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National Aeronautics and
Space Administration

Research Announcement

Research Opportunities
in
Space Life Sciences

Fundamental Space Biology
Ground-Based Research

A Research Announcement for the
Fundamental Space Biology Division

Notices of Intent Due: November 17, 2000
Proposals Due: January 19, 2001

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This National Aeronautics and Space Administration (NASA) Research Announcement (NRA) solicits proposals for new research in Fundamental Space Biology (FSB). This research uses the space environment to increase knowledge of biological processes, serves as the biological foundation in support of exploration, and enriches life on Earth through the use of space technology and the application of this knowledge. This research supports NASA's mission and the Office of Biological and Physical Research Strategic Plan. All participants in this NRA are strongly encouraged to promote general scientific literacy and public understanding of life sciences, the space environment, and the Office of Biological and Physical Research programs through formal and informal education opportunities. Where appropriate, supported investigators will be required to produce, in collaboration with NASA, a plan for communicating their work to the public.

This NRA is organized, such that

- Appendix A provides a detailed description of the research areas solicited by this Announcement.
- Appendix B contains specific instructions for this NRA and relevant application forms.
- Appendix C contains general instructions applicable to the preparation of proposals in response to NASA Research Announcements.
- The *Space Life Sciences Ground Facilities Information Package* describes the capabilities of ground-based facilities available to investigators, and procedures for their use.

Proposals submitted in response to this Announcement must address the research emphases defined in this Announcement. Those that do not will be returned to the proposer. **This Research Announcement does not solicit flight research**. It is anticipated that a solicitation for flight proposals will occur in early 2001. Other Announcements calling for focused research or utilization of unique resources may be issued throughout the year. Unsolicited proposals received at other times during the year will be held until the next annual review period if the proposed research is relevant to the programs described in this Announcement. However, NASA reserves the right to act in the best interest of the federal government in the matter of proposal acceptance and evaluation.

Proposals will be funded in one-year increments for activities lasting up to three years. The funding duration will depend on proposal requirements, review panel recommendations, and continuing progress of the activity. All proposals will be evaluated for overall scientific and technical merit by independent peer-review panels. Relevance to NASA's programmatic needs and goals will be evaluated separately by NASA. The government's obligation to make awards is contingent upon the availability of appropriated funds from which payment for award purposes can be made, and the receipt of proposals that the government determines are acceptable for award under this NRA. It is anticipated that a typical award will average $150,000 (total annual costs). The total annual cost for ground research may not exceed $350,000. NASA does not provide separate funding for direct and indirect costs; thus, the amount of the award requested is the total of all costs submitted in the proposed budget. It is planned for selections to be announced by May 2001 and grants or contracts awarded shortly thereafter.

Participation in this Announcement is open to all categories of organizations, industry, educational institutions, other nonprofit organizations, NASA laboratories, and other government agencies.

A notice of intent to propose is requested by November 17, 2000 (see Instructions, Appendix B of this Announcement). Notices of intent should be submitted via the World Wide Web (www) at:

http://peer1.idi.usra.edu/expro/noi/00_OBPR_01_noi.cfn

If you do not have access to the www, you may submit a notice of intent via email to:

noi@hq.nasa.gov

The subject heading of the e-mail message should read "Notice of Intent-00-OBPR-01." If you do not have access to e-mail, you may submit a notice of intent by U.S. Postal Service or commercial delivery to the address listed below for proposal submission.

Proposals may not be submitted electronically. Proposals must be received by 4:30 PM Eastern Time. Proposals and notices of intent mailed through the U.S. Postal Service by express, first class, registered, or certified mail are to be sent to the following address:

NASA Peer Review Services
SUBJECT: Fundamental Space Biology Research Proposal
500 E Street, SW
Suite 200
Washington, DC 20024

Proposals and notices of intent that are hand delivered or sent by commercial delivery or courier services are to be delivered to the above address between 8:00 AM and 4:30 PM. The telephone number, 202-479-9030, may be used when required for reference by delivery services. NASA Peer Review Services (NPRS) cannot receive deliveries on Saturdays, Sundays, or federal holidays. Upon receiving a proposal, NPRS will send notification to the proposer confirming its

arrival; however, there will not be a response from the Fundamental Space Biology Program office. Please submit proposals to the NASA Peer Review Service by January 19, 2001.

In order to be accepted as a complete submission, proposals **must include** completed copies of the appropriate forms provided in Appendix B.

The following items apply only to this Announcement:

Solicitation Announcement Identifier:	NRA 00-OBPR-01
Number of Copies Required:	Original + 25 copies
Notices of Intent Due:	November 17, 2000
Proposals Due:	January 19, 2001
Selection Announcement:	April 2001
Funding Begins:	May 2001
Selecting Official:	Director Fundamental Space Biology Division Office of Biological and Physical Research

Additional information is available from:

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This Announcement will be updated and issued annually and is the primary means of obtaining research proposals from the Fundamental Space Biology life sciences community. This Announcement is restricted to the program named above and described in detail in Appendix A. Potential proposers should read with care the program descriptions that are of interest, and focus their proposals on the specific research emphases defined in this Announcement.

Your interest and cooperation in participating in this effort is appreciated.

Original Signed by

Kathie L. Olsen, Ph.D.
Acting Associate Administrator
Biological and Physical Research

APPENDIX A
NRA 00-OBPR-01

Fundamental Space Biology

I. Introduction

The major goals of NASA's Fundamental Space Biology Division, located within the Office of Biological and Physical Research, are to:

- Effectively use gravity and microgravity and the other characteristics of the space environment to enhance our understanding of fundamental biological processes.
- Develop the fundamental biological knowledge to enable a long-duration human presence in space and to support other NASA biologically related activities.
- Apply this knowledge and technology to improve our nation's competitiveness, education, and quality of life on Earth.

This program contains several elements which extend from basic research related to the effects of the space environment on molecular and cellular processes to the interaction of species in environmental systems (http://www.funbio.arc.nasa.gov/). In addition, the Division supports the utilization of specialized NASA ground-based facilities and the development of special technologies required in the pursuit of its research goals. Proposers can access NASA specialized ground-based facilities for their research. Please refer to the *Space Life Sciences Ground Facilities Information Package* (see Appendix A, section VII) for instructions on how to incorporate the use of these facilities into a proposal.

This Appendix defines the research program and elements encompassed by this Announcement, describes the specific areas of ground-based research that proposals should address, and describes the specific emphases that are acceptable for submission in response to this Announcement. **This NRA does not request proposals for flight research**. It is important that the prospective investigator read the relevant section(s) carefully, as many of the programmatic emphases are different from those appearing in previous Division Announcements. In addition, this Appendix includes guidelines for preparing and submitting proposals, and defines the administrative policies governing the program and proposers.

II. Research Program and Emphases

Program Description

The major scientific objective of Fundamental Space Biology is to expand our understanding of fundamental biological processes, and the mechanisms by which these processes sense, respond, and adapt to, and evolve in, the space environment.

The objectives include, but are not limited to, discovery of:

- how physical forces encountered in spaceflight impact biological structure and function
- the role of the genome and cellular structures in sensing and responding to gravitational force
- whether, and to what extent, normal development of cells, systems, and organisms depends on gravitational force
- how and for what purposes different organisms in the animal and plant kingdom sense and use gravity
- the role of gravity in evolution
- the role of gravity in determining how the structure, function, and interactions of space and planetary ecosystems change over time

Objectives are accomplished using a spectrum of gravitational conditions or model systems (e.g., hypergravity, simulated hypogravity, microgravity, and other appropriate models of gravity effects) as research tools or by determining the effects of the interaction of gravity (hypergravity or microgravity) with other space environmental factors (e.g., radiation) on biological systems. The emphasis is on using these gravitational research tools to advance fundamental knowledge in the biological sciences. Research that applies this knowledge to NASA's other goals of enabling human exploration of space and improving the quality of life on Earth is also encouraged.

Studies may include animals (including humans), plants, tissues, or cells. Researchers should use species most appropriate for their research and are encouraged to take advantage of functionally characterized transgenic and mutant species as well as comparative biological approaches that enhance the research scope. Note that assurance of compliance with applicable federal regulations regarding human subjects or animal care and use is required as part of the proposal submission process (see the "Special Matters" instructions in Appendix B).

Elements and Emphases for FY 2001

The Fundamental Space Biology Division is interested in basic research which addresses the effects of the space environment on animal and plant systems across a range of model organisms. In FY 2001, however, high priority will be given to proposals using vertebrate cell culture, *C. elegans* and *Drosophila melanogaster* as model systems. Additionally, animal systems that are known, or believed, to be influenced by gravitational force (e.g., bone, muscle, endocrine system,

neurological and vestibular systems) or by other aspects of the space environment (e.g., stress-induced phenomena) will be emphasized. It should be noted that in order to achieve program balance specific topics that are currently well represented in our portfolio will be de-emphasized. Proposers are encouraged to review summaries of the research currently funded in this Program by accessing the Life Sciences Program Tasks and Bibliography (Life Sciences Task Book) at:

http://peer1.idi.usra.edu/peer_review/taskbook/taskbook.html

1. Molecular Structures and Physical Interactions

This element emphasizes physical effects of the space flight environment on cells and organisms. These physical effects may include static boundary layer effects on gas exchange, changes in heat transfer, lack of convective fluid movements, and alterations in diffusion-limited metabolic processes. This element seeks to determine how these factors affect the growth, development, and function of single-celled and multicellular organisms.

2. Developmental Biology

NASA's goals in developmental biology are to determine the role of gravity in normal development and function, how gravity and other aspects of the space environment may affect the capacity of organisms to reproduce, and the mechanisms by which subsequent generations are affected. Research in this area should focus on elucidating the influence of gravity during critical periods of development, including neural and vestibular development. Also, the effect of the space environment on behavior, reproduction, life span, senescence, and subsequent generations is of interest. Examples of important issues concerning developmental biology in space are whether; 1) normal development depends on gravity exposure during critical periods of development, especially for the vestibular and motor systems and the multiple sensory systems that interact with them, 2) exposure to the microgravity environment results in irreversible changes in morphology and function in adulthood, and 3) an organism can undergo a complete life cycle or several life cycles in the microgravity environment. Appropriate hypergravity or microgravity simulation ground research studies should be considered as suitable precursors to future flight studies.

3. Cellular and Molecular Biology

The principal aim of this element is to support research at the genetic, molecular, and cellular levels to elucidate specific cellular phenomena that are affected by conditions of microgravity and to develop an understanding of the molecular mechanisms by which these changes are induced. Research in this area should address how basic cellular function and properties (e.g., mechanoreception, signal transduction, gene regulation and expression, integrin function and structure, cytoskeletal structure and function etc.) may be directly or indirectly impacted by altered gravitational force and other space related effects. Of particular interest is how the space environment may affect cellular processes such as regulation of the cell cycle, apoptosis, cell senescence, cell growth, nerve cell process formation, and response to injury in nerve cells.

Cellular and molecular studies that begin to suggest countermeasure strategies for the physiological changes seen in whole animals in response to the space environment are also highly encouraged.

4. Organismal and Comparative Biology

The organismal element seeks to use the comparative approach to understand how whole organisms transduce, perceive, integrate, and respond to a gravitational force; the effect of hypergravity and hypogravity on developmental, regenerative, and reproductive processes; the regulation of physiological systems (e.g., the nervous system); and how gravity and other environmental factors interact. The comparative element elucidates the physiological, cellular, and molecular mechanisms of the effects of gravity and space flight on the growth, development, composition, and physiological and behavioral functions of animals and higher plants across the phylogenetic scale.

5. Gravitational Ecology

This element invites proposals directed at understanding how gravity might affect the structure, function, and possibly the evolution or stability of ecosystems, particularly as they might relate to spacecraft or planetary habitats. By conducting ecological research at different gravity and space radiation levels, it will be possible to determine the influence of those factors on the function of ecosystems and their interaction with the characteristics of life support system environments for human crews. Examples of such research might include studies of chemical or pathogen species released by one organism that may have important characteristics that impact other organisms.

6. Evolutionary Biology

This element invites proposals which address the evolutionary transitions that have occurred from the emergence of multicellular organisms to the present, and the fundamental pathways and mechanisms responsible for these transitions. Areas of interest include; the evolution of the gravity response, developmental mechanisms involved in the evolution of metazoan body plans, evolutionary diversification of gene regulatory systems, and investigation of the phylogenetic origins of metazoa. Also of interest are projects which employ rapid-cycling metaphytan and metazoan laboratory-based model systems and research which applies insights gained from the study of Earth organisms to the potential evolution of Earth-life transitioning to extraterrestrial environments. Research may include the experimental analysis of the role of gravity in the evolution of multicellular organisms and/or biological diversity. Proposed research may use any group of organisms from microbes and fungi to multicellular plants and animals.

III. Proposal Evaluation and Awards Selection Process

The following information is specific to this NRA and **supercedes** the information contained in Sections I and J of Appendix C, *Instructions for Responding to NASA Research Announcements.*

All proposals must comply with the general requirements of the Announcement as described in both Appendices B and C. Appendix B contains FSB-specific requirements and explanations for each section of the proposal above and beyond NASA-specified requirements. Appendix C outlines the NASA-specified requirements for proposal submission and should be used for clarification and reference. Upon receipt, proposals will be reviewed for compliance with the requirements of this Announcement. This includes:

1. Submission of complete proposals specified in this Announcement. Proposals must be responsive to the areas of program element emphasis described in this Announcement and include a project description that is not more than 20 pages in length.
2. Submission of appropriate Institutional Review Board (IRB) or Animal Care and Use Committee (ACUC) certification for all proposals using human or animal test subjects.
3. Submission of a budget that is within the guidelines specified in this Announcement and is for a funding period not exceeding three years in duration.
4. Proposals that are revised versions of proposals previously submitted to NASA must be clearly designated as such on the proposal cover page (Form A), and must contain an explanation of how the revised proposal has addressed criticisms from previous NASA review. This explanation should be presented in a separate section of **no more that two pages at the beginning of the project description**, and is in addition to the 20 pages allowed for the project description. Related changes to the research plan should be highlighted in the body of the project description.
5. Submission of all other appropriate forms as required by this NASA Research Announcement (refer to Appendix B).

Note: At NASA's discretion, non-compliant proposals may be withdrawn from the review process and returned to the proposer without further review.

Compliant proposals submitted in response to this Announcement will undergo an intrinsic scientific or technical merit review. Proposals receiving a passing score in this review will then undergo evaluation of NASA programmatic relevance and cost.

A. Intrinsic Scientific or Technical Merit Review

The **first review tier** will be a merit review by a panel of scientific or technical experts. The number and diversity of experts required will be determined by the response to this NRA and by the variety of disciplines represented in the proposals relevant to the research emphases described in Section II of this Appendix. The merit review panel will assign ***a score from 0-100*** or a score of "not recommended for further consideration" based upon the intrinsic scientific or technical merit of the proposal. This score will reflect the consensus of the panel.

The score assigned by this panel ***will not be affected by the cost of the proposed work nor will it reflect the programmatic relevance of the proposed work to NASA***. However, the panel will be asked to include in their critique of each proposal any comments they may have concerning the proposal's budget and relevance to NASA.

All of the following will be used in determining the merit score:

- **Significance:** Does this study address an important problem? If the aims of the application are achieved, how will scientific knowledge or technology be advanced? What will be the effect of these studies on the concepts, methods, or products that drive this field? Is there a significant societal or economic impact?
- **Approach:** Are the conceptual framework, design, methods, and analyses adequately developed, well integrated, and appropriate to the aims of the project? Is the proposed approach likely to yield the desired results? Does the applicant acknowledge potential problem areas and consider alternative tactics?
- **Innovation:** Does the project employ appropriate novel concepts, approaches, or methods? Are the aims original and innovative? Does the project challenge existing paradigms or develop new methodologies or technologies?
- **Investigator:** Is the investigator appropriately trained and well suited to carry out this work? Is the work proposed appropriate to the experience level of the principal investigator and any co-investigators? Is the evidence of the investigator's productivity satisfactory?
- **Environment:** Does the scientific environment in which the work will be performed contribute to the probability of success? Do the proposed experiments take advantage of unique features of the scientific environment or employ useful collaborative arrangements? Is there evidence of institutional support?

B. Evaluation of Programmatic Relevance and Cost

The **second review** will evaluate the programmatic relevance and cost of all proposed work. This review will be conducted by NASA program scientists and managers. Evaluation of the cost of a proposed effort includes consideration of the realism and reasonableness of the proposed cost and the relationship of the proposed cost to available funds. Programmatic relevance will include an evaluation of how the proposed work may help achieve an appropriate

balance of scientific and technical tasks required by critical research issues faced by the FSB Division.

C. Development of Selection Recommendation

The information resulting from these two levels of review, as described above, will be used to prepare a **selection recommendation** developed by NASA program scientists and managers for each of the program elements described in this Announcement. This recommendation will be based on:

1. The scientific or technical merit review score from the peer review panel.
2. The programmatic relevance.
3. Cost of each proposal.

This **selection recommendation** is the responsibility of the NASA program scientist(s). Selection for funding will be made by the Director of the Fundamental Space Biology Division.

IV. Eligibility

All categories of U.S. institutions are eligible to submit proposals in response to this NRA. Principal Investigators may collaborate with universities, Federal Government laboratories, the private sector, and state and local government laboratories. In all such arrangements, the applying entity is expected to be responsible for administering the project according to the management approach presented in the proposal.

The applying entity must have in place a documented base of ongoing high quality research in science and technology or in those areas of science and engineering clearly relevant to the specific programmatic objectives and research emphases indicated in this Announcement. Present or prior support by NASA of research or training in any institution or for any investigator is not a prerequisite to submission of a proposal or a competing factor in the selection process.

All types of institutions are eligible to submit proposals in response to this NRA, but only approved proposals from U.S. institutions will be selected for funding.

V. Foreign Proposals

Only ground-based proposals submitted in response to this NRA from U.S. entities, or from non-U.S. entities which involve substantive co-investigator collaboration from a U.S. entity, will be reviewed. U.S. co-investigators who are collaborating on such proposals with non-U.S. entities must ensure that their scientific role is clearly delineated in the proposal, that their expertise is shown to make a substantial contribution, and that their funding requirements are included in the proposal. Proposals from non-U.S. entities with significant co-investigator collaboration from a U.S. entity, must be endorsed by the respective government agency or funding/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 if

the proposal is selected, sufficient funds will be made available to undertake the activity as proposed. This Letter of Endorsement from the sponsoring non-U.S. government agency or funding/sponsoring institution should be forwarded along with the proposal.

All proposals from non-U.S. entities which involve substantive co-investigator collaboration from a U.S. entity must be typewritten in English and comply with all other submission requirements stated in this NRA. These proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received on or before January 19, 2001. Sponsoring foreign government agencies or funding institutions for proposals from non-U.S. entities meeting the above guidelines may, in exceptional situations, forward a proposal without endorsement to the above address if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office 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 sponsoring office. Copies of these letters will be sent to the sponsoring government agency or funding institution. Should a non-U.S. proposal with significant U.S. participation be selected, NASA's Office of External Relations will arrange with the foreign sponsoring agency or funding institution for the proposed participation on a non-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

Depending on the nature and extent of the proposed cooperation, this arrangement may entail:

1. A letter of notification by NASA;
2. An exchange of letters between NASA and the sponsoring foreign governmental agency; or
3. A formal Agency-to-Agency Memorandum of Understanding (MOU).

Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.

(1) Foreign proposals and proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not be limited to, whether or not the foreign participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at http://www.pmdtc.org and http://www.bxa.doc.gov. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations

(ITAR), 22 CFR Parts 120-130.

VI. Program Reporting

It is expected that results from funded research will be submitted to peer-reviewed journals as the work progresses. Only published papers that acknowledge NASA's support and identify the grant or contract will be counted as resulting from the research project and used to evaluate its productivity.

Annual Reporting. Investigators will be expected to provide NASA with annual summary information. This information will consist primarily of:

- an abstract
- a bibliographic list
- copies of publications
- a statement of progress
- potential scientific, technological, economic or societal impact

This information will be made available to the scientific community and will be used to assess the strength of the Division's programs. It will also serve as the basis for determining the degree of progress of the project.

Annual Task Book Reporting. The Office of Biological and Physical Research publishes a comprehensive annual document titled Life Sciences Tasks and Bibliography (Life Sciences Task Book) which includes descriptions of all peer-reviewed activities funded by the division during the previous fiscal year. Since its inception in fiscal year 1995, the Task Book has served as an invaluable source of information for NASA Life Sciences as well as the scientific and technical communities.

Investigators are required to provide information for this publication on an annual basis. Please note that this requirement is in addition to the annual report which investigators are required to submit at the end of each funding cycle. Supplying the requested information for the Life Sciences Task Book does NOT fulfill the requirement for the annual report. Unlike the annual report, information requested for the Task Book must be for the government's fiscal year rather than the project funding cycle and brief.

The information requested for inclusion in the Task Book consists primarily of:

- an abstract
- a brief statement of progress during the fiscal year
- a brief statement of benefits of the research with respect to life on Earth
- a bibliographic list for the fiscal year
- a copy or reprint of each publication listed in the bibliography for the fiscal year
- a listing of presentations or activities conducted at K-12 educational institutions

- a listing of interactions, presentations, or other activities with the general public

Note that although this publication will be made available to the general scientific community, it is not a substitute for traditional scientific reporting in journals and elsewhere.

Final Report A final report is required that shall include all peer-reviewed publications.

VII. Bibliography

1. **Life Sciences Program Tasks and Bibliography (Task Book)** for FY 1995 through FY 1999 are available on-line at the following World Wide Web address:
   http://peer1.idi.usra.edu/peer_review/taskbook/taskbook.html

2. **Space Life Sciences Ground Facilities Information Package**, this document is available on-line at the following World Wide Web address:
   http://peer1.idi.usra.edu/peer_review/nra/00_OBPR_01_gfip.html

3 **SPACELINE**, an on-line bibliographic database, is available for searching for references to publications about space life sciences research. A cooperative venture between NASA's Office of Biological and Physical Research and the National Library of Medicine (NLM), SPACELINE is similar in structure to NLM's MEDLINE database. Individuals can perform their own searches with the new web-based interface. Additional information may be obtained from the SPACELINE Office. Phone: 301-295-2482;
   email: **SPACELINE@usuhs.mil**
   Web address 1: **http://spaceline.usuhs.mil**
   Web address 2: **http://igm.nlm.nih.gov** (MEDLINE)

4. **The Space Life Sciences Data Archive (LSDA)** is an on-line database containing descriptions and results of completed NASA-sponsored flight experiments. Descriptions are included of experiments, missions, procedures, hardware, biospecimens collected, personnel, and documents. Biospecimens that are available for research purposes are described in detail. A limited number of experiments contain final reports and spreadsheet data suitable for downloading. Data from human subjects are unavailable online for reasons of privacy.

   Internet access: **http://lsda.jsc.nasa.gov**
   LSDA Help Desk: (281) 483-7876
   Email: lsda@semail.jsc.nasa.gov

5. **Center for Advanced Studies in the Space Life Sciences** contains a list of workshops and seminars sponsored by the Center. The proceedings and final reports of these workshops are also posted as they become available. Web address:
   http://www.mbl.edu/html/NASA/

6. **Medical Policies and Requirements Document**. National Aeronautics and Space Administration, Medical Policy Board. Arnauld Nicogossian, Chairperson. NASA Headquarters. This document is currently in revision. Please contact Dr. Richard Williams (202-358-4410) for more information.

7. **A Strategy for Research in Space Biology and Medicine in the New Century.** National Academy of Science. National Research Council Committee on Space Biology

and Medicine. Mary J. Osborn, Committee Chairperson. 1998. Washington D.C: National Academy Press. Web address: **http://www.nas.edu/ssb/csbm1.html**

8 **NASA Strategic Program Plan for Space Radiation Research**, available on the internet at: **http://www.hq.nasa.gov/office/olmsa/lifesci/Strategic_Plan.pdf**

9. **Space Physiology and Medicine, 3rd ed**. A. Nicogossian, C. Huntoon, and S. Pool. (Eds.). 1994. Philadelphia, PA: Lea & Febiger.

10. **Cell & Molecular Biology Research in Space**. *The FASEB Journal*, Vol. 13, Supplement, 1999.

11. **Guidance on Radiation Received in Space Activities**. July 31, 1989. NCRP Report 98. Bethesda, MD: National Council on Radiation Protection and Measurements.

12. **Workshop on Space Flight Validation of Radiation Risk**. January 24-26, 1996. Universities Space Research Association, 3600 Bay Area Boulevard, Houston, TX 77058

13. **Shielding Strategies for Human Space Exploration**. J. W. Wilson, J. Miller, A. Konradi and F. A. Cucinotta, Editors. NASA CP-3360, December 1997, pp. 456. Also available from the NASA Langley Technical Reports Server at: **http://techreports.larc.nasa.gov/ltrs/ltrs.html**

14. **Acceptability of Risk From Radiation - Application to Human Space Flight**. April 30, 1997. Symposium Proceedings No. 3. Bethesda, MD: National Council on Radiation Protection and Measurements.

15. **Modeling Human Risk: Cell & Molecular Biology in Context**. June, 1997. Ernest Orlando Lawrence Berkeley National Laboratory Report LBNL-40278. Berkeley, CA

16. **Radiation Hazards to Crews of Interplanetary Missions: Biological Issues and Research Strategies**. 1996. Washington, DC. Task Group on the Biological Effects of Space Radiation. Space Studies Board Commission on Physical Sciences, Mathematics and Applications, National Research Council. National Academy Press.

17. **Task Force on Countermeasures**. This report incorporates the output of the Countermeasures Task Force, the Vestibular Countermeasures Task Group, and the Behavior and Performance Working Group into a unified document. Available at: **http://peer1.idi.usra.edu/peer_review/prog/countermeasures/countermeasures.html** or (202) 358-4180.

18. **Plant Biology in Space: Proceedings of the International Workshop**. *Planta,* Supplement to Volume 203, 1997.

19. **International Workshop on Cardiovascular Research in Space**. *Medicine and Science in Sports and Exercise*, Volume 28, Number 10 Supplement, 1996.

20. **Muscle Research in Space: International Workshop**. *International Journal of Sports Medicine*, Volume 18, Supplement 4, S257-S331, 1997.

21. **Space Neuroscience Research**. *Brain Research Reviews*, Volume 28, Numbers 1/2, Special Issue, 1998.

22. **International Workshop on Bone Research in Space**. *Bone, Official Journal of the International Bone and Mineral Society*, Volume 22, Number 5 (Supplement), 1999.

**Obtaining cited papers*:
Many of the documents may be ordered through your library or through the National Technical Information Service (NTIS). Documents available through NTIS are accompanied by their NTIS order number and price. To order a document through NTIS, call 1-800-553-6847. If you are unable to locate a document through this means, please contact NASA Peer Review Services at 202-479-9030.

APPENDIX B
NRA 00-OBPR-01

Fundamental Space Biology NRA Requirements and Application Forms

This section contains the general instructions for notice of intent and proposal preparation and submission, including the specific forms required for proposal submission in response to agency solicitations in Fundamental Space Biology in 2001. Information presented in this Appendix is specific to this NRA and explains and enumerates Program requirements above and beyond those presented in Appendix C. For further clarification of each requirement, please refer to the appropriate section of Appendix C. The forms at the end of this section include the following:

Form A	Solicited Proposal Application
Form B	Proposal Abstract
Form C	Biographical Sketch
Form D	Other Support
Form E	Detailed Budget, First Year
Form F	Detailed Budget, Entire Project Period
Form G	Checklist for Proposers

Instructions for Notice of Intent Submission

To facilitate proposal processing, potential Principal Investigators are requested to confirm plans to submit a proposal responding to this Announcement by sending a notice of intent to propose. As stated previously (see Research Announcement, Pages 2 and 3) the notice of intent, which is not binding, should be submitted electronically by November 17, 2000. If you do not have access to electronic submission, you may submit a notice of intent by U.S. Postal Service or commercial delivery in the same manner as proposals.

As detailed on the electronic notice of intent submission form, the notice of intent should contain:

- A descriptive title of the research or technical proposal
- The names, addresses, and telephone numbers of a single Principal Investigator and all Co-Investigators
- The major participating institutions
- A brief summary describing the proposed research and clearly indicating the FSB program element(s) defined in this Announcement that is/are most relevant to the proposal
- The proposal type: ground-based versus flight research
- Up to six (6) key words that best describe the research area of the pending proposal

Instructions for Proposal Preparation

An original signed proposal, plus twenty-five (25) complete copies of the proposal and one 3.5-inch computer disk, should be mailed to the address indicated, and in the manner described, in the Research Announcement on Page 2 of this document.

All proposals must include each of the forms provided in this Appendix as part of the complete submission. The name of the Principal Investigator should appear in the upper right hand corner of each page of the proposal, except on the forms in this Appendix where special places are provided for this information. Note that the proposal must specify the period of performance for the work described; periods of performance may be for any duration up to three (3) years but should be suitable for the project proposed.

The proposal must include the following material, in this order:

(1) Cover Page: Solicited Proposal Application (Form A), including certification of compliance with U.S. code (if applicable). One signed original required.

For Item (7) on this form, new means that a proposal for this project has not been submitted to NASA from 1997 to 1999, renewal means that this proposal is for the continuation of a currently funded task beyond the term of the funded proposal, and revised means that this proposal represents a revision of a proposal submitted to NASA and reviewed from 1997 to 1999, but not funded. A proposal previously submitted but not funded should be termed revised even if the original Principal Investigator has changed for 2001. Renewal and revised applications should contain special material described in the Project Description section below. This form meets the requirements of the transmittal memo described in Appendix C, Section C (1).

(2) Proposal Abstract (Form B)

Includes a concise description of the objectives and methods of approach in less than 300 words. The information requested on this form is essential to the review of the

proposal. It determines how the application will be evaluated and which program manager(s) will receive the final review materials.

(3) Proposal Title Page, with Notice on Restriction on Use and Disclosure of Proposal Information, if any (see Appendix C for details).

(4) Project Description

The length of the Project Description section of the proposal cannot exceed 20 pages using regular (12 point) type. Referenced figures must be included in the 20 pages of the Project Description. The Bibliography section is not considered part of the 20 page project description. Proposals that exceed the 20-page limit for the project description (22 pages for revised proposals; see below) will not be reviewed. The proposal should contain sufficient detail to enable reviewers to make informed judgments about the overall merit of the proposed research and about the probability that the investigators will be able to accomplish their stated objectives with current resources and the resources requested. In addition, the proposal should clearly indicate the relationship between the proposed work and the research emphases defined in this Announcement. Reviewers are not required to consider information presented as appendices or to view and/or consider weblinks in their evaluation of the proposal.

Renewal applications (for competing renewal of currently funded activity). Results and evidence of progress of the associated NASA supported research must be presented as part of the project description

Revised applications (revisions of 1997, 1998 or 1999 submissions) must be so designated on the proposal cover page and explained in the project description. This explanation should be presented in a separate section of **no more that two pages at the beginning of the project description**, and is in addition to the 20 pages allowed for the project description. Related changes to the research plan should be highlighted in the body of the project description. Changes within the proposal may be highlighted by appropriate bracketing, indenting, or changing of typography. Clearly present any work done since the prior version was submitted. Revised applications that do not address the criticisms in the previous critique will be considered unresponsive and will be returned without review.

(5) Management Approach

Each proposal must specify a single Principal Investigator who is responsible for carrying out the proposed project and coordinating the work of other personnel involved in the project. In proposals that designate several senior professionals as key participants in the research project, the management approach section should define the roles and responsibilities of each participant, and note the proportion of each individual's time to be devoted to the proposed research activity. The proposal must

clearly and unambiguously state whether these key personnel have reviewed the proposal and endorsed their participation.

(6) Biographical Sketch (Form C)

The biographical sketch should not exceed two pages. If the list of qualifications and publications exceeds two pages, select the most pertinent information (see Appendix C and Form C for details).

(7) Other Support (Form D) (see Appendix C for details).

(8) Facilities and Equipment (see Appendix C for details).

(9) Special Matters (specific information on animal or human subjects protocol approval required, if applicable)

The Special Matters section must contain a statement from the proposer's institution that states that the proposed work will meet all Federal and local human subject requirements and animal care and use requirements, if applicable. Note that no animal subjects may be utilized unless specific information justifying and describing their use is included in the proposal. Policies regarding the protection of human research subjects in NASA-sponsored research are detailed in NASA Management Instruction (NMI) 7100.8B (Protection of Human Research Subjects), and animal care and use requirements are detailed in the NASA Code of Federal Regulations (CFR) 1232 (Care and Use of Animals in the Conduct of NASA Activities), both of which are available from the Office of Biological and Physical Research, Code UL, NASA Headquarters, Washington, DC 20546. Assurance of compliance with human subject or animal care provisions is required on Form A, to be submitted with each proposal. In addition, a letter signed by the chairperson of the Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC), or both, as appropriate, regarding approval of the experimental protocol, should be included with each copy of the proposal. If IRB or IACUC review is unavoidably delayed beyond the submission of the application, enter "Pending" on Line 9b or 10a of Form A, and be advised that the certification must be received within 60 days after the due date for which the application is submitted. **If certification is not received within 60 days after the application due date, the application will be considered incomplete, and will not be reviewed.** NASA shall require current IRB or IACUC certification prior to each year's award. All U.S., non-NASA proposals providing IACUC approval must also contain the institution's Public Health Assurance number.

(10) Detailed Budget, 12 Month (Form E)

(11) Detailed Budget, Entire Project Period (Form F)

NASA intramural Principal Investigator's research budgets for all years are to be submitted in a full-cost mode in accordance with the NASA CFO, Enterprise Office and Center full-cost budget policy. Funds to support the Resident Research Assistant (RRA) Postdoctoral Program costs (e.g., stipend, travel, computer time, supplies, etc.) are to be budgeted within the NASA intramural Principal Investigator budget.

If travel is planned, the proposal budget should include appropriate travel funds for visits to NASA field centers (as appropriate) and presentation of findings at professional society meetings.

(12) Supporting Budgetary Information

This section must include information which supports the costs submitted in Forms E and F. In this solicitation, the terms "cost" and "budget" are used synonymously. Sufficient proposal cost detail and supporting information are required; funding amounts proposed with no explanation (e.g., Equipment: $1,000, or Labor: $6,000) may cause delays in evaluation and award. Generally, costs will be evaluated as to realism, reasonableness, allowability, and allocation. The budgetary forms define the desired detail, but each category should be explained in this section. Offerors should exercise prudent judgment in determining what to include in the proposal, as the amount of detail necessarily varies with the complexity of the proposal.

The following examples indicate the suggested method of preparing a cost breakdown:

Direct Labor

Labor costs should be segregated by titles or disciplines with estimated hours and rates for each. Estimates should include a basis of estimate, such as currently paid rates or outstanding offers to prospective employees. This format allows the Government to assess cost reasonableness by various means including comparison to similar skills at other organizations.

Other Direct Costs

Please detail, explain, and substantiate other significant cost categories as described below:

- Subcontracts: Describe the work to be contracted, estimated amount, recipient (if known), and the reason for subcontracting.
- Consultants: Identify consultants to be used, why they are necessary, the time they will spend on the project, and the 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).

- 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 as a direct charge 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.
- Supplies: Provide general categories of needed supplies, the method of acquisition, and estimated cost.
- 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.
- Other: Enter the total of direct costs not covered by a) through e). Attach an itemized list explaining the need for each item and the basis for the estimate.

Indirect Costs

Indirect costs should be explained to an extent that will allow the Government to understand the basis for the estimate. Examples of prior year historical rates, current variances from those rates, or an explanation of other basis of estimates should be included. Where costs are based on allocation percentages or dollar rates, an explanation of rate and application base relationships should be given. For example, the base to which the General and Administrative (G&A) rate is applied could be explained as: application base equals total costs before G&A less subcontracts.

All awards made as a result of this NRA maybe funded as grants or contracts. However, while proposals submitted by "for profit" organizations are allowed, they cannot include a "fee."

(13) Checklist for Proposers (Form G)

(14) Appendices, if any (**reviewers are not required to consider information presented in appendices**)

(15) Computer diskette (3.5 inch, Macintosh or PC format) containing an electronic copy of the principal investigator's name, address, telephone and fax numbers, e-mail address, and the complete project title and abstract as provided on Form B

The Required Application Forms

must be downloaded separately from

http://peer1.idi.usra.edu/peer_review/nra/00_OBPR_01.html

APPENDIX C
NRA 00-OBPR-01

INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS

(JANUARY 2000)

(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 pre-award 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) NRAs 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 NRAs.

(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 NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. 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 NRAs; 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) The following information is needed to permit consideration in an objective manner. NRAs 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 (U.S. Proposals Only).

(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).

(iv) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator or a subcontract. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

(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. Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

(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) Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.

(1) NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

(2) All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government

agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.

(3) Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

(4) Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(i) An exchange of letters between NASA and the foreign sponsor; or

(ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

(m) 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.