for Level IV of the Executive Schedule, exclusive of expenses and indirect costs).
 - c. **Equipment:** List separately. Explain the need for items costing more than \$5,000. Describe basis for estimated cost. General purpose equipment is not allowable as a direct cost unless specifically approved by the NASA Grant Officer. Any equipment purchase requested to be made as a direct charge under this award must include the equipment description, how it will be used in the conduct of the basic research proposed and why it cannot be purchased with indirect funds.
 - d. **Supplies:** Provide general categories of needed supplies, the method of acquisition, and the estimated cost.
 - e. **Travel:** Describe the purpose of the proposed travel in relation to the grant and provide the basis of estimate, including information on destination and number of travelers where known.
 - f. **Other:** Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list explaining the need for each item and the basis for the estimate.

3. **Facilities and Administrative (F&A) Costs:** Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the indirect expense pool and corresponding allocation base for each rate.

4. **Other Applicable Costs:** Enter total explaining the need for each item.

5. **Subtotal-Estimated Costs:** Enter the sum of items 1 through 4.

6. **Less Proposed Cost Sharing (if any):** Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment.

7. **Carryover Funds (if any):** Enter the dollar amount of any funds expected to be available for carryover from the prior budget period. Identify how the funds will be used if they are not used to reduce the budget. NASA officials will decide whether to use all or part of the anticipated carryover to reduce the budget (not applicable to 2nd-year and subsequent-year budgets submitted for award of a multiple year award).

8. **Total Estimated Costs:** Enter the total after subtracting items 6 and 7b from item 5.

**Certification Regarding Debarment, Suspension, and Other Responsibility Matters
Primary Covered Transactions**

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participant's responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160-19211).

- (1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
 - (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
 - (d) Have not within three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.
- (2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Certification Regarding Lobbying

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000, and not more than \$100,000 for each such failure.

**Certification of Compliance with the NASA Regulations Pursuant to
Nondiscrimination in Federally Assisted Programs**

The (*Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant "*) hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1962 (20 U.S. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S. 794), and the Age Discrimination Act of 1975 (42 U.S. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognized and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign on behalf of the Applicant.

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