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National Aeronautics and Space Administration  
Office of Biological and Physical Research  
Washington, DC 20546

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# **NASA Research Announcement Soliciting Research Proposals Using Ground-based Analogs of Space Flight**

## **Biomedical Research and Countermeasures Program**

**A Research Announcement for the  
NASA Office of Biological and Physical Research**

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**Notices of Intent Due:                    June 25, 2003**  
**Proposals Due:                             August 11, 2003**

## **TABLE OF CONTENTS**

NASA Research Announcement Summary and Supplemental Information	1
Appendix A: NASA Research Announcement Soliciting Research Proposals Using Ground-based Analogs of Space Flight	A-1
I. Introduction	A-1
II. Ground-based Analogs of Space Flight	A-4
III. Countermeasure Readiness Levels	A-6
IV. CEVP	A-7
V. Statistical Considerations	A-7
VI. Bibliography	A-8
Appendix B: Instructions for Responding to NASA Research Announcements	B-1
I. Review and Selection Process	B-1
II. Program Reporting	B-4
III. Support of Education and Outreach	B-4
IV. Application Procedures	B-5
V. Compliance Matrix	B-16
VI. Eligibility	B-17
VII. Guidelines for International Participation	B-17
Appendix C: Certifications	C-1
Appendix D: Instructions for Responding to NASA Research Announcements	D-1
Appendix E: Proposal Submission FAQs and Sample Forms	E-1

# NASA Research Announcement

## Soliciting Research Proposals Using Ground-based Analogs of Space Flight

### Summary and Supplemental Information

NASA's new Vision for the 21<sup>st</sup> century is:

*To improve life here,  
To extend life to there,  
To find life beyond.*

The Office of Biological and Physical Research's (OBPR) contribution to the Agency is to realize this Vision that motivates our research on the ISS and is the framework for the activities of OBPR:

*Humans will extend the exploration of space. To prepare for and hasten the journey, OBPR must answer these questions through its research:*

- How can we assure the survival of humans traveling far from Earth?
- What must we know about how space changes life forms, so that humankind will flourish?
- What new opportunities can our research bring to expand our understanding of the laws of nature and enrich lives on Earth?
- What technology must we create to enable the next explorers to go beyond where we have been?
- How can we educate and inspire the next generations to take the journey?

OBPR is developing a Research Plan that will provide a top-level description of the direction that the Enterprise will take to answer these questions and fulfill its mission. The OBPR Research Plan can be accessed at <http://spaceresearch.nasa.gov/>.

This National Aeronautics and Space Administration (NASA) Research Announcement (NRA) solicits studies using ground-based analogs of space flight (e.g., bed rest, closed chamber studies) for the Biomedical Research and Countermeasures (BR&C) Program. The BR&C Program sponsors research that will lead to the development of countermeasures against the negative effects of space flight on humans. NASA is soliciting ground-based space flight analog research proposals that will utilize facilities at U.S. institutions, NASA Centers, and especially other facilities close to the NASA Johnson Space Center such as the University of Texas Medical Branch General Clinical Research Center. Collaborations with NASA-supported investigators and projects affiliated with the NASA Space Biomedical Research Institute (NSBRI) are encouraged.

The BR&C program uses the space environment to increase knowledge of biological and physiological processes, to provide the biomedical foundation in support of the International Space Station and exploration beyond low Earth orbit, and to enrich life on Earth through the transfer of new space technology, medicine, and fundamental knowledge. This research supports NASA's mission through the Office of Biological and Physical Research (OBPR). All respondents to this NRA are strongly encouraged to promote general scientific literacy and public understanding of life sciences, the space environment, and the OBPR 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.

In this NRA,

- Appendix A provides a description of the research emphasis for the ground-based space analog studies.
- Appendix B contains application procedures and a description of the selection process.
- Appendix C contains copies of the certifications required to be followed with any signed application.
- Appendix D contains the standard "Instructions for Responding to NASA Research Announcements."
- Appendix E contains the OBPR specific forms that must be included with each proposal.

The BR&C Program has scientific and educational goals to fund research that will result in the delivery of health-related countermeasures for astronauts. NASA is committed to maintaining a strong, openly competitive, peer-reviewed research program. Proposals submitted in response to this NRA must address the research emphasis described in this Announcement. Those that do not will be returned. **This NRA does not solicit flight research. Proposals that require flight resources will be returned to the proposer without being reviewed.** Other NRAs calling for focused research or utilization of unique resources may be issued throughout the year.

Proposals selected by NASA will be funded incrementally as grants for activities lasting up to four years, pending satisfactory progress. The funding duration will depend on proposal requirements, review panel recommendations, and continuing satisfactory 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 by NASA. Final selection will be made by the Division Director of the Bioastronautics Research Division of OBPR at NASA Headquarters. Funds are not currently available for awards under this NRA. The government's obligation to make award(s) is contingent upon the availability of appropriated funds from which payment can be made and the receipt of proposals that the government determines are acceptable for award under this NRA. It is planned for selections to be announced by January 2004 and awarded shortly thereafter.

**Inclusion of Women and Minorities in Research Involving Human Subjects** – NASA has adopted the NIH policy regarding this matter. Women and members of minority groups and their subpopulations must be included in NASA-supported biomedical and behavioral research

projects involving human subjects, unless a clear and compelling rationale and justification is provided that inclusion is inappropriate with respect to the health of the subjects or the purpose of the research.

Participation in this Announcement is open to all categories of organizations, including industry, educational institutions, other nonprofit organizations, NASA laboratories, and other government agencies. Guidelines for International Participation are detailed in Appendix B and D of this Announcement.

A notice of intent (NOI) to propose is requested by June 25, 2003. Proposals must be submitted by August 11, 2003, 5:00 p.m. Eastern Time. (See Appendix B of this NRA for specific instructions for these activities.)

The following items apply only to this NRA:

Solicitation NRA Identifier:	NRA 03-OBPR-06
Number of Copies Required:	Original + 20 paper copies
Notices of Intent Due:	June 25, 2003
Proposals Due:	August 11, 2003
Selection Announcement:	January 31, 2004
Funding Begins:	Approximately 30-90 days following notification of selection
Selecting Official:	Director, Bioastronautics Research Division

Additional information about this NRA is available from

Bette Siegel, Ph.D.  
NASA Headquarters, Code UB  
Washington, DC 20546-0001  
Telephone: 202-358-2245  
Fax: 202-358-4168  
Email: [bette.siegel@nasa.gov](mailto:bette.siegel@nasa.gov)

All prospective investigators to this NRA are advised that the highest priority in all of NASA's programs is given to safety and mission assurance, occupational health, environmental protection, information technology, export control, and security. Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment. NASA's safety priorities are to protect (i) the public, (ii) astronauts and pilots, (iii) the NASA workforce (including employees working under NASA instruments), and (iv) high-value equipment and property. All proposals submitted in response to this solicitation are expected to comply with this policy.

This NRA is restricted to the BR&C program and is described in detail in the Appendices. Potential investigators should read with care the program description, and focus their proposals on the specific research emphasis defined in this NRA.

Original signed by

Mary E. Kicza  
Associate Administrator  
Office of Biological and Physical Research

## Ground-based Analogs of Space Flight

### I. Introduction

This NASA Research Announcement (NRA) solicits research proposals in support of the goals and objectives of the NASA Office of Biological and Physical Research (OBPR). Ground-based research using analogs of space flight is solicited for conduct by the Biomedical Research and Countermeasures (BR&C) Program. The goals of this solicitation are to

1. Develop countermeasures that allow humans to live and work in microgravity for long durations, minimize the risks in readapting to gravity, and optimize crew safety, well-being, and performance.
2. Develop an understanding of the physiological mechanisms that are responsible for space flight-related biomedical and behavioral changes in humans in support of countermeasure development.

Space flight has significant impact on humans. Space travelers will experience physiologic and psychological adaptations and/or maladaptations in all organ systems that could impair their well being and performance during and after space missions. To meet the requirements of long-duration missions aboard the International Space Station (ISS) and prepare for future interplanetary missions, NASA is interested in developing preventive medicine, therapy, and rehabilitation (collectively referred to as countermeasures) to overcome the adverse effects of space flight.

#### ***Research Questions & Objectives***

*The primary objective of this solicitation is to sponsor ground-based analog research to perform hypothesis-driven scientific studies to evaluate and test countermeasures (e.g., exercise and/or drug therapy to prevent bone and muscle loss), and develop prescriptions that can be used operationally in flight.* Additionally, research is solicited that could help 1) identify and quantify the medical and/or psychological risks that could be associated with space flight and 2) develop appropriate diagnostic tools and instrumentation for space flight use. The proposal must represent questions and priorities as enumerated in the Critical Path Roadmap (CPR) at <http://criticalpath.jsc.nasa.gov/> The following questions from NASA's Critical Path Roadmap are the focus of this solicitation

#### ***Bone Loss***

- What are the specifics of the optimal exercise regimen to minimize decreases in bone mass during exposure to hypogravity? The specifics needed include workout duration, intensity, and frequency. Is impact loading an essential element?
- Is there an optimal combination of exercise (an anabolic stimulus) and a pharmacological

countermeasure (anti-resorptive) that would minimize decrements in bone mass in hypogravity?

- What countermeasures can reduce the incidence of soft connective tissue injury and pain during recovery after prolonged hypogravity or bed rest?

### ***Cardiovascular Alterations***

- Does space flight increase susceptibility to serious cardiac dysrhythmias? If so, what are the mechanisms?
- What countermeasures may prevent or reduce the occurrence of serious cardiac dysrhythmias during long-term space flight?
- Can risk of serious cardiac dysrhythmias be predicted for individual crewmembers?
- What countermeasures can be developed to overcome or prevent orthostatic intolerance? What countermeasures may be effective in mitigating the risk?
- Can susceptibility to reduced cardiac function be predicted for individual crewmembers? What countermeasures may be effective in mitigating the risk?

### ***Clinical Capabilities***

- What are the effects and implications of space flight alterations in human physiology on the absorption, distribution, metabolism, clearance, excretion, clinical efficacy, side effects, and drug interactions of clinically useful medications?
- What are the side effects and interaction profiles of the commonly used medications in space flight, and how should the crew and medical team be trained and prepared to recognize and deal with these issues?
- What are the most appropriate dosages and routes of administration for medications that are clinically useful in space flight (taking into account the effects of space flight alterations in human physiology)?

### ***Human Behavior and Performance***

- What are the fundamental behavioral and social stressors during long-duration missions that will most likely affect crew performance, both individual and team?
- What are the acute and long-term effects of exposure to the space environment on biological rhythmicity; on sleep architecture, quality, and quantity; and on their relationship to performance capability?
- What are the best methods to monitor, during flight, the status of sleep and circadian functioning and to assess the effects of sleep loss and circadian dysrhythmia on performance? These methods should be portable and non-intrusive in the space flight environment.
- What workload schedule(s) per workday will best enhance crew performance and mitigate adverse effects of the space environment?

### ***Immunology, Infection, and Hematology***

- Do factors associated with flight (stress, environment, microgravity, nutritional status, radiation) affect humoral or cell-mediated immune function, non-specific immunity, mucosal immunity, or immune surveillance capabilities of crewmembers in a manner that exposes them to unacceptable medical risk (disease, allergy, delayed wound healing)?
- Are there countermeasures for space flight-associated defects in the antibody, T-cell,

phagocyte, and complement systems?

- Are there countermeasures for infections developed in space travel, especially latent virus infections?

### ***Multisystem Alterations***

- How do alterations in neural, endocrine, and metabolic function associated with space flight affect the functioning of organ systems?

### ***Muscle Alterations and Atrophy***

- What are the appropriate prescription modalities and the compliance factors needed to minimize losses in muscle mass, strength, and endurance, and to facilitate rehabilitation?
- To what extent should hormonal or other pharmacological supplements be used as countermeasures if exercise regimens are ineffective in maintaining homeostasis?
- What are the appropriate exercise modalities and prescriptions needed to optimize skeletal muscle performance?

### ***Neurological Adaptation***

- How do countermeasures (such as artificial gravity, in-flight exercise, or pre-flight training) affect neurological adaptation?
- Which countermeasures for neurological adaptation are required for long duration space flight and during rehabilitation?

Of particular interest are research proposals that

- Use accessible, functional measurements or endpoints (e.g., bone density, muscle size, and strength).
- Test appropriate pharmacological or hormonal replacement countermeasures, including anti-resorptive bone agents, growth hormone, and/or sex hormone replacement therapy.
- Provide evidence that other indices of muscle function (e.g., surface electromyography) correlate to the forces generated by specific muscle groups during exercise.
- Study the use of aerobic and resistive exercise to prevent cardiovascular deconditioning, including orthostatic intolerance as well as loss of muscle strength and mass, and changes in sensory-motor function. Such research could compare the effectiveness of different exercise prescriptions. Use of International Space Station (ISS) or NASA-proposed ISS exercise devices is encouraged.
- Develop new rehabilitation strategies for enhancing and monitoring the recovery of the musculoskeletal, cardiovascular, and sensory-motor systems following space flight.
- Investigate the impact of bed rest on nutrition, including appetite and nutritional intake.
- Study the immune system and possible increased susceptibility to infections.
- Study personal, interpersonal, and group dynamics.
- Develop predictive tools for the assessment of psychological well-being, cognitive processing, mood, and emotion, especially those affected by multicultural variables.
- Investigate balance and locomotion patterns following long-duration bed rest.

Proposals in other research areas are also encouraged, particularly those that can be implemented on a basis of non-interference with the particular interests of this solicitation.

## **II. Ground-based Analogs of Space Flight**

NASA is interested in research proposals that use ground-based space flight analogs that appropriately induce physiological and psychological changes similar to those encountered in astronauts during short- and long-duration space flight missions. The types of analogs that have proven effective are as follows:

### ***Bed Rest and Unloading***

Unloading of the gravity-dependent portions of the musculoskeletal system.

- Bed Rest (unloading, not immobilization) – adaptation similar to space flight for cardiovascular and musculoskeletal systems, fluid and electrolytes, sensory proprioception and stretch reflexes, some hormonal changes
- Paraplegia (unloading and immobilization) – same as bed rest but with greater magnitude of change
- Dry Immersion (unloading and immobilization) – same as bed rest but with greater magnitude of change
- Unilateral Lower Limb Suspension – musculoskeletal atrophy

### ***Bed Rest Study Resources Provided by NASA***

Main characteristics of the University of Texas Medical Branch (UTMB) General Clinical Research Center (GCRC) bed rest study:

Studies conducted at the UTMB Facility will require human volunteers to lie in bed 24 hours a day.

**Duration:** A justification for the preferred duration and bed rest orientation (-6 degrees head down tilt, horizontal, etc.) is required from the applying investigator. The consortium of selected investigators will decide on the duration prior to the selection of the subjects.

**Access to subjects:** At least 15 days of ambulatory control before the study and at least 15 days of ambulatory testing after the bed rest.

**Diet:** Controlled diet and energy intake.

**Monitoring:** Continuous video monitoring of the subjects.

**Number of subjects:** The facility can accommodate up to 15 subjects at a time.

Characteristics of the subjects:

**Number:** The PI must justify the number of subjects required with appropriate power analyses.

Age: The astronaut age range, between 25 and 55 years old, is preferred; however, the PI should justify the age of subjects required.

Gender: Males and females.

Physical characteristics: Matched to astronauts is preferred; however, the PI should justify the physical characteristics of the subjects required.

Medical selection: Healthy individuals who fulfill a complete medical and psychological evaluation (U.S. Air Force class 3 criteria).

Medical facilities and resources:

The Johnson Space Center (JSC) Countermeasure Evaluation and Validation Project (CEVP), in cooperation with the UTMB GCRC, will provide nurses, technicians, a dietician, other medical professionals, the bed rest facilities at UTMB, and standard medical capabilities of UTMB (for example, CT radiology, MRI, X-Ray, DEXA, etc.) for selected investigations where appropriate.

*Non-NASA Bed Rest Resources*

Although the preferred bed rest study site is UTMB, investigators may propose to use alternate bed rest facilities.

### ***Other Ground-based Space-flight Analogs***

It is the responsibility of the investigator to propose the specific analog of space to be used and to provide justification for its use and duration and, where applicable, the specific facility or site in which the research should be performed. Examples of other ground-based space flight analog facilities are:

#### Isolation Facilities

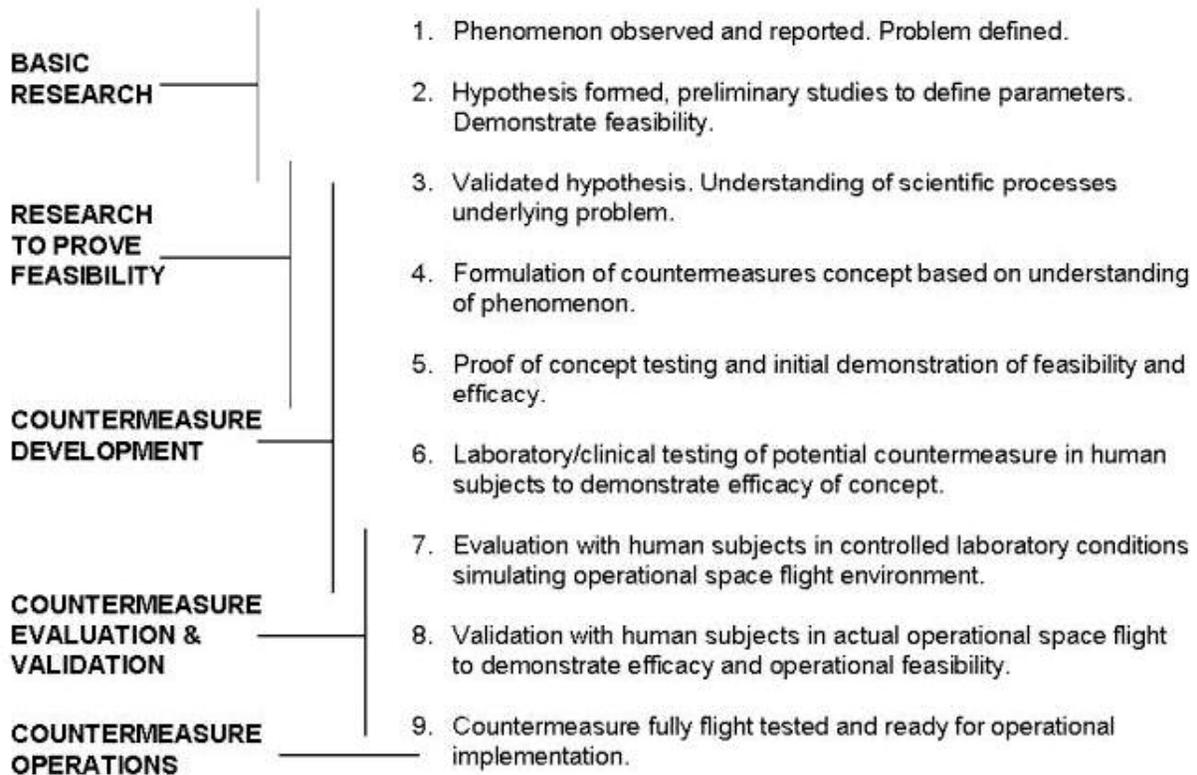
- Closed Chambers – small group dynamics, work/sleep physiology and psychology, nutrition and environmental control
- Antarctica (Australian Station) – up to 8 months isolation, small groups, extreme environments (cold, must take all supplies into environment and become self sufficient, use of new technology for diagnosis and treatment, use of people doing “real” work, both sex and multicultural groups, low atmospheric studies (up to 10,000 feet), immunology, microbiology, and telemedicine
- Submarines- large group dynamics, human performance issues, circadian rhythm and work cycle, nutrition, environmental factors
- Undersea Isolation Habitats – (e.g. Aquarius, Tektite, SeaLab, Conshelf) small group dynamics, immunology, telemedicine

### III. Countermeasure Readiness Levels (CRL)

NASA’s Biomedical Research and Countermeasures (BR&C) Program has developed a scale to allow NASA to quantify the level of “countermeasure readiness.” NASA program managers use the scale to determine and describe how each funded research project fits into countermeasure development and to monitor progress. Figure 1 illustrates the CRL scale, which describes the level of scientific maturity of BR&C research, from the fundamental studies that suggest potential countermeasures to studies that allow the systematic evaluation and validation of countermeasures ready for operational implementation.

**This Announcement solicits proposals that address the CRL range of 1-8. Proposals in the CRL range of 3-7 may participate with ongoing NSBRI research. NASA’s Countermeasures Evaluation and Validation Project (CEVP) is particularly interested in proposals at CRL levels 7 and 8. Other NASA Research Announcements may be issued throughout the year to call for studies to evaluate and validate potential countermeasures.**

**Figure 1. Countermeasure Readiness Levels**



## **IV. Countermeasures Evaluation and Validation Project (CEVP)**

The goal of the Countermeasure Evaluation and Validation Project (CEVP) is to support NASA's ISS and exploration objectives by evaluating, validating, and certifying the optimal complement of countermeasures (CMs) required to maintain astronaut functional ability during and after short- and long-duration space flight. This will be accomplished using a team approach, integrating the space medicine and space research expertise resident within the Johnson Space Center (JSC), the NSBRI (see [www.nsbri.org](http://www.nsbri.org) for more details), and biomedical expertise from outside NASA. The CEVP will serve as the final element in the process in which ideas and concepts emerging from basic research are developed into operational CMs and implemented as part of mission operations.

CEVP forms the bridge between operational research and countermeasure development performed by institutions, and the countermeasure prescriptions used by NASA flight surgeons to maintain crew health and performance. The priorities established by NASA's Critical Path Roadmap are those used for selecting promising countermeasures to be developed.

### ***Clinical Status Evaluation (CSE)***

The Clinical Status Evaluation is a standardized set of physiological and psychological tests conducted on astronaut and CEVP research subjects. It was developed by the CEVP to examine countermeasures (CM) efficacy and multi-organ effects of space flight. The CSE provides data pertaining to the effects of candidate CMs on the target physiological system(s) and the side effects and/or interactions of the CMs on non-target systems. All astronauts and CEVP research subjects are asked to participate in either the CSE alone, or the CSE as part of a CM validation.

The CEVP-determined CSE is obtained for all CEVP studies. The CSE data may be used by investigators for scientific purposes. Non-CSE data, i.e., investigator-specific research data, requested by the PI, shall be referred to as proprietary data. The PI proprietary data may be used immediately by CEVP for internal purposes. These data will not be made available to other investigators for one year after the completion of the study.

## **V. Statistical Considerations**

Space flight analog studies are limited to relatively small numbers of subjects because of constraints on facilities and funding. Strategies similar to those used for design of flight investigations may also be applied to analog studies. Strategies (such as the use of "historical" controls from earlier studies) to limit the requirement for control subjects should be considered in the experiment design. These options and their potential benefits should be presented in the proposal.

## VI. Bibliography

1. **OBPR Program Tasks and Bibliography (Task Books)** for FY1995-2002 are available at <http://research.hq.nasa.gov/taskbook.cfm>
2. **National Space Biomedical Research Institute Web site:** <http://www.nsbri.org/>
3. **Space Life Sciences Ground Facilities Information Package.** This document is available at [http://research.hq.nasa.gov/code\\_u/nra/current/NRA-03-OBPR-06/index.html](http://research.hq.nasa.gov/code_u/nra/current/NRA-03-OBPR-06/index.html)
4. **Guidebook for Proposers Responding to a NASA Research Announcement (NRA), 2001 edition:** <http://www.hq.nasa.gov/office/procurement/nraguidebook/>
5. **The Human Adaptation and Countermeasures Web site:** <http://haco.jsc.nasa.gov/>
6. **Life Sciences research publications:** <http://spaceline.usuhs.mil/> *Additional information may be obtained from the SPACELINE Project (phone: 301-295-2482; email: spaceline@usuhs.mil).*
7. **The Space Life Sciences Data Archive (LSDA)** is an online 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 address: <http://lsda.jsc.nasa.gov/>  
LSDA Help Desk: 281-483-7876  
Email: [lsda@semail.jsc.nasa.gov](mailto:lsda@semail.jsc.nasa.gov)
8. **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 at <http://www.mbl.edu/CASSLS/workshops.html>
9. **Guidance for NASA Medical Board Procedures.** National Aeronautics and Space Administration, Medical Policy Board. Richard Williams, M.D., Chairperson. NASA Headquarters. This document is available at [http://peer1.nasaprs.com/peer\\_review/prog/mpbhand.pdf](http://peer1.nasaprs.com/peer_review/prog/mpbhand.pdf)
10. **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 DC: National Academy Press. <http://www.nas.edu/ssb/csbl1.html/>
11. **Space Physiology and Medicine, 3<sup>rd</sup> ed.** A. Nicogossian, C. Huntoon, and S. Pool. (Eds.). 1994. Philadelphia, PA: Lea & Febiger.

12. **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. This document is available at [http://peer1.nasaprs.com/peer\\_review/prog/countermeasures/countermeasures.html](http://peer1.nasaprs.com/peer_review/prog/countermeasures/countermeasures.html)
13. **International Workshop on Cardiovascular Research in Space.** *Medicine and Science in Sports and Exercise*, Volume 28, Number 10 Supplement, 1996.
14. **Muscle Research in Space: International Workshop.** *International Journal of Sports Medicine*, Volume 18, Supplement 4, S257-S331, 1997.
15. **Space Neuroscience Research.** *Brain Research Reviews* , Volume 28, Numbers 1/2, Special Issue, 1998.
16. **International Workshop on Bone Research in Space.** *Bone, Official Journal of the International Bone and Mineral Society*, Volume 22, Number 5 (Supplement), 1999.
17. **Small Clinical Trials: Issues and Challenges.** Institute of Medicine, National Academy Press, 2101 Constitution Avenue NW, Washington DC 20418 (2001).  
<http://www.nap.edu/books/0309073332/html/>
18. **Sex and Gender: Exploring the Biological Contributions to Human Health.** *NH Guidelines on the Inclusion of Women and Minorities as Subjects in Clinical Research*, 59 Fed. Reg. 14508 (1994).
19. **Grant and Cooperative Agreement Handbook.** Office of Procurement, National Aeronautics and Space Administration, Washington, D.C. 20546
20. **Safe Passage, Astronaut Care for Exploration.** Institute of Medicine, National Academy Press, 2101 Constitution Avenue NW, Washington DC 20418 (2001).
21. **Space and Life Sciences Directorate Web site:** <http://www.jsc.nasa.gov/sa/>

## **Instructions for Responding to NASA Research Announcements**

**It is critical for investigators to read carefully all of the instructions in this NRA. All compliant proposals will undergo peer review.** The average total annual cost for research grants will be about \$250,000 on average and will not exceed \$800,000. The average and maximum amount includes funding for both direct and indirect costs; thus, the amount of the award requested is the total of all costs submitted in the proposed budget.

When costing proposals that use bed rest as the space flight analog,

- Maximum total grant for proposals requesting use of the UTMB GCRC facility or other GCRC sites is \$450,000/year. Do not include the cost of the UTMB GCRC or other GCRC facility, if that is where you plan to do your research.
- Maximum total grant for proposals using other bed rest facilities is \$800,000/year. Include the cost of the proposed facility, if you prefer to do the research at a different bed rest facility.

NASA reserves the right to require that the proposers use the UTMB facility, recommend the use of one of the other proposed facilities based on cost effectiveness and programmatic need, or that additional studies be performed along with the proposers at his/her institution to maximize the scientific return from bed rest studies.

In general, the maximum total grant for proposals that will use other analog facilities may not exceed \$450,000/year. When costing proposals that use other space flight analogs, include the cost of the use of the facility.

### **I. Review and Selection Process**

This Appendix supersedes, modifies, or extends the requirements enumerated in Appendix D. All proposals must comply with the general requirements of the Announcement as described in Appendices A, B, and D. Appendix D 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 the following:

1. Submission of complete proposals specified in this Announcement. Proposals must be responsive to the objectives described in Appendix A and must include a project description that is not more than 20 pages in length.
2. Submission, as specified in Appendix B, of appropriate Institutional Review Board (IRB) certifications.

3. Submission of a budget within the guidelines specified in this Announcement and for a funding period not exceeding four years in duration.
4. Submission of all other appropriate forms as required by this NASA Research Announcement (refer to Section D of this Appendix).

**Note: Non-compliant proposals will be withdrawn from the review process and returned to the investigator without further review.**

Compliant proposals submitted in response to this Announcement will undergo an intrinsic scientific or technical merit review. The merit review will assign a score from 0-100 based on the intrinsic scientific or technical merit of the proposal. Only those proposals most highly rated in the merit review process will undergo the additional reviews for program relevance and cost.

### **Scientific or Technical Merit Review**

A merit review of proposals submitted to this NRA will be conducted by panels of scientific or technical experts. A single set of discipline-specific panels will evaluate all proposals submitted to this NRA. The number and diversity of experts required will be determined by the response to this NRA. Merit review panels will score proposals. The scientific merit score assigned by each panel *will not be affected by the proposed cost of the work, nor will it reflect the programmatic relevance of the proposed work to NASA*. However, the panels will be encouraged to include comments concerning the proposal's budget and relevance to NASA in the critique of each proposal, after it has been scored.

All of the following criteria will be used equally 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? What is the likelihood that the proposed research will lead to new countermeasures or tests of the utility of countermeasures? 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? Are there strong interdisciplinary components?
- **Innovation:** Does the project employ novel concepts, approaches, or methods? Are the aims original and innovative? Does the project challenge existing paradigms or develop new methodologies or technologies?

- **Investigator:** Are the scientists in the project, including collaborators, suitably trained for the proposed work? Is the work proposed appropriate to the experience level of the principal investigator and other researchers (if any)? Is the evidence of the investigator's productivity satisfactory?
- **Environment:** Do the proposed experiments take advantage of unique features of the scientific environment or employ useful collaborative arrangements?

### **Evaluation of Programmatic Relevance and Cost**

A **second review** will evaluate the programmatic relevance and cost of all proposed work. **Only those proposals most highly rated in the merit review process will undergo the additional reviews for program relevance and cost.** 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. Is the proposal responsive to the needs of NASA as expressed in this NRA? 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.

### **Development of a Selection Recommendation**

A selection recommendation will be developed based on the merit review, programmatic relevance, and cost as described above. The most important element in the evaluation process is the merit review, which carries the highest weight in final evaluation and selection. The other factors are approximately equal in weight to each other. **Deficiencies in any one of these factors may prevent selection of a proposal.** The development of selection recommendations is the responsibility of NASA. Selections for funding by NASA will be made by the Director of the Bioastronautics Research Division, Office of Biological and Physical Research (OBPR).

NASA reserves the right to select and make an award covering only a portion of an investigator's project. The applicant will be given the opportunity to accept or decline such a partial award. If two or more proposals address similar problems and/or adopt similar approaches, NASA may request that the investigators consolidate specific parts of their projects into a single project and work as a team.

Once selected, the Grants Office points of contact will be identified in selection letters.

### **Investigators Working Group for UTMB GCRC Bed Rest Study**

All Principal Investigators selected by NASA for the UTMB GCRC bed rest study may participate in the project's Investigators Working Group (IWG). The IWG may develop a single integrated study plan that best represents the investigators' sciences requirements within the study resources and the ethical concerns for the protection of human subjects.

## **II. Program Reporting**

It is expected that results from funded research will be submitted to peer-reviewed journals as the work is completed. Published papers must acknowledge NASA. In addition, investigators whose proposals are selected must also provide annual reports on progress in achieving the goals of the research project.

### **Final Report**

A final report is required that shall include a summary of completed research and a record of all scientific communications and peer-reviewed publications to date. This report must be submitted to the NASA Technical Monitor within 90 days after the end of the grant period.

## **III. Support of Education and Outreach**

OBPR envisions that the selected individual investigator proposals will be structured and operated in a manner that supports the nation's educational initiatives and goals (including support of historically black colleges and universities and other minority universities), and in particular the need to promote scientific and technical education at all levels. OBPR envisions that the selected proposals will support the goals for public awareness and outreach to the general public. The selected investigators are invited to participate in OBPR-funded educational programs.

### **OBPR Policy for Education (6-12) and Public Outreach**

The proposal represents an opportunity for NASA to enhance and broaden the public's understanding and appreciation of the value of OBPR research in the context of NASA's mission. Therefore, all principal investigators are strongly encouraged to promote general scientific literacy and public understanding of OBPR research through formal and/or informal education opportunities. If appropriate, proposals should include a clear and concise description of the education and outreach activities proposed. Examples include such items as involvement of students in the research activities, technology transfer plans, public information programs that will inform the general public of the benefits being gained from the research, and/or plans for incorporation of scientific results obtained into educational curricula consistent with educational standards. Where appropriate, the supported institution will be required to produce, in collaboration with NASA, a plan for communicating to the public the value and importance of their work.

Once NRA selections are made, the selected NASA PIs will have an opportunity to request additional funding through an OBPR-sponsored pilot program to implement an education outreach program at the grades 6-12 level, at an amount not to exceed \$10,000 per year for the term of the grant. A request for proposal will accompany the selection notification letter. Proposals will be due within 60 days of selection notification and shall be limited to 4 pages. A review of these proposals by educational specialists will determine which proposals will be funded.

For more information, the OBPR Educational Outreach Vision, Mission, Goals and Operating Guidelines are provided in the Educational Outreach handbook. The handbook is available on the Internet at [http://spaceresearch.nasa.gov/research\\_projects/nrahardware.html](http://spaceresearch.nasa.gov/research_projects/nrahardware.html). If you would like assistance in preparing outreach proposals, the National Space Grant College and Fellowship Program is available to help. Visit their Web site at <http://education.nasa.gov/spacegrant> for a state-by-state listing of Space Grant Directors.

#### **IV. Application Procedures**

Except where specifically stated otherwise in this NRA, applicants must prepare proposals in accordance with the “Instructions for Responding to NASA Research Announcements,” which is part of the NASA Federal Acquisition Regulations (FAR) Supplement (NFS), Part 1852.235-72 (Appendix E).

##### *Instructions for Notice of Intent and Proposal Submission*

#### **A. SYS-EYFUS Registration for All Applicants**

SYS-EYFUS is an electronic system used by NASA Headquarters to manage research solicitation activity, plan for the receipt of research proposals, track the receipt and peer evaluation of these proposals, and manage funded research (grants, cooperative agreements, etc.) sponsored by NASA’s Office of Equal Opportunity (Code E), Office of Earth Science (Code Y), Office of Human Resources & Education Division (Code F), Office of Biological and Physical Research (Code U), Office of Space Science (Code S), and the Office of Space Flight (Code M). SYS-EYFUS also supports the funding and administration of awards pursuant to selection of these research opportunities.

**The SYS-EYFUS Help Desk is available at 202-479-9376. Help desk hours are from 8 a.m. to 6 p.m. Eastern time.**

All investigators planning to submit a proposal to this solicitation are requested to register online with SYS-EYFUS. Comprehensive help, instructions, and contact information are provided online. SYS-EYFUS can be accessed at <http://proposals.hq.nasa.gov/>.

If you have previously registered with SYS-EYFUS, you are requested to verify and update your user information. If you have forgotten your user ID or password, select the “Forgot Your Password” option and type in your first and last name to search our database. The system will send an automatic email message with your username and password to the email address listed in our database.

#### **B. Instructions for Preparing a Notice of Intent**

All investigators planning to submit a proposal in response to this solicitation are requested to submit a **non-binding** notice of intent (NOI) to propose by the due date identified in the

Summary and Supplemental Information Section of this NRA via the Web at the following address:

**<http://proposals.hq.nasa.gov/proposal.cfm>**

- 1) Login to SYS-EYFUS at the URL listed above and select “New Notice of Intent.”
- 2) The Division Specific Opportunities screen will appear. In the selection window, highlight **Bioastronautics Research Division** and click on “Continue.”
- 3) The List of Existing Opportunities screen will appear. In the selection window, highlight **03-OBPR-06** and then click on “Continue.”
- 4) This will bring you to the Notice of Intent Submission Form. **All fields are required.**
  - a. Please select from **only** the following three options: For the proposal type field on this form, new / no prior support means that the investigator has not received NASA funding from 1999 through 2002, new/prior support means that the investigator has received NASA funding between 1999 and 2002, and revised means that the proposal is a revised version of a proposal submitted to NASA and reviewed from 1999 through 2002, but not funded. A proposal previously submitted but not funded, should be identified as being “revised” even if the original Principal Investigator has changed.
- 5) Click on “Submit NOI Page.”
- 6) The Team Member Page screen will appear, where you can add or remove team members. Select continue if there are no other team members. To add a team member, highlight the role option on the selection list, type in first and last name and click on search. When the resulting set appears, choose the appropriate radio button and click on ADD to add the person to the NOI. After you are done, click on “Continue.” **IMPORTANT:** If the team member is not listed in our database, please have them add themselves as a new user to the system. You may then add them to your team member list.
- 7) After continuing from the Team Members Page, your NOI will be displayed. Click on “Resubmit NOI Page” to complete your NOI submission.
- 8) You may edit and resubmit your NOI at any time before the submission deadline of June 25, 2003. Once you submit an NOI, it cannot be deleted, only edited. For title, team member, or any other changes, please edit your existing NOI and resubmit changes to avoid duplicate records.

## C. Instructions for Preparing and Electronically Submitting a Proposal Cover Page

All investigators planning to submit a proposal in response to this solicitation must electronically submit proposal cover page information online and provide a hardcopy of the cover page attached to each proposal copy by the due date indicated in the Summary and Supplemental Information Section of this NRA. The proposal cover page can be submitted and printed at

**<http://proposals.hq.nasa.gov/proposal.cfm>**

- 1) Login to SYS-EYFUS at the URL listed above.
- 2) To submit a New Proposal Cover Page, click the “New Proposal Cover Page” option on the SYS-EYFUS Options screen, and the New Proposals Cover Page screen will appear.
- 3) If you previously submitted an NOI in response to this solicitation, choose to carry over the existing NOI. This option will populate the cover page fields with the NOI information. Edit the information as necessary, click “Continue,” and proceed to #8 below.
- 4) If you did not previously submit an NOI, click on New Proposal Cover Page option, and the Division Specific Opportunities screen will appear.
- 5) In the selection window, highlight **Bioastronautics Research Division** and click on “Continue.”
- 6) The List of Existing Opportunities screen will appear. In the selection window, highlight **03-OBPR-06** and then click on “Continue.”
- 7) This will bring you to the Proposal Cover Page Submission Form. Fill in all the fields. All fields are required.
  - a. Please select from **only** the following three options: For the proposal type field on this form, new / no prior support means that the investigator has not received NASA funding from 1999 through 2002, new / prior support means that the investigator has received NASA funding between 1999 through 2002, and revised means that the proposal is a revised version of a proposal submitted to NASA and reviewed from 1999 through 2002, but not funded. A proposal previously submitted but not funded should be identified as being “revised” even if the original Principal Investigator has changed.
  - b. Indicate the status of IRB/IACUC for your proposal. If IRB or IACUC review is unavoidably delayed beyond the submission of the application, enter “Pending” on the Proposal Cover Page, and be advised that the certification must be received within 90 days after the due date for which the application is submitted.

- c. Provide your TIN and CAGE numbers. Every U.S. institution that submits a proposal to a U.S. agency must provide their permanently-assigned Taxpayer Identification Number (TIN) and must register with the Department of Defense Central Contractor Registration (CCR) database for a permanently-assigned Commercial and Government Entity (CAGE) number. Reference the 2003 NRA Proposers Guidebook (<http://www.hq.nasa.gov/office/procurement/nraguidebook>) for additional information. If you are unsure of your institution's TIN number, please contact your institution's Office of Sponsored Research to obtain the your institution's Taxpayer Identification Number (TIN), Employer Identification Number (EIN) or Commercial and Government Entity (CAGE) number.

Click on "Continue."

- 8) The Team Member Page screen will appear, where you can add or remove team members. Every proposal must specify the critically important personnel who are expected to play a significant role in the execution of the proposed effort and their institution of employment. Categories of personnel to be included as Team Members are described in Appendix B, Section V, Part D(5) and in Section 1.4.2 in the 2003 NRA Proposers Guidebook (<http://www.hq.nasa.gov/office/procurement/nraguidebook/>)

**You must include your authorizing official as a team member.** When you complete and print the proposal cover page, you will see signature blocks both for yourself and your authorizing official. You are required to submit one original signed (by both you and your authorizing official) cover page with your proposal hardcopies.

**IMPORTANT:** If the team member is not listed in our database, please have them add themselves as a new user to the system. You may then add them to your team member list.

Select "Continue" if there are no other team members. To add a team member, highlight the role option on the selection list, type in first and last name and click on search. When the resulting set appears, choose the appropriate radio button and click on ADD to add the person to the proposal. After you are done, click on "Continue."

- 9) After continuing from the Team Member Page, the Proposal Options Page appears.
- 10) Please fill out the budget form by clicking on the "Budget" button, filling in project costs, and clicking "Continue." This will bring you to the Proposal Budget Review Page. Click "Continue" if the information is correct.
- 11) After verifying your budget information, you will be returned to the Proposal Options Page. Click the "Show/Print" button.

- 12) For detailed budget information, you must use Forms C and D, provided at [http://research.hq.nasa.gov/code\\_u/nra/current/NRA-03-OBPR-06/nra\\_forms2.rtf](http://research.hq.nasa.gov/code_u/nra/current/NRA-03-OBPR-06/nra_forms2.rtf)  
Sample copies of Forms C and D are also available in Appendix E.

Form D must be filled out for each year of grant support requested.

**These forms cannot be electronically submitted. Fill out the forms and attach them to your proposal.**

- 13) At the page entitled Proposal Information Item List, click “Continue” to preview your Proposal Cover Page. Print the cover page from your Internet browser once you have reviewed the information. The cover page must be signed by both the Principal Investigator and the authorizing official and attached to the front of your proposal before submission of hard copies to NASA.

By signing and submitting the proposal identified on the cover sheet, the Authorizing Official of the proposing institution (or the individual investigator if there is no proposing institution): 1) certifies that the statements made in the proposal are true and complete to the best of his/her knowledge; 2) agrees to accept the obligations to comply with NASA Award terms and conditions if an award is made as a result of this proposal; 3) provides certification to the following that are reproduced in their entirety in Appendix D of this NRA: (i) Certification Regarding Debarment, Suspension and Other Responsibility matters, (ii) Certification Regarding Lobbying, and (iii) Certification of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs.

- 14) You may edit and resubmit your proposal cover page at any time before the submission deadline as indicated in the Summary and Supplemental Information Section of this NRA. Please note that once you submit a proposal cover page, it can only be edited, not deleted. For title, team member, budget or any other changes, please edit your existing proposal cover page and resubmit changes to avoid duplicate records.

#### D. Instructions for Preparation and Delivery of Proposals

**All** proposals submitted must include the completed cover page form as described in this Appendix. The name of the Principal Investigator should appear in the upper right hand corner of each page of the proposal except on the cover page form, 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 the maximum duration identified in the Announcement section of this NRA but should be suitable for the project proposed.

**Please use the proposal submission checklist template form (Appendix E, Form A), located at [http://research.hq.nasa.gov/code\\_u/nra/current/NRA-03-OBPR-06/nra\\_forms2.rtf](http://research.hq.nasa.gov/code_u/nra/current/NRA-03-OBPR-06/nra_forms2.rtf), to assist you in assembling your proposal.**

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

- (1) Proposal Cover Page: Solicited Proposal Application, including certification of compliance with U.S. code (if applicable). One signed original required. Please see “Instructions for Preparing and Electronically Submitting a Proposal Cover Page” (Appendix B, Section V, Part C) for instructions on how to complete the proposal cover page information.
- (2) Transmittal Letter or Prefatory Material, if any (see Appendix D, “Instructions for Responding to NASA Research Announcements,” for details).
- (3) Proposal Title Page, with Notice of Restriction on Use and Disclosure of Proposal Information, if any (see Appendix D, “Instructions for Responding to NASA Research Announcements,” for details).
- (4) Project Description

The length of the Project Description section of the proposal cannot exceed 20 pages using regular (12 point) type. Text must be printed on one side only and should have the following margins: left = 1.5”; Right, top, bottom = 1.0”. 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-page limit 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 Web links in their evaluation of the proposal.

New applications where the investigator has received NASA funding in related fields from 1999 through 2002: Results and evidence of progress of the associated NASA supported research must be presented as part of the project description. See “Instructions for Responding to NASA Research Announcements” for details.

Revised applications (revisions of 1999 through 2002 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 than 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 review will be considered non-responsive and will be returned without review.** See

“Instructions for Responding to NASA Research Announcements” for additional information.

#### (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.

Investigators are strongly encouraged to identify only the most critically important personnel (Team Members) to aid in the execution of their proposals. Should such positions be necessary, Co-Investigators (Co-Is) may be identified who are critical for the successful completion of research through the contribution of unique expertise and/or capabilities, and who serve under the direction of the PI, regardless of whether or not they receive compensation under the award. Most NRAs require a Co-I to have a well-defined role in the research that is defined in the Management section of the proposal. Evidence of a Co-I’s commitment to participate is often requested through a brief letter to be included with the proposal.

Co-Principal Investigators (Co-PIs) are not permitted with the sole exception when a non-U.S. Co-Investigator is proposed. This exception is described in the third subcategory below.

There are three subcategories of Co-Is that a proposal may identify, 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. 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 use of funds.
- A Co-I may be designated as an *Institutional PI* when their institution is making a major contribution to a proposal submitted by a PI from another institution.
- A Co-I from a non-U.S. institution may be designated as a *Co-Principal Investigator* (Co-PI) should such a designation serve required administrative purposes in that Co-I’s institution and/or for the procurement of funding by that Co-I from their sponsoring funding authority.

Additional Team Member category positions are often included in proposals as defined as follows:

A *Postdoctoral Associate* holds a Ph.D. or equivalent degree and is identified as a major participant in the execution of the proposed research. Such personnel may be identified

by name or only by function in those cases where their recruitment depends on the successful selection of the proposal.

*Other Professional* is a description appropriate for personnel who support a proposal in a critical albeit intermittent manner, such as a consulting staff scientist or a key Project Engineer and/or Manager, who is not identified as a Co-I or Postdoctoral Associate.

A *Graduate Student* included in a proposal is working for a post-graduate degree and will support the proposed research under direction of the PI. Such a student may be identified by name or only by function in case their recruitment depends on the successful selection of the proposal.

A *Collaborator* is an unfunded position included in a proposal, whose participation is less critical than a Co-I, but who is committed to provide a specific contribution to the proposal.

(6) Personnel/Biographical Sketches (Appendix E, Form B)

The biographical sketch for each investigator must not exceed two pages. If the list of qualifications and publications exceeds two pages, select the most pertinent information (see “Instructions for Responding to NASA Research Announcements” for details). You must use the biographical sketch form (Form B, Appendix E) located at:

[http://research.hq.nasa.gov/code\\_u/nra/current/NRA-03-OBPR-06/nra\\_forms2.rtf](http://research.hq.nasa.gov/code_u/nra/current/NRA-03-OBPR-06/nra_forms2.rtf)

This form cannot be electronically submitted. Fill out Form B for each investigator and attach it to your proposal.

(7) Facilities and Equipment (see Appendix D, “Instructions for Responding to NASA Research Announcements,” for details).

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

For proposals employing human subjects and/or animals, assurance of compliance with human subjects and/or animal care and use provisions is required on the Proposal Cover Page. In addition, the application must include a statement from the applicant institution certifying that the proposed work will meet all Federal and local human subjects requirements and/or animal care and use requirements.

Policies for the protection of human subjects in NASA sponsored research projects are described in NASA Management Instruction (NMI) 7100.8B (*Protection of Human Research Subjects*). Animal use and care requirements are described in the NASA Code of Federal Regulations (CFR) 1232 (*Care and Use of Animals in the Conduct of NASA Activities*). Both documents are available from the Office of Biological and Physical Research, Code UB, NASA Headquarters, Washington, DC 20546.

### Additional Requirements for Research Employing Human Subjects

A letter signed by the Chair of the Institutional Review Board (IRB) identifying the proposal submitted to NASA by title and certifying approval of proposed human subjects protocols and procedures should be included with each copy of the proposal. IRB certifications for other research proposals or grants cannot be substituted (even if they employ the same protocols and procedures).

If IRB certification is pending on the proposal due date, select “pending” from the IRB/IACUC section menu on the Proposal Cover Page, and include with each copy of the proposal a letter signed by the IRB Chair identifying the proposal by title and indicating the status of the IRB review process at the time of submission. IRB certification must be received no later than 90 days after the proposal due date. An application lacking the required IRB certification 90 days after the proposal due date will be considered incomplete and may be returned to the applicant without review.

With regard to research involving human subjects, NASA and the NSBRI have adopted the National Institutes of Health (NIH) policy. Women and members of minority groups and their subpopulations must be included in NASA-supported biomedical and behavioral research projects involving human subjects, unless a clear and compelling rationale and justification is provided showing that inclusion of these groups is inappropriate with respect to the health of the subjects or the purpose of the research.

NASA will require current IRB certification prior to each year’s award.

### Additional Requirements for Research Employing Animals

Specific information describing and justifying the use of animal subjects must be included in the proposal.

A letter signed by the Chair of the Institutional Animal Care and Use Committee (IACUC) identifying the proposal submitted to NASA by title and certifying approval of the proposed animal research protocols and procedures should be included with each copy of the proposal. The institution’s Public Health Service Animal Welfare Assurance Number must be included on the IACUC certification and entered in the IRB/IACUC section of the Proposal Cover Page. IACUC certifications for other research proposals or grants cannot be substituted (even if they employ the same protocols and procedures).

If IACUC certification is pending on the proposal due date, select “pending” from the IRB/IACUC selection menu on the Proposal Cover Page, and include with each copy of the proposal a letter signed by the IACUC Chair identifying the proposal by title and indicating the status of the IACUC review process at the time of submission. IACUC certification must be received no later than 90 days after the proposal due date. An application lacking the required

IACUC certification 90 days after the proposal due date will be considered incomplete and may be returned to the applicant without review.

NASA will require current IACUC certification prior to each year's award.

(9) Detailed Budget and Supporting Budgetary Information (Appendix E, Forms C and D).

For detailed budget information, you must use Forms C and D, provided at [http://research.hq.nasa.gov/code\\_u/nra/current/NRA-03-OBPR-06/nra\\_forms2.rtf](http://research.hq.nasa.gov/code_u/nra/current/NRA-03-OBPR-06/nra_forms2.rtf)

Form D must be filled out for each year of grant support requested.

**These forms cannot be electronically submitted. Fill out the forms and attach them to your proposal.**

NASA is expected to be operating on the basis of full cost accounting as soon as possible, including all Civil Service salaries with overhead. In the interim period, proposals should use the accounting method authorized at their institutions at the time proposals are due and for the entire proposed period of performance. 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.

Proposers submitting to use the UTMB GCRC bed rest facility are not required to submit GCRC facility costs. Proposers submitting to use other space flight analog facilities, including bed rest facilities, are required to submit facility costs as appropriate.

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.

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 for realism, reasonableness, allowability, and allocation. The budgetary forms define the desired detail, but each category should be explained. 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.
- 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 (if 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.”

- (10) Other Support: You must complete Form E for specific sources of other support for the principal investigator and each Co-Investigator (not consultants). Form E is available at [http://research.hq.nasa.gov/code\\_u/nra/current/NRA-03-OBPR-06/nra\\_forms2.rtf](http://research.hq.nasa.gov/code_u/nra/current/NRA-03-OBPR-06/nra_forms2.rtf)
- (11) Appendices, if any (reviewers are not required to consider information presented in appendices).

(12) One (1) signed original and twenty (20) copies of the proposal cover page and the proposals must be received by **5:00 p.m., August 11, 2003**, at the following address:

NASA Peer Review Services  
SUBJECT: 03-OBPR-06 Ground-based Analogs of  
Space Flight Proposal  
500 E Street SW, Suite 200  
Washington, DC 20024  
202-479-9030

## V. Compliance Matrix

The following information is specific to this NRA and **supersedes** the information contained in paragraphs (i) and (j) of Appendix D “Instructions for Responding to NASA Research Announcements.”

All proposals must comply with the general requirements of the Announcement as described in both Appendices A, B and D. Appendices A and B contain specific requirements and explanations for each section of the proposal above and beyond the NASA-specified requirements. Appendix D, “Instructions for Responding to NASA Research Announcements,” 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 the following:

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 that described in the Announcement.
4. Proposals that are revised versions of proposals previously submitted to NASA must be clearly designated as such on the proposal cover page 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 than 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 information as required by this NASA Research Announcement (refer to Appendices A and B).

*Note: At NASA’s discretion, non-compliant proposals may be withdrawn from the review process*

*and returned to the investigator without further review.*

Compliant proposals submitted in response to this Announcement will undergo an intrinsic scientific or technical merit review. Only those proposals most highly rated in the merit review process will undergo additional reviews for program relevance and cost.

## **VI. Eligibility**

All categories 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. 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 neither a prerequisite to submission of a proposal nor a competing factor in the selection process.

## **VII. Guidelines for International Participation**

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.

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 Appendix D. 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.

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.

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).

**Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.** 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 investigator 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/>. Investigators 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 are subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

**CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER  
RESPONSIBILITY MATTERS**

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*PRIMARY COVERED TRANSACTIONS*

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This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 14 CFR Part 1269.

A. The applicant certifies 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 application been convicted 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 government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph A.(b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or Local) terminated for cause or default; and

B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.

C. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lowered Tier Covered Transactions (Subgrants or Subcontracts)

- a) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department of agency.
- b) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

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**CERTIFICATION REGARDING  
LOBBYING**

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As required by S 1352 Title 31 of the U.S. Code for persons entering into a grant or cooperative agreement over \$100,000, the applicant certifies that:

- (a) 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, in connection with making of any Federal grant, the entering into of any cooperative, and the extension, continuation, renewal, amendment, or modification of any Federal grant or cooperative agreement;
- (b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting an officer or employee of any agency, Member of Congress, an or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, contracts under grants and cooperative agreements, and subcontracts), 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 S1352, 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.

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**CERTIFICATION OF COMPLIANCE WITH THE NASA REGULATIONS PURSUANT  
TO  
NONDISCRIMINATION IN FEDERALLY ASSISTED PROGRAMS**

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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 participating 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 the United States shall have the right to seek judicial enforcement of this assurance. His 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.

**INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS**  
**(MAY 2002)**

**(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 award 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.

## Proposal Submission Frequently Asked Questions (FAQs) and Sample Forms

The information provided here is in response to questions from investigators such as yourself. Additional information regarding submission procedures and requirements can be found in the research announcement to which you are responding, and at the NASA online proposal site:

<http://proposals.hq.nasa.gov/proposal.cfm>

### *1. What forms should I use when submitting a proposal?*

Currently, the NASA proposal site does not support the uploading of information or forms other than the information gathered while completing the online cover page. Please complete the online cover page early in the process (you can always return and edit the cover page at any time up to the due date). After completing the cover page, any additional information you are required to provide or wish to provide can be submitted in hardcopy in any format you choose.

Please find included in this document several sample forms that you may use when providing additional information. A standard checklist of materials to include is also provided. Information outside of the online proposal cover page can be provided in any format you choose, as long as it adheres to the NRA requirements. Please reference the NRA for information on all material required when submitting your proposal. Please be aware that we ask for copies of the completed proposal package, not just the project description, and must **receive** the copies by the proposal due date. The additional information requested in the NRA does not count towards the 20 page limit of your project description.

### *2. Where does my authorizing official sign?*

You must include your authorizing official as a team member. When you complete and print the proposal cover page, you will see signature blocks both for yourself and your authorizing official. You are required to submit one original signed (by both you and your authorizing official) cover page with your proposal hardcopies.

To be added as a team member to your proposal, the individual must be registered with the SYS-EYFUS system. If you try and add a team member and they are not found in the database, you must contact and have that individual register as a new SYS-EYFUS user. You will then be able to add them as a team member.

### *3. Who should I contact if I receive errors or have additional problems while using the NASA proposal site?*

For technical support, please e-mail [proposals@hq.nasa.gov](mailto:proposals@hq.nasa.gov) or call 202-479-9376 (Monday to Friday 8 a.m.-6 p.m. EST/EDT).

**CHECKLIST FOR PROPOSERS**

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- Proposal Cover Page (completed online)
- Response to previous reviews (if applicable)
- Project Description
- Biographical Sketches
- Other Support
- Facilities and Equipment Description
- Summary Budget Form/Budget Justification
- Detailed 12-Month Budget (for each year of support)
- IRB or ACUC letter/form (if applicable)
- Letters of Collaboration/Support (if applicable)
- Appendices, if any

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**BIOGRAPHICAL SKETCH**

Provide the following information for the key personnel.  
 Photocopy this page or follow this format for each person.

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NAME	POSITION TITLE
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***EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)***

INSTITUTION(S) AND LOCATION	DEGREE(S) (if applicable)	YEAR(S)	FIELD(S) OF STUDY

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**RESEARCH AND PROFESSIONAL EXPERIENCE:** Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years, and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications. **DO NOT EXCEED TWO PAGES.**

**BUDGET FOR ENTIRE PROJECT PERIOD  
DIRECT COSTS ONLY**

<i>BUDGET CATEGORY TOTALS</i>		<i>1<sup>st</sup> BUDGET PERIOD</i>	<i>ADDITIONAL YEARS OF SUPPORT REQUESTED</i>		
			<i>2<sup>nd</sup></i>	<i>3<sup>rd</sup></i>	<i>4<sup>th</sup></i>
PERSONNEL (Salary and Fringe Benefits) (Applicant organization only)					
SUBCONTRACTS					
CONSULTANT COSTS					
EQUIPMENT					
SUPPLIES					
TRAVEL	DOMESTIC				
	NON-DOMESTIC				
OTHER EXPENSES					
<b>TOTAL DIRECT COSTS FOR EACH PERIOD</b>					
<b>TOTAL INDIRECT COSTS FOR EACH PERIOD</b>					
<b>TOTAL DIRECT + INDIRECT COSTS FOR EACH PERIOD</b>					
<b>TOTAL DIRECT + INDIRECT COSTS FOR ENTIRE PROJECT</b>					

**JUSTIFICATION FOR UNUSUAL EXPENSES :**

## Form D

<b>DETAILED BUDGET FOR 12-MONTH BUDGET PERIOD</b>		FROM	THROUGH		
<b>DIRECT COSTS ONLY</b>					
Duplicate this form for each year of grant support requested		FUNDING AMOUNT REQUESTED			
<b>PERSONNEL</b> (Applicant Organization Only)					
NAME	ROLE IN PROJECT	EFFORT ON PROJECT	SALARY	FRINGE BENEFITS	TOTALS
	Principal Investigator				
SUBTOTALS <span style="float: right;">→</span>					
SUBCONTRACTS					
CONSULTANT COSTS					
EQUIPMENT (Itemize; use additional sheet if needed)					
SUPPLIES (Itemize by category; use additional sheet if needed)					
TRAVEL	DOMESTIC				
	NON-DOMESTIC				
OTHER EXPENSES (Itemize by category; use additional sheet if needed)					
<b>TOTAL DIRECT COSTS FOR FIRST 12-MONTH BUDGET PERIOD</b>					
<b>INDIRECT COSTS FOR FIRST 12-MONTH BUDGET PERIOD</b>					
<b>TOTAL COST FOR FIRST 12-MONTH BUDGET PERIOD</b>					

**OTHER SUPPORT**

Please provide information regarding specific sources of other support for the principal investigator and each co-investigator (not consultants). This information should be provided separately for each individual in the format shown below. List all active support for an individual before listing pending support. Include the investigator's name at the top of each page and number pages consecutively.

<b>NAME OF INDIVIDUAL</b>		
<b>ACTIVE/PENDING</b>		
Project Number (Principal Investigator)	Dates of Approved/ Proposed Project	Percent Effort
Source Title of Project (or Subproject)	Annual Direct Costs	
One-sentence description of project goals. (The major goals of this project are...)		
Brief description of potential scientific or commitment overlap with respect to this individual between this application and projects described above (summarized for each individual).		