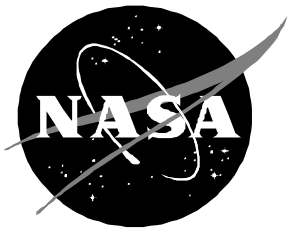

National Aeronautics and Space Administration

November 15, 1999
AO 99-OSS-05

Announcement of Opportunity

Explorer Program

Small Explorers (SMEX) and Missions of Opportunity

Notice of Intent Due: December 16, 1999
Proposals Due: February 17, 2000

OMB APPROVAL NO. 2700-0085

SMALL EXPLORERS (SMEX) AND MISSIONS OF OPPORTUNITY

Announcement of Opportunity
Soliciting Proposals
For Basic Research in Space Science

AO 99-OSS-05
Issued: November 15, 1999

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

SMALL EXPLORER AND MISSIONS OF OPPORTUNITY
ANNOUNCEMENT OF OPPORTUNITY

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APPENDICES

FOREWORD

This document is an Explorer program Announcement of Opportunity (AO) for two different types of investigations - Small Explorers (SMEX) and Missions of Opportunity.

Section 1, Description of Opportunity, provides a brief introduction describing the scope of the solicitation, the two types of investigations that may be proposed in response to this AO, a summary of the selection process, and the schedule. Section 2, Explorer Program Goals, Objectives, and Background, and Section 3, Explorer Program Constraints, Guidelines, and Requirements, are applicable to both SMEX investigations and Missions of Opportunity investigations. Section 4 describes SMEX investigations and SMEX-specific requirements. Section 5 describes Missions of Opportunity investigations and Missions of Opportunity-specific requirements. Section 6, Proposal Preparation and Submission, Section 7, Proposal Evaluation, Selection, and Implementation, and Section 8, Conclusion, are applicable to both SMEX investigations and Missions of Opportunity investigations.

Proposers interested only in SMEX investigations should read Sections 1, 2, 3, 4, 6, 7, and 8 and any Appendices referenced in those sections.

Proposers interested only in Missions of Opportunity should read Sections 1, 2, 3, 5, 6, 7, and 8 and any Appendices referenced in those Sections.

Proposers should be aware that the evaluation and selection approach described in this AO is somewhat different from approaches used in recent Explorer solicitations. The requirements for mission implementation details in the proposal (such as detailed spacecraft information) are reduced. Requirements for submission of a detailed Education and Public Outreach (E/PO) component of the proposal are also deferred until the second step of the selection process. See Section 1.2 for an overview of the approach and Sections 3.7.1 and 7.0 for details. Proposers should also note that this AO incorporates changes in the range and constraints of Small Explorers and Missions of Opportunity from recent Explorer solicitations. For Small Explorers, these include the addition of long duration balloons as launch vehicles (Section 4.1), the availability of Shuttle-deployed Spartan 400 carriers (Section 3.3.1), an increase in the cost cap on contributions to the total mission cost (Section 4.3.2), and the option of NASA provided project management and other mission implementation services through the NASA Goddard Space Flight Center for missions selected for Phase A concept studies (section 3.3.2). For Missions of Opportunity, these include an increase in the nominal cost cap (Section 5.5) and the opportunity to propose such investigations for the International Space Station (Section 5.4).

1.0 DESCRIPTION OF OPPORTUNITY

1.1 General Provisions

The National Aeronautics and Space Administration (NASA), Office of Space Science (OSS), announces the opportunity to conduct space science investigations through the Explorer program. For the purposes of this announcement, the term "space science" encompasses the Office of Space Science scientific objectives of the following NASA science themes:

Astronomical Search for Origins;
Structure and Evolution of the Universe; and
The Sun-Earth Connection.

For the purpose of this announcement, the Structure and Evolution of the Universe theme should be understood also to include tests of the fundamental laws of physics as they might be relevant to astrophysics and cosmology. Examples include tests of gravitational physics, general relativity, the equivalence principle, early universe physics, and high energy physics.

Additional information concerning these themes is provided in Section 2.1 and through appropriate links found on the Office of Space Science homepage at the World Wide Web address <http://spacescience.nasa.gov/>.

Proposals submitted in response to this Announcement of Opportunity (AO) must be for investigations encompassing all appropriate mission phases. For the purposes of this AO, mission phases are defined as follows: Phase A - concept study; Phase B - definition and preliminary design; Phase C - detailed design; Phase D - development (through launch plus 30 days); and Phase E - mission operations and data analysis. Phase E is to include analysis and publication of data in the peer reviewed scientific literature and delivery of the data to an appropriate NASA data archive as well as full implementation of an appropriate Education and Public Outreach (E/PO) program.

This AO invites proposals for Small Explorer (SMEX) missions and for participation in space missions that are sponsored by organizations other than the Office of Space Science, identified in this announcement as Missions of Opportunity:

- SMEX investigations are free flyers launched on expendable launch vehicles, the Space Shuttle, or long duration balloons. Further description of SMEX investigations is given in Section 4.0. Depending on the availability of proposals of appropriate merit, NASA intends to select two SMEX missions, one to launch by September 2003, and one to launch by September 2004.

- Participation in Missions of Opportunity may be undertaken through the Explorer program when the perceived value is high and the proposed cost to NASA OSS is within the funding limits of the Explorer program. NASA is not obligated to select a Mission of Opportunity under this solicitation. The Explorer program expects Missions of Opportunity, like SMEX investigations, to meet other program objectives for reducing cost, injecting new technology, and enhancing education and public outreach. Note that if a Mission of Opportunity is selected, a reduced flight rate of future Explorers will result. For this AO, investigations to be flown on the International Space Station (ISS) may be proposed as Missions of Opportunity. Further information on Missions of Opportunity is given in Section 5.0.

1.2 Proposal Evaluation and Selection Process

The selection process will be done in two stages. In stage 1, proposals will be assessed against the criteria given in Section 7.2 by panels of individuals who are peers of the proposers in the relevant scientific and technical areas. This assessment will focus primarily on the proposed science investigation. Proposals will then be categorized in accordance with the NASA Federal Acquisition Regulation Supplement (NFS) Part 1872.0. The results of the proposal evaluations and categorizations will be reviewed by the Space Science Steering Committee which will conduct an independent assessment of the evaluation and categorization processes. After this review, the final evaluation and categorization results will be presented to the Associate Administrator for Space Science, who will make the selections for a six-month Phase A concept study. It is anticipated that up to eight SMEX investigations will be selected for concept studies. Each SMEX Phase A study will be funded up to $450K in Fiscal Year 2000 dollars. NASA may also select investigations that will be awarded contracts to conduct concept studies for Missions of Opportunity. Each Mission of Opportunity will be funded up to $250K in Fiscal Year 2000 dollars for a six-month concept study. In accordance with this process, science Co-I's must be identified in the proposal. Nonscience partners are expected to be added during Stage 2 to those proposals selected for Phase A concept studies.

For stage 2, NASA will conduct a detailed review of the Phase A concept study results to evaluate the implementing details of the candidate investigations. This evaluation will consider any modifications of the scientific objectives, design details of the investigation hardware, plans for mission implementation including all technical, management, and cost factors, details of the Education and Public Outreach programs that are to be developed as an explicit part of the Phase A concept study, and plans for any new technology. As a result of this second evaluation, NASA intends to select two SMEX investigations, and possibly Missions of Opportunity, for implementation leading to flight. Section 7.0 provides additional details on these activities.

1.3 Proposal Opportunity Period and Schedule

NASA is soliciting SMEX investigations with mission launch dates no later than September 2004 with one launch anticipated by September 2003 and the other by September 2004. Investigations with an anticipated launch date later than September 2004 should be proposed in response to a subsequent SMEX AO.

NASA is soliciting Missions of Opportunity through this AO where a commitment from NASA is required by the sponsoring organization before December 31, 2001. The launch dates may be at any time. Missions of Opportunity requiring later commitment dates should propose in response to a subsequent Explorer program AO. The following schedule describes the major milestones for this SMEX and Missions of Opportunity AO.

AO release	November 15, 1999
Preproposal Conference	December 2, 1999
Notice of Intent to Propose due	December 16, 1999
Proposal submittal due by 4 pm EST	February 17, 2000
Non-U.S. Letter(s) of Endorsement due	March 17, 2000
Selections for Phase A Concept Study (target)	June 2000
Contract award for Phase A Concept Study (target)	July 2000
Phase A Concept Study Report due (target)	January 2001
Downselections for Flight (target)	April 2001

2.0 EXPLORER PROGRAM GOALS, OBJECTIVES, AND BACKGROUND

2.1 Space Science Research Goals

The scientific goals of space science research within the Office of Space Science (OSS) are generally contained in *The Space Science Enterprise Strategic Plan: Origins, Evolution, and Destiny of the Cosmos and Life* (November 1997). See Appendix C for access information for this and related documents describing OSS scientific goals.

The goals and strategies outlined in these documents encompass a wide range of scientific questions spanning a variety of scientific disciplines that NASA seeks to address by supporting investigations in three broad categories: (1) laboratory research and theoretical analyses; (2) ground-based astronomical observations; and (3) flight projects. This AO solicits only those investigations that fall into the third category. The scientific goals in these referenced documents as they relate to the NASA science themes listed in Section 1.1 will form the basis of the science evaluation criteria. Further information on the science themes may be obtained through appropriate links found on the Office of Space Science homepage at the World Wide Web address <http://spacescience.nasa.gov/>.

2.2 Explorer Program Objectives

Explorers are space physics and astronomy missions intended to study the Sun, to examine the space environment of the Earth and other planets, and to observe the universe beyond our Solar System.

The Explorer program seeks to conduct scientific investigations of modest programmatic scope. The program intends to provide a continuing opportunity for quickly implemented flight missions that conduct focused investigations that complement major flight missions, prove new scientific concepts, and/or make other significant contributions to space science.

The Explorer program is designed to accomplish frequent, high quality space science investigations utilizing innovative, streamlined, and efficient management approaches. It seeks to reduce cost and improve performance by selecting investigations for which investigators will commit to cost limits, control business and technical processes, and apply new technology. Finally, it seeks to enhance public awareness of, and appreciation for, space science and to incorporate educational and public outreach activities as integral parts of space science investigations.

2.3 Program Background

The Explorer program provides several classes of flight opportunities for the science themes described in Section 1.1. Changes to the Explorer program have been designed to increase the number of flight opportunities in response to recommendations from the scientific community. These changes include providing new classes of Explorer missions and opening up additional opportunities within each class. Explorer program classes are characterized by the scope of the mission, based primarily on cost and secondarily on payload size and launch vehicle capabilities. The current Explorer program classes are as follows:

- University-class Explorers (UNEX) are investigations characterized by definition, development, launch service, and mission operations and data analysis costs not to exceed $15 million (in Fiscal Year 2000 dollars) total cost to NASA OSS. University-class Explorer missions will be launched by a variety of low cost methods. Initially, one launch per year is anticipated. A long term program goal is to achieve multiple launches per year for a more modest version of this class of Explorer missions.

- Small Explorers (SMEX) are investigations characterized by definition, development, launch service, and mission operations and data analysis costs not to exceed $75 million (in Fiscal Year 2000 dollars) total cost to NASA OSS. It is NASA's intent to launch one Small Explorer mission per year.

- Medium-class Explorers (MIDEX) are investigations characterized by definition, development, launch service, and mission operations and data analysis costs not to exceed $150 million (in Fiscal Year 2000 dollars) total cost to NASA OSS. NASA intends to launch one MIDEX mission per year.

- Missions of Opportunity are investigations characterized by being part of a non-OSS space mission of any size, but having a total NASA OSS Cost that is typically under $35 million (in Fiscal Year 2000 dollars). These missions are generally conducted on a no-exchange-of-funds basis with the organization sponsoring the mission. NASA intends to solicit proposals for Missions of Opportunity with each AO issued for UNEX, SMEX, and MIDEX investigations. For each AO, the cost limit for Missions of Opportunity is expected to be constant, adjusted only for inflation.

3.0 EXPLORER PROGRAM CONSTRAINTS, GUIDELINES, AND REQUIREMENTS

This Section describes the constraints, guidelines, and requirements applicable to all Explorer program selections. Not all of the requirements need to be addressed in the proposal. Some will be addressed in the Phase A concept study. See Appendix B for requirements on contents of the proposal.

Additional constraints specific to SMEX are in Section 4, and constraints specific to Missions of Opportunity are in Section 5. Specific directions for proposal preparation are included in Section 6.

3.1 General Program Constraints and Guidelines

The strategic role of the Explorer program is to address Space Science Enterprise science goals and objectives that can be executed within the scope of the Explorer program cost caps but are not addressed by missions explicitly included in the Space Science Enterprise Strategic Plan (see Appendix C). Explorer missions that are intended to achieve science goals of missions already in the Strategic Plan for a similar time period (that is, proposed for launch by mid 2005) may not be proposed for consideration by this AO.

The responsibility for implementing a selected investigation rests with the PI and the investigation team, which will have a large degree of freedom with which to accomplish its proposed objectives with only essential NASA oversight. In accordance with NASA's transfer of program management responsibility to its Centers, the NASA Goddard Space Flight Center (GSFC) has been assigned program management responsibility for Explorers. In this role, which is separate from their role as a possible partner in the investigation, GSFC is responsible for NASA's fiduciary responsibility to ensure that Explorer missions are achieved in compliance with the cost, schedule, performance, reliability, and safety requirements committed to by the PI. The level of GSFC's involvement in this role may vary from mission to mission, depending on the implementing organization and other programmatic considerations. It is expected that the GSFC Explorer Program Office will work with the selected Principal Investigators and implementing organizations to define roles and responsibilities to fulfill this responsibility in the most effective manner (see Appendix C for an example Mission Definition and Requirements Agreement).

Once an investigation has been selected for flight, failure to maintain reasonable progress on an agreed upon schedule or failure to operate within the constraints outlined below may be cause for its termination by NASA. Every aspect of a selected investigation must reflect a commitment to mission success while keeping total costs as low as possible. Consequently, investigations should be designed and planned to emphasize mission success within cost and schedule constraints by incorporating sufficient margins, reserves, and resiliency. Only those investigations whose proposed cost, schedule, and launch vehicle requirements do not exceed the constraints and guidelines identified in this AO will be considered as candidates for selection for flight.

3.2 Science Requirements

The relationship between the proposed scientific objectives, the data to be returned, and the instrument payload to be used in carrying out the proposed investigation must be unambiguous and clearly stated in the proposal. Explorer investigation teams will be responsible for initial analysis of the data, their subsequent delivery to an appropriate NASA data archive, the publication of scientific findings, implementation of an appropriate Education and Public Outreach program, and communication of the results to the public.

In accordance with NASA policy, data are to be released as soon as possible after a brief validation period appropriate for the mission. Explorer teams will be responsible for collecting the scientific, engineering, and ancillary information necessary to validate and calibrate the scientific data prior to depositing it in the appropriate NASA data archive. The time required to complete this process should be the minimum necessary to provide appropriate data to the scientific community and the general public and must be described in the proposal. As part of their funded Phase E activities, investigation teams must include an appropriate period for data analysis independent of archiving activities.

3.3 Technical Approach Requirements

Investigations must encompass all technical aspects from the initial studies through delivery of the data to the appropriate NASA data archive and their analysis. The document, NPG 7120.5A *NASA Program and Project Management Processes and Requirements*, delineates activities, milestones, and products typically associated with each of these phases and may be used as a reference in defining a team's mission approach. This document is included in the Explorer Program Library (see Appendix C). Mission teams have the freedom to use their own processes, procedures, and methods, and the use of innovative processes is encouraged when cost, schedule, technical improvements, and reliability can be demonstrated. Mission teams shall abide by all necessary Federal (including NASA), state, and local laws and regulations.

Selected investigations shall have a product assurance program that is consistent with the requirements of the ISO 9000 series, American National Standard, *Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing*, ANSI/ASQC Q9001-1994. The investigation's product assurance program must meet the requirements in the *SMEX Safety, Reliability, and Quality Assurance Requirements* document that is available in the Explorer Program Library.

Proposers are free to use all, some, or none of the NASA-provided services for tracking, control, communications, and other services. Costs for such services, whether obtained from NASA or from other sources, *must* be included in the cost estimate. Early in Phase B, the Office of Space Science and the Space Operations Management Office (SOMO) will jointly consider other, broader NASA objectives that could result in NASA directing changes to the proposed approach. Selected investigations should be prepared to support tradeoff studies to be carried out by OSS and SOMO during the investigation's definition study. Information on NASA SOMO space communications capabilities and costing is given in the document, *NASA's Mission Operations and Communications Services,* available in the Explorer Program Library.

3.3.1 Government Furnished Equipment (GFE)

For purposes of this AO, the following items are considered Government Furnished Equipment (GFE):

- NASA-provided expendable launch services as described and costed in the *ELV Launch Opportunities* document in the Explorer Program Library
- Spartan 400 options as described and costed in the *GFE Spacecraft* document in the Explorer Program Library
- NASA-provided balloon services as described and costed in the *Long Duration Balloon Opportunities* document in the Explorer Program Library

As GFE costs have been verified prior to the release of this AO, NASA will accept the published cost of a GFE option provided that the proposed application is consistent with the intended use of the GFE. Proposers must include the cost of GFE in their proposal, and such costs count against the NASA OSS Cost cap.

3.3.2 Available GSFC Services

For any PI's selected for Phase A concept studies who so request, NASA can provide the project management, mission system engineering, spacecraft, ground system, and other support needed to complete the formulation and implementation of an investigation. NASA intends to capitalize on the project management and technical expertise at the NASA Goddard Space Flight Center (GSFC) and the investment in the design and development of small spacecraft by industry and by GSFC.

A variety of alternative spacecraft are available through GSFC, including a number of commercial spacecraft via the Rapid Spacecraft Procurement and small in-house spacecraft. An investigator may offer a concept to provide a scientific investigation and an instrument, and propose to utilize a spacecraft provided by NASA. For any selected mission that will use a spacecraft procured by GSFC from industry, GSFC, with the participation of the PI, will select and contract for the spacecraft/mission definition, design, and development. Alternatively, consistent with national policy, the Associate Administrator for OSS may decide to have GSFC perform spacecraft development in-house. In either case, GSFC will assist a PI during the Phase A concept study under a partnering arrangement to establish the technical, management, cost, and

other approaches for formulating, developing, and implementing the investigation and will aid the PI in the preparation of the Concept Study Report. As a nonscience partner providing services, GSFC may be added to the proposal team after a proposal has been selected for Phase A concept studies. Except for the GFE items described in Section 3.3.1 above, Concept Study Reports utilizing available GSFC services are subject to full technical, management, cost, and other factors review, as is any other Report. Guidelines for this approach are available in the document *SMEX - Available GSFC Services* in the Explorer Program Library (See Appendix C).

3.4 Management Requirements

Explorer mission investigation teams must be led by a single Principal Investigator who may be from any category of U.S. or non-U.S. organization, including educational institutions; industry or nonprofit institutions; or from one of the NASA Centers, the Jet Propulsion Laboratory (JPL), other Federally-funded research and development centers, or other U. S. Government agencies. Teams may be formed from any combination of these institutions. *Note that the level of detail required in the proposal (and the Phase A concept study report) is the same no matter what organizations are partners in the investigation team, even a NASA center.*

The Principal Investigator is in charge of his/her investigation, with full responsibility for not only its scientific integrity, but its implementation as well, from development of the proposal through all phases of the investigation. NASA intends to allow the Principal Investigator and his/her team to use their own management processes, procedures, and methods to the fullest extent possible. Investigation teams should define the management approach best suited for their particular teaming arrangement. This approach should be commensurate with the investigation's implementation approach, while retaining a simple and effective management structure necessary to assure the adequate control of development within the cost and schedule constraints. The investigation team should develop a Work Breakdown Structure (WBS) that best fits its organizational approach and mission design concept. A WBS will be required in the phase A Concept Study Report.

In the concept study report, each investigation must define the risk management approach it intends to use to ensure successful achievement of the mission objectives within established resource and schedule constraints. Included in this discussion of risk management should be risk mitigation plans for any new technologies and the need for any long-lead items that need to be placed on a contract before the start of the development phase, to ensure timely delivery. In addition, any manufacturing, test, or other facilities needed to ensure successful completion of the proposed investigation should be identified. The proposer must describe the approach for managing risk which will mitigate loss of the mission or serious degradation due to errors by human operators or errors or malfunctions in the mission data systems during the flight phase.

Each selected investigation must have a Project Manager (PM), selected by the PI, who will oversee the technical implementation of the investigation. The role, qualifications, and experience of the PM should be adequate to ensure that the technical and managerial needs of the investigation will be met. The PM need not be named in the proposal.

Finally, the PI is accountable to NASA for the scientific success of the investigation. Therefore, the PI must be prepared to recommend mission termination if, in his/her judgment, the successful achievement of established science objectives, as defined in the proposal, is no longer likely within the committed cost and schedule reserves.

3.4.1 Co-Investigator Roles and Requirements

A Co-Investigator is defined to be an investigator who plays a necessary role in the proposed investigation and whose services are either funded by NASA or are contributed. If funded by NASA, costs must be accounted for in the NASA OSS Cost. If contributed, the costs must be accounted for in the Total Cost and an endorsement letter from the proposed Co-Investigator's institution must be provided with the proposal. The role of each Co-Investigator must be described in the proposal. Other nonfunded members of the proposal team may be included in the proposal as collaborators. See Appendix B for details.

3.5 Cost Requirements

3.5.1 Full Cost Accounting

Where NASA-provided services are used, NASA Civil Service labor and supporting NASA Center infrastructure must be costed on a full cost accounting basis. If NASA guidance for full cost accounting has not been fully developed by the closing date for completion of the concept study, NASA Centers may submit full cost proposals based on the instructions in the NASA Financial Management Manual, Section 9091-5, Cost Principles for Reimbursable Agreements, or based on their own Center-approved full cost accounting models. If any NASA costs are to be considered as contributed costs, the contributed item(s) or service must be separately funded by an effort complementary to the proposed investigation and the funding sources must be identified. Other Federal Government elements of proposals must follow their agency cost accounting standards for full cost. If no standards are in effect, the proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

3.5.2 Goods and/or Services Offered on a No Exchange of Funds Basis

Contributions of any kind, whether cash or noncash (property and services), to Explorer investigations by organizations other than the Office of Space Science are welcome. Values for all contributions of property and services shall be established in accordance with applicable cost principles. Such contributions may be applied to any part or parts of a mission. A letter of endorsement that provides evidence that the institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA must be submitted with the proposals for all U.S. components. For non-U.S. components of proposals, see Section 3.6.

The cost of contributed hardware or software should be estimated as either: (1) the cost associated with the development and production of the item if this is the first time the item has been developed and if the mission represents the primary application for which the item was developed; or (2) the cost associated with the reproduction and modification of the item (i.e., any recurring and mission-unique costs) if this is not a first-time development. If an item is being developed primarily for an application other than the one in which it will be used in the proposed investigation, then it may be considered as falling into the second category (with the estimated cost calculated as that associated with the reproduction and modification alone).

The cost of contributed labor and services should be consistent with rates paid for similar work in the offeror's organization. The cost of contributions does not need to include funding spent before the start of the investigation (before completing a contract, grant, or cooperative agreement with NASA). The value of materials and supplies shall be reasonable and shall not exceed the fair market value of the property at the time of the contribution.

3.5.3 NASA OSS Cost

The NASA OSS Cost is the funding that NASA OSS would be expected to provide to the investigation team over the course of the investigation, beginning with selection and ending with the conclusion of Phase E. Examples of costs to be included are launch services including any upper stages; education and outreach activities; new technology; subcontracting costs (including fees); science teams; all personnel required to conduct the investigation, analyze and publish results, and deliver data in archival format; insurance; ground data system; labor (contractor); noncontributed NASA civil servant costs; reserves; and contract fees. The specific total funding limits and limits for major mission elements are specified in Sections 4 and 5. The NASA OSS Cost is a consideration in the selection of investigations and in the continuing assessment of ongoing missions.

3.6 International Participation

Recognizing the potential scientific, technical, and financial benefits offered to all partners by international cooperation, participation by non-U.S. individuals and organizations as team members in Explorer investigations is welcomed. Participation may include, but is not limited to, the contribution of scientific instruments, the spacecraft (or a portion thereof), and the subsequent sharing of the data from the mission, all on a no-exchange-of-funds basis. Carriers, launch vehicles and launch services, and space operations may also be contributed by international partners.

The direct purchase of supplies and/or services which do not constitue research from non-U.S. sources is permitted except that NASA is precluded from purchasing non-U.S. launch vehicles, nor may NASA funds provided to a mission team be used to purchase a launch vehicle from a non-U.S. source. The provision of launch services as a contribution to an Explorer mission by a non-U.S. partner is acceptable only on a no-exchange-of-funds basis (i.e., at no cost to NASA). Only those non-U.S. launch vehicles with demonstrated reliabilities may be proposed for Explorer missions.

Proposers are advised that a contract or subcontract by a U.S. team with a non-U.S. participant using funds derived from NASA must meet all applicable NASA and Federal regulations. Proposers are further advised that these regulations will place an additional burden on investigation teams that must be explicitly included in discussions of the investigation's cost, schedule, and risk management. Information regarding regulations governing the procurement of foreign goods or services is provided in Appendix D.

Proposers should be aware that investigations selected for phase A that include international participation, either through involvement of non-U.S. nationals and/or involvement of non-U.S. entities must include in their Phase A Concept Study Report a section discussing compliance with U.S. export laws and regulations; e.g., 22 CFR 120-130, *et seq.* and 15 CFR 730-774, *et seq.*, as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary the Phase A Concept Study Report must 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 through Internet URLs http://www.pmdtc.org and http://www.bxa.doc.gov. Prospective proposers are advised that under U.S. law and regulation, spacecraft and their specifically designed, modified or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, *et seq*.

Participation by non-U.S. individuals and/or institutions as team members or contributors critical to Explorer investigations must be endorsed by the institutions and/or governments involved. If government support is required, then a government endorsement is also needed. The letter of endorsement must provide evidence that the non-U.S. institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA. Such endorsements must be submitted per the schedule in Section 1.3.

3.7 Education, Public Outreach, New Technology, Small Disadvantaged Business Requirements, and Minority Institution Requirements

3.7.1 Education and Public Outreach

OSS expects education and public outreach to be a significant part of each OSS flight program and research discipline, and strongly encourages space science researchers to engage actively in education and public outreach as an important component of their NASA-supported professional activities. In order to achieve this goal, OSS has developed a comprehensive approach for making education at all levels (with a particular emphasis on K-14 education) and the enhancement of public understanding of space science integral parts of all of its missions and research programs. The three key documents that establish the basic policies and guide all OSS

Education and Public Outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (October 1996), and the *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (April 1999). These documents are available through the Explorer Program Library (see Appendix C) or, alternatively, can be accessed by selecting "Education and Public Outreach" from the menu on the OSS homepage at the World Wide Web address <http://spacescience.nasa.gov>, or may be requested from Dr. Jeffrey Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington, DC 20546-0001.

In accord with these established OSS policies, Education and Public Outreach (E/PO) will be an integral element of the Explorer Program, and 1-2% of the total program budget (excluding launch vehicles) will be allocated to education and outreach.

Instructions for the E/PO component of the proposal are contained in Appendix B. A detailed E/PO implementation plan will be developed by each selected investigation as part of its Phase A concept study. As outlined in Section 7.4.4, plans for E/PO will play an explicit role in the evaluation of the concept studies and in the downselection of investigations. See the document, *Guidelines and Criteria for the Phase A Concept Study*, in the Explorer Program Library for further information.

3.7.2 Advanced Technology

NASA seeks to infuse new technologies that enhance performance and reduce costs into its programs and to strengthen the mechanisms by which it transfers such technologies to the private sector, including the nonaerospace sector. The means by which NASA's Office of Space Science plans to implement new technology is described in *The Space Science Enterprise Integrated Technology Strategy* (October 1998), which is included in the Explorer Program Library (see Appendix C). Explorer investigations present an opportunity to develop and test new technologies and applications. Investigations dependent on new technology will not be penalized for risk provided that adequate plans are described to provide a reasonable back-up approach that will assure the success of the investigation.

3.7.3 Small Disadvantaged Businesses and Minority Institutions

The Principal Investigator (PI) and team members shall agree to use their best efforts to assist NASA in achieving its goal for the participation of small disadvantaged businesses, women-owned small businesses, Historically Black Colleges and Universities, and other Minority Educational Institutions in NASA procurements. Investment in these organizations reflects NASA's commitment to increase the participation of minority concerns in the aerospace community and is to be viewed as an investment in our future. Offerors, other than small business concerns, are also advised that contracts resulting from this AO will be required to contain a subcontracting plan that includes goals for subcontracting with small, small disadvantaged, and women-owned small business concerns. See Appendix A, Section XIII for information on goals and subcontracting plan requirements.

4.0 SMEX OPTIONS, GUIDELINES, AND REQUIREMENTS

A SMEX proposal must be for an investigation whose implementation requires a complete, free-flying mission. The Principal Investigator is responsible to NASA not only for the scientific integrity of the investigation, but also for the management of the complete mission, including provision of the spacecraft or balloon craft, instrument, and ground system. Such missions may be launched on long duration balloons, or released as free flying spacecraft from expendable launch vehicles or the Space Shuttle.

4.1 SMEX Options

Expendable Launch Vehicle Option

Under this option, SMEX investigations are launched using expendable launch vehicles (ELV's) either as primary, secondary, or co-manifested payloads. NASA-provided ELV launch options available through this AO include launch services on a Small Expendable Launch Vehicle Kennedy Space Center (SELV KSC) or those offered under the NASA Launch Services (NLS) contract. Other options that may be proposed are as a secondary or co-manifested payload on commercial missions using larger ELV's such as a Delta II or Atlas Centaur (IIA or IIAS). NASA seeks to take advantage of all reasonable sources of commercial ELV services while assuring that NASA-funded payloads are not exposed to excessive risk. The demonstrated reliability of the proposed launch vehicle and the resultant probability of mission success will be considered by NASA in the evaluation of risk. Information on the reliability of ELV's may be obtained from the point of contact listed in the Expendable Launch Vehicle Opportunities document in the Explorer Program Library (Appendix C). If the proposed launch opportunity is a secondary or co-manifested payload on an ELV, the proposer must identify the opportunity and provide evidence as part of the concept study report that the launch service provider agrees to manifest the investigation. If the investigation is selected for flight, NASA expects to contract with the U.S. launch service provider to acquire the launch service for the investigation.

It is the responsibility of the proposer to find an organization that will contribute a launch if a contributed launch is part of the proposed investigation. The demonstrated reliability and the resultant probability of mission success will be evaluated as described above for both contributed launch services and NASA OSS-funded launch services. The use of non-U.S. provided launch services may be proposed only on a no-exchange-of-funds basis.

Space Shuttle Free Flyer Option

A SMEX investigation may be proposed to be launched using the Space Shuttle. A SMEX-size investigation is anticipated to be classified as a secondary payload by the Space Shuttle Office. If designated a primary payload, an investigation must demonstrate compliance with the Space Shuttle Use Policy set forth in Public Law 101-611. The PI is responsible for working with the point(s) of contact identified in the Shuttle Launch Opportunities document (See Appendix C) during the Phase A concept study to determine whether the investigation is classified as a primary or secondary payload and to identify an appropriate flight assignment.

Long Duration Balloon Option

A long duration balloon may be proposed as the launch vehicle for a SMEX investigation. For this AO, a long duration balloon flight is defined as a balloon flight lasting more than one week. A complete mission using long duration balloons may include more than one flight as long as the first flight is no later than September 2004 and the total investigation is executed within the NASA OSS Cost cap. See the Long Duration Balloon Opportunities document in the Explorer Program Library for additional information. Note that the ultra long duration super pressure balloon capability that is under development for large payloads is not available for this AO.

4.2 International Participation

Any proposed international participation must be described at the same level of detail as that of U.S. partners. This includes the provision of cost, schedule, and management data. Failure to document cost and schedule data, management approaches, or failure to document the commitment of team members, may cause a proposal to be found unacceptable.

4.3 Cost and Schedule Requirements

The SMEX program is part of an effort to develop frequent space science investigations of modest scope. The schedule for investigations selected through this AO is expected to be such that launch can take place by September 2003 for the first mission and September 2004 for the second mission. The proposer must specify the launch date in the proposal. It may be necessary for NASA to adjust the launch dates of the selected missions from those proposed to conform to the available Explorer program budget profile; therefore, the degree of launch date flexibility should also be indicated in the proposal. Procurement of long lead materials is permitted during the Phase B/C time frame but must be defined in the concept study. No time constraint is placed on Phase E.

4.3.1 NASA OSS Cost

For a SMEX, the NASA OSS Cost is limited to $75 million in Fiscal Year 2000 dollars, including funding for all phases and all elements (e.g., launch services, GFE, Phase A through Phase E, implementation of the Education and Public Outreach program, mission operations and data analysis, and reserves). The proposer may distribute the funds among these elements as best suits the investigation.

Although NASA plans to fund directly the costs for any U.S. launch services, these costs are nonetheless to be included in the proposal. The ELV launch services cost to be used to calculate the NASA OSS Cost for an investigation using an ELV is provided in the SMEX ELV Launch Opportunities document available in the Explorer Program Library. Launch services may also be proposed at no cost to NASA as part of a teaming proposal.

If launch services using the Space Shuttle are proposed, the launch services costs must include any mission unique costs and integration costs. The basic Space Shuttle launch service cost is not charged to the proposal. See the Space Shuttle Launch Opportunities document in the Explorer Program Library for further information.

Launch services costs for long duration balloon missions may include mission-unique costs necessary to conduct the investigation. See the Long Duration Balloon Opportunities document in the Explorer Program Library.

The cost of any GFE, such as the Spartan 400 carrier, must be included in the proposed NASA OSS Cost. See the GFE Spacecraft document in the Explorer Program Library for further information.

The specific cost information required for SMEX proposals is contained in Appendix B.

4.3.2. Total Mission Cost including Contributions

The Total Mission Cost is defined as <u>all</u> costs that are necessary to complete an investigation beginning with selection through Phase E, including NASA OSS Costs, non-NASA Civil Servant costs, and contributions from U.S. (including non-NASA OSS) and non-U.S. entities. In general, proposers should assume all costs must be included unless specifically excluded. Proposers must estimate the Total Mission Cost in the proposal as described in Appendix B, Table B2.

Contributions, that is, goods and/or services offered on a no-exchange-of-funds basis, may be proposed to any mission element but the total contribution is not to exceed the NASA OSS Cost established at the end of Phase A.

4.4 Selection and Cost Limits

It is anticipated that up to eight SMEX investigations will be selected for a six-month Phase A concept study through this AO, with each awarded a contract with a priced option for a two-month bridge phase (see Section 7.4.2). At the conclusion of the concept study, it is planned that two investigations will be selected to proceed into subsequent mission phases. NASA will not exercise contract options nor continue funding for those investigations not selected to proceed. Those investigations not selected to proceed may propose to future Explorer AO's with neither prejudice nor advantage on the part of NASA.

A concept study will be conducted by each selected investigation team. The cost (up to $450K in Fiscal Year 2000 dollars) of the concept study should be part of the proposal and is included in the NASA OSS Cost cap. See the Guidelines and Criteria for the Phase A Concept Study document available in the Explorer Program Library for information on the concept study to be conducted by the investigation team.

The NASA OSS Cost cap including reserves as specified in Section 4.3.1 must not be exceeded in the proposal nor at any time thereafter. The Investigation Cost cap, established at the end of Phase A and committed to by the PI, shall not be exceeded.

Each mission's concept study must conclude with a commitment by the PI for the cost, schedule, and scientific performance of the investigation. If, at any time, the cost, schedule, or scientific performance commitments appear to be in peril, the investigation will be subject to cancellation. The Explorer program does not maintain a budget reserve to which investigations exceeding their cost commitments may have access for cost overruns.

5.0 MISSIONS OF OPPORTUNITY BACKGROUND, CONSTRAINTS, GUIDELINES, AND REQUIREMENTS

5.1 Missions of Opportunity Background and Constraints

By funding U.S. participation in a Mission of Opportunity, NASA seeks to allow the U.S. scientific community to conduct a science investigation of interest to OSS as part of a non-OSS space mission. Typically, such missions are sponsored by non-U.S. governments, although missions from U.S. agencies (including NASA) or private sector organizations are equally qualified. Mission of Opportunity investigations on a military satellite are allowed as long as the satellite is not planned for weapons testing.

For Missions of Opportunity, the proposer offers to participate in a non-OSS mission that is planned or that has been approved by its sponsoring organization. Such participation could take many forms, such as providing a complete science instrument, hardware components of a science instrument, or expertise in critical areas of the mission. NASA OSS will evaluate the proposed investigation, not the sponsor's entire mission. While the investigator is not required to document the entire mission of the sponsor, the U.S. investigator must fully document their complete investigation in the proposal.

Note that, except for investigations selected for the International Space Station (see Section 5.4 below), selection by NASA OSS through this AO does not constitute selection of a Mission of Opportunity investigation as part of the mission, which necessarily is a decision made by the sponsor of the mission. Instead, selection is a commitment by NASA OSS to fund the NASA OSS portion of the investigation as part of the Explorer program, although funding beyond basic studies will not begin until detailed design of the mission itself is underway. If a Mission of Opportunity investigation is selected both by NASA OSS and by the mission sponsor, the PI is responsible to NASA OSS for the scientific integrity and the management of the PI's contribution to the mission.

Except for Missions of Opportunity proposed for the International Space Station, it is incumbent on the proposing investigator to provide evidence in their proposal that the sponsoring organization intends to fund the primary host mission and that the endorsement of NASA for

U.S. participation is required by the sponsoring organization prior to December 31, 2001. The launch date itself is not constrained. If a commitment from NASA is not needed by the sponsoring organization before December 31, 2001, then the proposal must be submitted to a subsequent Explorer program AO.

A selected investigation may result in a contract, a grant, or a cooperative agreement, depending on the nature of the proposal and the institutions involved. For this AO, a deviation is granted by the NASA Office of Procurement that allows a commercial firm to be awarded a grant (with no requirement for NASA involvement in and contribution to the technical aspects of the investigation). For either a grant or a cooperative agreement, a commercial firm is expected to contribute at least 50% of the total resources. Further information on grants and cooperative agreements is contained in NASA Handbook NPG 5800.1D, entitled, *Grant and Cooperative Agreement Handbook*, dated July 23, 1996, available from the Explorer Program Library (see Appendix C).

A selected Mission of Opportunity investigation will be expected to submit a concept study report to NASA OSS for detailed review. Concept studies are expected to address plans for education and public outreach and for meeting other programmatic objectives of this AO. This report will conclude with a commitment by the PI for the cost, schedule, and scientific performance of the investigation. If, at any time, this commitment appears to be in peril, the investigation will be subject to cancellation. Like other missions proposed to this AO, NASA OSS funding is subject to cancellation if there is a cost overrun charged to NASA for any reason, including a launch delay caused by the non-NASA OSS partner.

A technical and programmatic review will be held prior to the start of phase C/D. Assuming a positive outcome, NASA will confirm the investigation to proceed to development. As a condition for confirmation, the organization sponsoring the full mission must make a commitment to enter into an appropriate agreement with NASA OSS that shall include provisions for sharing of flight data necessary for the completion of the selected Mission of Opportunity investigation (see Section 5.3 below).

5.2 General Guideline for Missions of Opportunity

Missions of Opportunity are generally conducted on a no-exchange-of-funds basis between NASA OSS and mission sponsors. They are always conducted on a no-exchange-of-funds basis with a non-U.S. mission sponsor.

5.3 Science Requirements

Mission of Opportunity investigation teams will have data analysis responsibilities primarily defined by the policies of the host mission sponsor; nevertheless, NASA OSS expects that the mission sponsor will enter into an agreement with NASA OSS to assure that data returned from at least those aspects of the mission in which NASA OSS support is involved, if not the entire mission, will be made available to the U.S. scientific community in a timely way.

5.4 International Space Station Payloads as Missions of Opportunity

Under this AO, Explorer investigations that may be carried out from the International Space Station (ISS) may be proposed as Missions of Opportunity. Any selections by NASA under this AO will also constitute approval to fly on the ISS. The Office of Space Science (OSS) has allocations for two zenith-pointing EXPRESS (EXpedite the PRocessing of Experiments to Space Station) Pallet Adapter payloads, available beginning in 2003. Information on the specifics of the EXPRESS Pallet, including interfaces, available payload resources, costing information, and a point of contact from the OSS Research Program Office for ISS Utilization may be found in the *International Space Station Opportunities* document in the Explorer Program Library (see Appendix C). Payloads for the Japanese Experiment Module – Exposed Facility (JEM-EF), Columbus Orbiting Facility (COF), and nonstandard payloads are not being solicited through this AO.

The current preliminary date for the launch of the first EXPRESS Pallet and integrated payloads is May 2003. Proposers will be notified of any significant change to this milestone via the OSS E-mail notification system, and posted amendments to this AO. If the milestone is delayed beyond the period covered by this AO, NASA intends to offer ISS opportunities in subsequent Explorer AO's.

5.5 Cost and Schedule Requirements for Missions of Opportunity

Although the level of funding available for each proposal will be decided on a case-by-case basis, proposers should be aware that any Mission of Opportunity investigation costing the Explorer program more than $35 million in Fiscal Year 2000 dollars (including all phases of the investigation) will be difficult to support. NASA's funding for a selected investigation's concept study will be limited to $250K (in Fiscal Year 2000 dollars). Follow-on work prior to acceptance of the Mission of Opportunity investigation by the mission's sponsoring organization is limited to $100K (in Fiscal Year 2000 dollars), and the limit for all studies prior to the initiation of mission detailed design (Phase C) is 25% of the total NASA commitment for Phases A/B/C/D. The PI must assume all risk for delays in the mission and should propose appropriate reserves.

If launch services using the Space Shuttle are proposed, the launch services costs must include any mission unique costs and integration costs. The basic Space Shuttle launch cost itself is not charged to the proposal. See the *Space Shuttle Launch Opportunities* document in the Explorer Program Library for further information.

Proposers must estimate the total NASA OSS Cost in the proposal. The specific cost information required for proposals is contained in Appendix B. *The Investigation Cost cap incuding reserves, established at the end of Phase A and committed to by the PI, shall not be exceeded.* Each mission's concept study must conclude with a commitment by the proposer for the cost, schedule, and scientific performance of the investigation. If, at any time, the cost, schedule, or scientific performance commitments appear to be in peril, the investigation will be subject to cancellation. The Explorer program does not maintain a budget reserve to which investigations exceeding their cost commitments may have access for cost overruns.

6.0 PROPOSAL PREPARATION AND SUBMISSION

6.1 Preproposal Activities

6.1.1 Explorer Program Library

The Explorer Program Library provides additional requirements and background information on the Explorer program, including science goals, technology and education/public outreach strategies, and information on management aspects of flight programs. Information on the Explorer Program Library is contained in Appendix C.

6.1.2 Technical and Scientific Inquiries

All inquiries should be directed to the SMEX Program Scientist, as designated below. Inquiries are preferred in writing and may be sent by fax or E-mail; the character string "SMEX AO" (without quotes) should be included in the subject line of all transmissions.

Dr. William Wagner
Research Program Management Division
Code SR
Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001
U.S.A.
Fax Number: 202-358-3097
Phone: 202-358-0911
E-mail: william.wagner@hq.nasa.gov

6.1.3 SMEX Announcements Web Page

A SMEX Announcements web page, available at the URL <http://explorer.larc.nasa.gov/explorer/ppconf.html >, will provide updates during the SMEX AO solicitation process. It will provide links to the Explorer Program Library, information about the preproposal conference, a list of potential proposers (see Section 6.1.5), and responses to frequently asked questions.

6.1.4 Preproposal Conference

A preproposal conference will be held in the Washington, DC, metropolitan area in accordance with the schedule in Section 1.3. Further information, including logistics, will be available on the SMEX Announcements web page at the URL given in Section 6.1.3 above, prior to the Preproposal Conference.

Participants are to attend at their own expense and to make their own travel arrangements. The purpose of this conference will be to address questions about the proposal process for this AO, including a discussion of the evaluation criteria, procurement approach, and GFE. The preproposal conference will address all those questions that are received by NASA at least one week prior to the Preproposal Conference. Questions should be addressed to the SMEX Program Scientist at the address above. Additional questions submitted after this date, including those provided in writing at the conference, may be addressed at the conference only as time permits. Anonymity of the authors of all questions will be honored. A SMEX AO Preproposal Conference Transcript, including answers to all questions addressed at the conference, will be prepared and mailed approximately two weeks after the conference to attendees, to those submitting Notices of Intent (see below), and to anyone who submits a request for this document to the SMEX Program Scientist via fax or electronic mail.

6.1.5 Notice of Intent to Propose

To assist NASA's planning of the proposal evaluation process, a Notice of Intent to Propose should be submitted by all prospective proposers in accordance with the schedule in Paragraph 1.3. Those submitting a Notice of Intent will directly receive program updates as may occur up to the time of proposal due date. This Notice is to be submitted electronically by entering the requested information on the site at the World Wide Web address <http://props.oss.hq.nasa.gov>. Proposers without access to the Web or who experience difficulty in using this site should contact Ms. Debra Tripp (E-mail: deb.tripp@hq.nasa.gov) for assistance.

To the extent the following information is known by the due date, the Notice of Intent should include:

(a) Names, addresses, telephone numbers, E-mail addresses, and fax numbers of (1) the Principal Investigator; (2) any Co-Investigators; and (3) the lead representative from each organization (industrial, academic, educational, nonprofit, and/or Federal) expected to be included in the proposal team;

(b) Title of the proposed investigation, a brief statement of its scientific objectives, and the primary NASA OSS science theme (see Section 1.1) that the investigation supports;

(c) Mission mode (SMEX or Mission of Opportunity), and
for a SMEX, the likely launch vehicle, or
for a Mission of Opportunity, the name of the organization sponsoring the primary host;

(d) Identification of any new technologies that may be employed as part of the mission; and

(e) A brief statement of commitment to the OSS Education/Public Outreach goals and objectives.

Material in a Notice of Intent is for NASA planning purposes only, is confidential, and is not binding on the submitter.

SPECIAL NOTICE: As a result of recent AO's for complete mission investigations such as this one, commercial aerospace and technology organizations have requested access to the names and addresses of those who submit Notices of Intent (NOI's) in order to facilitate informing potential proposers of their services and/or products. At the option of the submitters of a NOI, NASA OSS is willing to offer this service with the understanding that the Agency takes no responsibility for the use of such information. Therefore, all those submitting an NOI in response to this AO are requested to include the appropriately edited form of the following material (Note: this material is included in the format of the NOI on the World Wide Web):

> "By submitting this Notice of Intent to propose, I hereby do / do not authorize NASA to post my name and institutional address (but not the name of my intended proposal) as an addendum to this AO on the World Wide Web starting approximately one week after the NOI due date. If I do authorize such a posting, I understand that such information will be in the public domain, and I will not hold NASA responsible for any use made by others for revealing this information."

6.2 Format and Content of Proposals

General NASA guidance for proposals is given in Appendix A of this AO, which is considered binding unless specifically amended in this Section of this AO. A uniform proposal format is required from all proposers to aid in proposal evaluation. The required proposal format and contents are summarized in Appendix B. Failure to follow this outline may result in reduced ratings during the evaluation process or, in extreme cases, could lead to rejection of the proposal without review.

6.3 Submission Information

6.3.1 Certification

All proposals must have a Cover Page and Proposal Summary that is to be submitted electronically through the Web site given in Appendix B. Once the form is submitted, it must be printed and used to obtain the required Principal Investigator and institutional signatures. The Cover Page must be signed by an official of the PI's institution authorized to certify institutional support and sponsorship of the investigation, and the management and the financial parts of the proposal. The proposal shall include a letter of endorsement signed by an institutional official from each known partner and each organization expecting to provide critical, no-exchange-of-funds contributions of hardware, software, facilities, services (including Co-Investigator services), etc., that provides evidence that the institution and/or government officials are aware and supportive of the investigation and will pursue funding if selected by NASA. Paper copies of proposals and the original, signed version must be received by the due dates specified in Section 1.3 of this AO.

Non-U.S. organizations must additionally submit such endorsements to:

Ms. Wavalene Barnes
Space Science and Aeronautics Division
Code IS
Ref: SMEX 1999
National Aeronautics and Space Administration
Washington, DC 20546-0001
U.S.A.
Phone: 202-358-0900
Fax Number: 202-358-3029

with a copy to:

SMEX 1999 Support Office
Jorge Scientific Corporation
400 Virginia Avenue, SW, Suite 700
Washington, DC 20024
U.S.A.
Fax Number: 202-554-2970

by the due date given in the schedule in Section 1.3.

Unlike previous Explorer program solicitations, the authorizing institutional signature on the printout of the electronically submitted cover now also certifies that the proposing institution has read and is in compliance with the three required certifications printed in full in Appendix E. Therefore, it is not necessary to separately submit these certifications with the proposal.

6.3.2 Quantity

Proposers must provide 40 copies of their proposal, plus the signed original, by the proposal deadline given in Section 1.3.

6.3.3 Submittal Address

All proposals must be received at the following address by the schedule in Section 1.3:

SMEX 1999 Support Office
Jorge Scientific Corporation
400 Virginia Avenue, SW, Suite 700
Washington, DC 20024
U.S.A.

Point of contact for commercial delivery: Ms. Debra Tripp
Phone: 202-554-2775

Furthermore, one copy (over and above the 40 copies) of any proposal that includes any non-U.S. participants and/or institutional and governmental commitments must be sent to the address listed in Section 6.3.1.

6.3.4 Deadline

All proposals must be received at the address above by the closing date specified in Section 1.3. All proposals received after the closing date will be treated in accordance with NASA's provisions for late proposals (Appendix A, Section VII).

6.3.5 Notification of Receipt

NASA will notify the proposers in writing or E-mail that their proposals have been received. Proposers not receiving this confirmation within ten days after submittal of their proposals should contact the SMEX Program Scientist at the address given in Section 6.1.2.

7.0 PROPOSAL EVALUATION, SELECTION, AND IMPLEMENTATION

7.1 Evaluation, Selection, and Debriefing Processes

All proposals submitted in response to this AO will be subjected to a screening to determine their compliance to the constraints, requirements, and guidelines of the AO. Proposals not in compliance will be returned to the proposer without further review. Proposals in compliance with this AO will be assessed against the criteria given in Section 7.2 by panels of individuals who are peers of the proposers. This assessment will focus primarily on the proposed science investigation. Panelists will be instructed to evaluate all proposals independently and not to compare larger missions with smaller ones. These panels may be augmented through the solicitation of mail-in reviews as well, which the panels have the right to accept, in whole or in part, or reject. Proposers should be aware that during the evaluation and selection process, NASA may request clarification of a specific point or points in a proposal. Such a request and the proposer's response shall be in writing.

An *Ad Hoc* Categorization Subcommittee of the Space Science Steering Committee (see below), composed wholly of Civil Servants, will convene to consider the peer review results. This Committee will categorize the proposals in accordance with procedures required by NFS Part 1872.403-1. These Categories are defined as follows:

> Category I. Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

Category II. Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.
Category III. Scientifically or technically sound investigations which require further development.
Category IV. Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

The results of the evaluations and categorizations will be reviewed by the Space Science Steering Committee (SSSC), which is composed wholly of NASA Civil Servants and appointed by the Associate Administrator for Space Science. The SSSC will conduct an independent assessment of the evaluation and categorization processes regarding both their compliance to established policies and practices as well as their completeness, self-consistency, and adequacy of all materials related thereto. After this review, the final evaluation and categorization results will be forwarded to the Associate Administrator for Space Science who will make the final selections in consultation with the OSS Science Directors.

NASA may select one or more SMEX Category III investigations for further development under the Explorer new technology program. Any investigation selected for Explorer new technology funding will be invited to submit a revised statement of work and a revised budget for a technology development program that addresses developmental shortcomings identified by the SMEX proposal review panel. The revised statement of work will be reviewed by NASA. In order to be considered for flight opportunities, any investigations selected for Explorer new technology funding must repropose to a future Explorer Announcement of Opportunity.

Selected proposers will be notified immediately by phone and then by letter, and provided with instructions for initiating their Phase A concept study. Proposers not selected will be notified by letter and will be offered a debriefing. Such debriefings may be in person at NASA Headquarters or, if the investigation team prefers, by telephone. In the former case, NASA funds may not be used to defray travel costs by the proposer for a debriefing. In either case, along with the proposing Principal Investigator, a senior representative from key institution(s) of a proposal may also participate in such debriefings.

7.2 Evaluation Criteria

The evaluation criteria below will be used to evaluate and categorize proposals as described in Section 7.1. For a Mission of Opportunity, the proposed investigation encompasses only the contribution to the mission, not the entire mission. The evaluation factors (which are defined more fully in subsections below) are as follows:

- The scientific merit of the proposed investigation
- The technical merit and feasibility of the proposed investigation
- Feasibility of the mission implementation concept

The proposal categorizations, discussed in Section 7.1 above, will be based on these criteria. The first two criteria are of approximately equal weight and the third is of much less importance than either of the first two.

7.2.1 Scientific Merit of the Proposed Investigation

To evaluate the intrinsic scientific merit, the goals and objectives of the proposed investigation will be assessed to determine the impact of the investigation on one or more of the OSS space science themes as identified in Section 1.1 of this AO and, additionally, on the U.S. space science program (see Sections 2). This evaluation will include how well the investigation fills gaps in the understanding of space science and thereby provides for progress in one of the NASA space science themes identified in Section 1.1, and/or how well the proposed investigation may synergistically support other ongoing space science missions related to these themes sponsored by NASA or a non-U.S. space agency, and whether or not it provides ancillary benefits to the U.S. space science program. A major element in this assessment will be whether the data that are to be gathered will be sufficient to complete the proposed investigation.

7.2.2 Technical Merit and Feasibility of the Proposed Investigation

Each proposed investigation will be evaluated for its technical merit, feasibility, and the probability of success. Technical merit and feasibility will be evaluated by assessing the degree to which the proposed instrument(s) can be built using the proposed technologies and the degree to which the proposed instrument(s) can provide the necessary data, as well as the degree to which the mission will support the accomplishment of acquisition of the required data. Areas requiring critical technology development of the instrument for flight readiness shall be identified. Other major elements include the proposed data analysis and archiving plan, the proposed plan for the timely release of the data to the public domain, and inclusion of a Guest Investigator Program (GIP) or Guest Observer Program (GOP) for enlarging science impact. Note that such GIP's or GOP's may be initiated no earlier than Phase E, must be fit within the NASA OSS Cost cap, and that NASA reserves the right to solicit and select all participants in such programs. Should a new technology that represents an untested advance in the state of the art be proposed for use, an assessment will be made of the likelihood of its success. The probability of success will be evaluated by assessing science team roles, experience, expertise, and the organizational structure of the science team and the technical risk associated with the overall mission design and/or instrument set. The role of <u>each</u> Co-Investigator will be evaluated for necessary contributions to the proposed investigation.

7.2.3 Feasibility of the Mission Implementation Concept

The proposed mission implementation concept will be evaluated to assess its feasibility. The evaluation will consider the proposed mission design approach, management approach, schedule, and the NASA OSS Cost in determining the likelihood, at a top level, that the proposed investigation can be implemented within SMEX or Mission of Opportunity constraints. The mission design approach will be assessed to determine if it is within the state-of-the-art for its mission class. The management and schedule approaches will be assessed to determine the degree of the proposer's understanding of the work to be done and the time it takes to do it. The costs will be reviewed to assure that they are within the constraints of the appropriate mission class.

7.3 Selection Factors

As described in Section 7.1, the results of the proposal evaluations based on the criteria above and categorizations will be considered in the selection process.

Proposers to this AO should recognize that the program of the Office of Space Science is an evolving activity that critically depends upon Administration policies and budgets, as well as Space Science objectives and priorities, any of which may change quickly. Therefore, it is incumbent upon the Associate Administrator for Space Science to use all relevant science planning, policy, and cost considerations when making selection(s) among top ranked proposals submitted in response to this AO. In addition, proposers to this AO are advised that it is an objective, but not a requirement, that the final selections reflect a balance among the applicable scientific themes listed in Section 1.1 of this AO within the context of other approved OSS missions.

7.4 Implementation Activities

7.4.1 Notification of Selection

Following selection, the PI's of the selected investigations will be notified immediately by telephone, followed by formal written notification. The formal notification will include any issues noted during the evaluation that may require resolution and any special instructions for the concept study. A Project Initiation Conference will be held as soon as possible after selection to clarify requirements and responsibilities of all parties having roles in the mission, including launch service personnel. Proposers of investigations that were not selected will be notified in writing and offered a debriefing as described in Section 7.1.

7.4.2 Award Administration and Funding

It is anticipated that contracts will be awarded for Phase A concept studies for up to eight SMEX investigations selected under this AO. One or more Missions of Opportunity may also be selected for Phase A concept studies. Each contract resulting from this selection will contain a priced option for a bridge phase, to be exercised upon investigations selected to proceed into phase B/C/D. The bridge phase is intended to cover a two month period of Phase B effort to provide program continuity while the Phase B/C/D and E contract negotiations are completed.

7.4.3 Phase A Concept Study

The concept studies are intended to provide NASA with more definitive information regarding the cost, risk, and feasibility of the investigations, as well as a detailed plan for the conduct of an appropriate education and outreach program before final selection for implementation. The product of the concept studies will be reports to be delivered by each selected investigation team six months after the Project Initiation Conference. The content and format of the study reports are specified in the *Guidelines for Concept Study Report Preparation* document in the Explorer Program Library. NASA will conduct, in the Washington, DC, area, a preliminary, one-day

review of the concept study results approximately two thirds of the way through the investigation's Phase A study and will provide appropriate feedback to the proposing teams. Cost will not be reviewed at that time. The NASA review of the completed concept study report will include all mission facets including education and public outreach. NASA may request presentations and/or site visits to review the final concept study results with the investigators.

Should a non-U.S. proposal or a U.S. proposal with non-U.S. participation be selected, NASA's International Space Science and Aeronautics Division will arrange with the non-U.S. sponsoring agency for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency will each bear the cost of discharging their respective responsibilities. Depending on the nature and extent of the proposed cooperation, these arrangements may entail a letter of notification by NASA with a subsequent exchange of letters between NASA and the sponsoring governmental agency or a formal Agency-to-Agency Memorandum of Understanding (MOU).

7.4.4 Downselection of Investigations

The downselection will be made by the Associate Administrator for Space Science, based upon NASA review of the Phase A concept study results and programmatic considerations. The criteria for evaluating the concept study are as follows:

- Scientific merit
- Technical merit and feasibility
- Feasibility of the proposed approach for mission implementation, including cost risk
- Quality of plans for education and public outreach
- Quality of plans for new technology and small disadvantaged business activities.

These criteria are described in the *Guidelines and Criteria for the Phase A Concept Study* document in the Explorer Program Library. Any changes to science and science implementation scheme contained in the Phase A Concept Study Report will be carefully evaluated. Assuming no changes to the first two criteria, the emphasis for downselection will be on the latter three.

As a result of evaluation of the concept studies, NASA expects to downselect to two SMEX investigations to proceed by exercising their bridge phase options. Any selected Mission of Opportunity may also be authorized to proceed. In no case, however, is NASA required to exercise any option. NASA will not exercise the contract option nor continue funding those investigations not selected to proceed.

The overriding consideration for the final selection of proposals submitted in response to this AO will be to maximize scientific return within the available budget. Depending on the availability of proposals of appropriate merit, this objective may be achieved by the selection of two investigations each at the cost ceiling for SMEX investigations, or a larger number of lower cost investigations, or a combination of investigations, including Missions of Opportunity and long duration balloon investigations, of various costs.

Proposers should note that the definition phase for any investigation chosen as the second SMEX mission (launch by September 2004) will proceed at a lower level for a period of time, to conform to the available Explorer program budget profile.

7.4.5 Confirmation of Investigations

During the Phase B/C timeframe, NASA will conduct an independent review of the investigation's readiness to proceed before being authorized to spend more than 25 percent of the total NASA commitment for Phases A/B/C/D, excluding launch services costs Results of this Confirmation Review and a decision to proceed (or not) will be rendered within 30 days of the review. This decision will be based upon review of all aspects of the Phase B results (including education and outreach), and evidence of satisfactory technical, cost and schedule performance. In addition, for any Mission of Opportunity, a commitment from the organization sponsoring the full mission to enter into an appropriate agreement with NASA is required.

8.0 CONCLUSION

The Explorer program continues to represent a challenging new way for NASA to accomplish important space science exploration, as well as to generate opportunities to enhance education and to engage the public in the excitement of science discoveries. NASA invites both the U.S. and international space science communities to participate in proposals for SMEX and Missions of Opportunity investigations to be carried out as a result of this Announcement.

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

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

Anne L. Kinney
Science Program Director
Astronomical Search for Origins

Carl B. Pilcher
Science Program Director
Solar System Exploration

Edward J. Weiler
Associate Administrator
for Space Science

APPENDIX A

GENERAL INSTRUCTIONS AND PROVISIONS

I. INSTRUMENTATION AND/OR GROUND EQUIPMENT

By submitting a proposal, the investigator and institution agree that NASA has the option to accept all or part of the offeror's plan to provide the instrumentation or ground support equipment required for the investigation, or NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. In addition, NASA reserves the right to require use of Government instrumentation or property that subsequently becomes available, with or without modification, that meets the investigative objectives.

NOTICE TO ALL OFFERORS: In the event that a Principal Investigator employed by NASA is selected under this Announcement of Opportunity (AO), NASA will award prime contracts to non-Government participants, including co-investigators, hardware fabricators, and service providers, who are named members of the proposing team, as long as the selecting official specifically designates the participant(s) in the selection decision. Refer to Section G of Appendix B of this AO for proposal information which the selecting official will review in determining whether to incorporate a non-Government participant in the selection decision. Each NASA contract with a team member selected in this manner will be supported by an appropriate justification for other than full and open competition, as necessary.

II. TENTATIVE SELECTIONS, PHASED DEVELOPMENT, PARTIAL SELECTIONS, AND PARTICIPATION WITH OTHERS

By submitting a proposal, the investigator and the organization agree that NASA has the option to make a tentative selection pending a successful feasibility or definition effort. NASA has the option to contract in phases for a proposed experiment, and to discontinue the investigative effort at the completion of any phase. NASA may desire to select only a portion of the proposed investigation and/or that the individual participates with other investigators in a joint investigation. In this case, the investigator will be given the opportunity to accept or decline such partial acceptance or participation with other investigators prior to a NASA selection. Where participation with other investigators as a team is agreed to, one of the team members will normally be designated as its leader or contact point. NASA reserves the right not to make an award or cancel this AO at any time.

III. SELECTION WITHOUT DISCUSSION

The Government intends to evaluate proposals and award contracts without discussions with offerors. Therefore, each initial offer should contain the offeror's best terms from a cost or price and technical standpoint. However, the Government reserves the right to conduct discussions, if later determined by the Contracting Officer to be necessary.

IV. NONDOMESTIC PROPOSALS

The guidelines for proposals originating outside of the United States are the same as those for proposals originating within the United States, except that the additional conditions described in Sections 3.6 shall also apply.

V. TREATMENT OF PROPOSAL DATA

It is NASA policy to use information contained in proposals and quotations for evaluation purposes only. While this policy does not require that the proposal or quotation bear a restrictive notice, offerors or quoters should, in order to maximize protection of trade secrets or other information that is commercial or financial and confidential or privileged, place the following notice on the title page of the proposal or quotation and specify the information, subject to the notice by inserting appropriate identification, such as page numbers, in the notice. In any event, information (data) contained in proposals and quotations 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.

RESTRICTION ON USE AND DISCLOSURE OF
PROPOSAL AND QUOTATION INFORMATION (DATA)

> The information (data) contained in (insert page numbers or other identification) of this proposal or quotation 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 for other than evaluation purposes; provided, however, that in the event a contract is awarded on the basis of this proposal or quotation, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract. This restriction does not limit the Government's right to use or disclose this information (data), if obtained from another source without restriction.

VI. STATUS OF COST PROPOSALS

Submission of cost or pricing data is required if the combined Phase A and Bridge Phase costs exceed $500,000. Cost or pricing data will also be required for proposals for subsequent mission phases. The investigator's institution agrees that the cost proposal submitted in response to the Announcement is for proposal evaluation and selection purposes, and that, following selection and during negotiations leading to a definitive contract, the institution may be required to resubmit or execute all certifications and representations required by law and regulation.

VII. LATE PROPOSALS

The Government reserves the right to consider proposals or modifications thereof received after the date indicated for such purpose, if the selecting official deems it to offer NASA a significant technical advantage or cost reduction. (See NFS 18-15.208.)

VIII. SOURCE OF SPACE INVESTIGATIONS

Investigators are advised that candidate investigations for space missions can come from many sources. These sources include those selected through the AO, those generated by NASA in-house research and development, and those derived from contracts and other agreements between NASA and external entities.

IX. DISCLOSURE OF PROPOSALS OUTSIDE THE GOVERNMENT

NASA may find it necessary to obtain proposal evaluation assistance outside the Government. Where NASA determines it is necessary to disclose a proposal outside the Government for evaluation purposes, arrangements will be made with the evaluator for appropriate handling of the proposal information. Therefore, by submitting a proposal, the investigator and institution agree that NASA may have the proposal evaluated outside the Government. If the investigator or institution desires to preclude NASA from using an outside evaluation, the investigator or institution should so indicate on the cover. However, notice is given that if NASA is precluded from using outside evaluation, it may be unable to consider the proposal.

X. EQUAL OPPORTUNITY

For any NASA contract resulting from this solicitation, the clause at FAR 52.222-26, "Equal Opportunity," shall apply.

XI. PATENT RIGHTS

A. For any NASA contract resulting from this solicitation awarded to other than a small business firm or nonprofit organization, the clause at NFS 18-52.227-70, New Technology, shall apply. Such contractors may, in advance of a contract, request waiver of rights as set forth in the provision at NFS 18-52.227-71, Requests for Waiver of Rights to Inventions.

B. For any NASA contract resulting from this solicitation awarded to a small business firm or nonprofit organization, the clause at FAR 52.227-11, Patent Rights -- Retention by the Contractor (Short Form), (as modified by NFS 18-52.227-11) shall apply.

XII. RIGHTS IN DATA

Any contract resulting from this solicitation will contain the Rights in Data - General clause: FAR 52.227-14.

XIII. SMALL AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING

A. Offerors are advised that, in keeping with Congressionally mandated goals, NASA seeks to place a fair portion of its contract dollars, where feasible, with small disadvantaged business concerns, women-owned small business concerns, Historically Black Colleges and Universities, and minority educational institutions, as these entities are defined in 52.219-8 and in 52.226-2 of the FAR. For this Announcement of Opportunity, NASA has established a recommended goal of 8 percent for the participation of these entities at the prime and subcontract level. This goal is stated as a percentage of the total contract value. NASA encourages all offerors to meet or exceed this goal to the maximum extent practicable and to encourage the development of minority businesses and institutions throughout the contract period. Offerors will be evaluated on the proposed goal for participation of the entities listed above in comparison with the 8 percent goal and on the methods for achieving the proposed goal.

B. Offerors are advised that for NASA contracts resulting from this solicitation which offer subcontracting possibilities, exceed $500,000, and are with organizations other than small business concerns, the clause FAR 52.219-9 shall apply. Offerors who are selected under this AO will be required to negotiate subcontracting plans which include subcontracting goals for small, small disadvantaged, and women-owned small business concerns. Note that these specific subcontracting goals differ from the 8 percent goal described in paragraph A above, and need not be submitted with the proposal. Failure to submit and negotiate a subcontracting plan after selection shall make the offeror ineligible for award of a contract.

APPENDIX B

GUIDELINES FOR PROPOSAL PREPARATION

The following guidelines apply to the preparation of proposals in response to this SMEX and Missions of Opportunity AO. The material presented is a guide for the prospective proposer and is not intended to be all encompassing. The proposer must, however, provide information relative to those items applicable, as well as other items required by the AO. In the event of an apparent conflict between the guidelines in this Appendix and those contained within the body of the AO, those within the AO shall take precedence.

GENERAL GUIDELINES

All documents must be typewritten in English, use metric and standard astronomical units, and be clearly legible. Submission of proposal material by facsimile (fax), electronic media, videotape, or floppy disk is not acceptable. No proposal may reference a World Wide Web site for any data or material needed for adequate review of the proposal.

The proposal must consist of only one volume, with readily identified sections corresponding to Sections C through G given below. In order to allow for recycling of proposals after the review process, all proposals and copies must be submitted on plain white paper only (e.g., no cardboard stock or plastic covers, no colored paper, etc.). Proposers are requested not to use three-ring binders. Photographs and color figures are permitted if printed on recyclable white paper only. The original signed copy must be bound in a manner that makes it easy to disassemble for reproduction. Except for the original, two-sided copies are preferred. Every side upon which printing appears will be counted against the page limits.

Proposals must contain no more than 30 pages, with exclusions to the page count as noted below, including no more than three fold out pages (28 x 43 cm; i.e., 11 x 17 inches). A fold out page counts as one page. All pages other than fold out pages shall be 8.5 x 11 inches or A4 European standard.

Single- or double-column format is acceptable. In complying with the page limit, no page may contain more than 55 lines of text and the type font must not be smaller than 12-point (i.e., less than or equal to 15 characters per inch). Figure captions should be in 12 point. Smaller font is allowed within figures and tables but must be easily read.

The following table provides restrictions and guidance on page count within the proposal:

Section	Page Limits
Cover Page and Proposal Summary	Printout of electronic submission
Table of Contents	2
Science Investigation	20
Mission Design Approach Management Approach, Schedule, and Cost Education and Public Outreach and Small Disadvantaged Businesses	8
Appendices: (no others permitted) Statement(s) of Work (SOW) Letter(s) of Endorsement Resumes NASA PI Proposing Teams (1 page) Acronyms List Reference List (optional)	No page limit, but small size encouraged

A. COVER PAGE AND PROPOSAL SUMMARY

A Cover Page and Proposal Summary must be a part of the proposal, but will not be counted against the page limit. It must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. This authorizing signature now also certifies that the proposing institution has read and is in compliance with the three required certifications printed in full in Appendix E; therefore, certifications do not need to be submitted separately.

The Cover Page and Proposal Summary must be submitted electronically to the WWW site located at <http://props.oss.hq.nasa.gov/>. The full names of the Principal Investigator and the authorizing official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, are required on the specified form, as well as the names, institutions, and E-mail addresses of all participants, the type of investigation proposed, the total NASA OSS Cost, and a 200-word Summary. A hard copy version of this Cover must be printed in time to acquire signatures and include with the original hard copy of the proposal for delivery according to the schedule provided in Section 1.3 in this AO. Proposers are advised that they must not reformat this Cover after it is printed, as important NASA-required documentation may be lost. Proposers without access to the Web or who experience difficulty in using this site may contact Ms. Debra Tripp (E-mail: dtripp@hq.nasa.gov) for assistance. Please note that submission of the electronic Cover does <u>not</u> satisfy the deadline for proposal submission.

It is NASA's intent to enter the Summaries of all selected investigations for its various programs into a publicly accessible database. Therefore, the Summary should not contain any proprietary or confidential information that the submitter wishes to protect from public disclosure.

B. TABLE OF CONTENTS

The proposal shall contain a table of contents that parallels the outlines provided below in Sections C through G.

C. SCIENCE INVESTIGATION

As with previous Explorer Announcements of Opportunity, the science section must describe the scientific objectives of the proposed investigation, including the value of the investigation to one or more of the specified space science themes. The primary science theme to which the investigation applies must be identified. A discussion of the scientific products and how the science products and data obtained will be used to fulfill the scientific objectives must be provided. A discussion of how the science data will be obtained, including a plan for delivery of the products, and the individuals responsible for the data delivery, must also be provided.

1. Scientific Goals and Objectives. This section must discuss the goals and objectives of the investigation, their value to the primary and any secondary science themes, and their relationships to past, current, and future investigations and missions. It should describe the history and basis for the proposal and discuss the need for such an investigation. An overview of the mission must be provided.

   The measurements to be taken in the course of the mission, the data to be returned, and the approach that will be taken in analyzing the data to achieve the scientific objectives of the investigation must be discussed. This description must identify the investigation to be performed, the quality of the data to be returned (resolution, coverage, pointing accuracy, measurement precision, etc.), and the quantity of data to be returned (bits, images, etc.). The relationship between the data products generated and the scientific objectives must be explicitly described, as should the expected results.

2. Science Implementation.

   a. Instrumentation. This section must describe the instrumentation and the rationale used for its selection. It should identify the individual instruments and instrument systems, including their characteristics and requirements, and indicate items that are proposed to be developed, as well as any existing instrumentation or design/flight heritage.

A preliminary description of each instrument design with a block diagram showing the instrument systems and their interfaces must be included, along with a description of the estimated performance of the instrument. Performance characteristics must be related to the measurement and investigation objectives as stated in the proposal. Such characteristics include a discussion of the data rates, fields of view, resolution, precision/sensitivity, pointing accuracy, etc.

b. Mission. Mission observing strategy and spacecraft performance required for obtaining the necessary data with the proposed instrumentation must be described. The concept for operating the mission and the requirements for mission operations must be given.

c. Data Analysis and Archiving. The data reduction and analysis plan must be discussed, including the method and format of the data reduction, data validation, and preliminary analysis. The process by which data will be prepared for archiving should be discussed, including a list of the specific data products and the individual team members responsible for the data products. The plan must include a detailed schedule for the submission of raw and reduced data to the appropriate NASA data archive in the proper formats, media, etc. Delivery of the data to the data archive must take place in the shortest time possible.

d. Science Team. This section must identify each necessary individual of the investigation science team and their roles and responsibilities. The capabilities and experience of all members of the proposed science team must be described. Resumes or curriculum vitae of team members should be included as attachments to the proposal (see Section G, below). The role of each Co-Investigator must be explicitly defined and justified, and the funding source (NASA or contributed) for the PI and each Co-Investigator noted. A letter of endorsement is required from each Co-Investigator's institution if the Co-Investigator's services are contributed (see Section G.2).

D. MISSION DESIGN APPROACH

The proposer must provide a table that depicts the linkage between the required science objectives and the requirements that these objectives impose on the mission elements. Table B1, the Science-to-Mission Traceability Matrix, is provided as guidance for the kinds of information required. Proposers should use a table layout that best suites the investigation.

SMEX proposals must also describe:

- Launch vehicle including any upper stages and the launch location to achieve required orbit;
- Spacecraft/balloon craft approach and an assessment of the spacecraft/balloon craft technology required to meet science requirements;
- Overview of the ground data system; and
- Overview of operations requirements.

Mission of Opportunity proposals must also describe:

- An overview of the total mission;
- If and how the proposed investigation relates to the spacecraft sponsor's overall mission objectives;
- An overview of how the operations plan for the proposed investigation fits within the mission of the sponsoring organization; and
- ISS Mission of Opportunity proposers must document their conceptual design response to the EXPRESS Pallet interface, addressing resource requirements versus the Pallet capabilities (the proposer is not required to document the ISS mission, the EXPRESS Pallet, or the EXPRESS Pallet interfaces).

E. MANAGEMENT APPROACH, SCHEDULE, AND COST

The management approach must describe the roles, responsibilities, and experience of major team members. An organization chart that includes all major functions shall be provided. A Mission of Opportunity investigation shall also describe its management relationship to the sponsoring organization and provide a status of the commitment from the spacecraft/host or sponsoring organization to fly the proposed instrument or conduct the proposed investigation.

The recent past performance of known and candidate team members (institutions/departments) of the investigation on similar efforts to the one proposed shall be described, including cost and schedule performance.

A top-level schedule must be provided that includes major reviews; instrument development; spacecraft development (if applicable); instrument-to-spacecraft/host integration and test; launch vehicle integration and launch; and mission operations and data analysis. A Mission of Opportunity schedule shall also include the major milestones of the mission sponsor/host.

The proposed Phase A cost, the anticipated total NASA OSS Cost, and the anticipated Total Mission Cost (including contributions) shall be provided by completing tables B2 and B3. Costs must be within the appropriate SMEX or Mission of Opportunity cost caps. Provide a paragraph that describes why NASA should feel confident that the proposed costs are reasonable and will remain within the cost cap.

F. EDUCATION AND PUBLIC OUTREACH AND SMALL DISADVANTAGED BUSINESSES

The proposer must provide a statement that she/he understands NASA OSS requirements for Education and Public Outreach and for participation of Small Disadvantaged Businesses and intends to comply with these requirements. Details of the plans for addressing these areas will be part of the Phase A concept studies and will be evaluated as part of the downselection process.

G. APPENDICES

The following additional information is required to be supplied with the proposal as Appendices and, as such, will not be counted within the specified page limit. NO OTHER APPENDICES ARE PERMITTED.

1. Statement of Work (SOW) and Funding Information. For investigations managed from non-Government institutions, provide a SOW. For investigations managed from Government institutions, provide a SOW as if the institution were non-Government. This SOW must include the requirement for a Phase A concept study report that is described in the *Guidelines and Criteria for the Phase A Concept Study* document available through the Explorer Program Library. The SOW must include general tasks statements for Phases B/C/D and for Phase E. All SOW's must include Scope of Work and Government Responsibilities (as applicable). SOW's need not be more than a page or two in length. If more than one contractual arrangement between NASA and the proposing team is required for Phase A or the Bridge Phase, information must be provided which identifies how funds are to be allocated among the organizations.

2. Letters of Endorsement. Letters of endorsement must be provided from all organizations offering critical goods and /or services (including Co-Investigator services) on a no-exchange-of-funds basis, non-U.S. organizations providing hardware or software to the investigation, and the major participants in the proposal. Letters of endorsement must provide evidence that the institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA. They must be signed by institutional and/or Government officials authorized to commit their organizations to participation in the proposed investigation.

3 Resumes. Provide resumes or curriculum vitae for the PI and all Co-Investigators identified in the science section and for any key project personnel. The resume should clearly show experience related to the job the individual will perform on the proposed investigation. Resumes or curriculum vitae should be no longer than one page for each participant.

4. NASA Principal Investigator Proposing Teams. Proposals submitted by NASA employees as Principal Investigators should contain the following information concerning the process by which non-Government participants were included in the proposal. The proposal should (i) indicate that the supplies or services of the proposed non-Government participant(s) are available under an existing NASA contract; (ii) make it clear that the capabilities, products, or services of these participant(s) are sufficiently unique to justify a sole source acquisition; or (iii) describe the open process that was used for selecting proposed team members. While a formal solicitation is not required, the process cited in (iii) above should include at least the following competitive aspects: notice of the opportunity to participate to potential sources; submissions from and/or discussions with potential sources; and objective criteria for selecting team members among interested sources. The proposal should address how the selection of the proposed team members followed the objective criteria and is reasonable from both a technical and cost

standpoint. The proposal should also include a representation that the Principal Investigator has examined his/her financial interests in or concerning the proposed team members and has determined that no personal conflict of interest exists. The proposal must provide a certification by a NASA official superior to the Principal Investigator verifying the process for selecting contractors as proposed team members, including the absence of conflicts of interest.

5. Acronyms List.

6. References List. In addition to the above items, a References List may be provided that identifies reference documents and materials that were fundamentally important in generating the proposal. The documents and materials themselves cannot be submitted except as a part of the proposal and then must be included within the prescribed page count.

TABLE B1. SCIENCE-TO-MISSION TRACEABILITY MATRIX

Science Driver	Instrument Requirement	Mission Requirement	Spacecraft/ Balloon/ Host Requirement	Comm and Ground Data System Requirement	Mission Operations Requirement	Other Requirement
1.						
2.						
3.						
....						
n.						

Kinds of information to be addressed in the Matrix (not all inclusive):

<u>Requirements on Mission</u>
Orbit information (type, altitude, inclination)
Launch vehicle and any upper stages
Launch date and launch date flexibility
Mission duration
Number of satellites

<u>Requirements on Spacecraf/Balloncraft/Host</u>
Control method (3-axis stabilized, spinner, gravity-gradient)
Pointing control, knowledge, and jitter
Slew Rates
Data storage
Special thermal requirements
Power required by instruments
Radiation environment

<u>Requirements on Communications and Ground Data System</u>
Data Volume (Mbytes per day)
Number of data dumps per day
Real time requirements

<u>Requirements on Mission Operations</u>
Maneuvering, including constraints on
Concept existing or not?

<u>Other Requirements</u>
Any other driving requirement on a mission element

TABLE B-2.
ANTICIPATED COST TOTALS
(in Fiscal Year 2000 dollars)

Total NASA OSS Cost	
Total Contributions	
Total Cost	

Total NASA OSS Cost includes all phases and all elements that are proposed to be funded by NASA.

Contributions include all phases and all elements that are proposed to be provided to the proposed investigation at no cost to NASA. Include contributed Co-Investigator costs for SMEX or Mission of Opportunity proposals.

Examples of costs to be included are launch services, including any upper stages; flight hardware, including science instrumentation and spacecraft; integration and test; education and public outreach activities; new technology; subcontracting costs; PI and Co-Investigator costs; all personnel required to operate the mission, conduct the investigation, analyze and publish results and deliver data in archival format; insurance; ground data system; labor; NASA Civil Servant costs; reserves; and contract fees.

TABLE B-3.
NASA OSS COST FOR PHASE A AND BRIDGE PHASE
(in Fiscal Year 2000 dollars)

Phase A Cost	
Bridge Phase Cost	

Note that if the combined Phase A and Bridge Phase cost exceeds $500,000, submission of cost or pricing data is required, in addition to completing this table. See Appendix A, Section VI.

APPENDIX C

CONTENTS OF THE EXPLORER PROGRAM LIBRARY

The Explorer Program Library includes documents available electronically via the Internet, as well as paper copy. Proposers are requested to access the document electronically where possible. Only limited paper copies of documents are available. Please note that not all documents are available via the Explorer Program Library, but access information is provided.

It is incumbent upon the proposer to ensure that the documents used in proposal preparation are of the date and revision listed in the Announcement of Opportunity or this Appendix.

The Explorer Program Library is accessible on the World Wide Web at the World Wide Web address
<http://explorer.larc.nasa.gov/explorer/epl.html>.

Requests for paper copies should be submitted in writing to:

Explorer Program Library
Mail Stop 160
Langley Research Center
National Aeronautics and Space Administration
Hampton, VA 23681-0001
Fax Number: (757) 864-8894
E-mail: j.a.lintott@larc.nasa.gov

Office of Space Science Strategies and Policies

The Space Science Enterprise Strategic Plan: Origins, Evolution, and Destiny of the Cosmos and Life **(**November 1997)

This document is a concise statement of the goals and outlook of NASA's Space Science Enterprise. It is a compilation of the major ideas described in more detail in the context of the overall NASA Strategic Plan.

Partners in Education: A Strategy for Integrating Education and Public Outreach into NASA's Space Science Programs (March 1995)

This document describes the overall strategy for integrating education and public outreach into NASA's space science programs.

Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy (October 1996)

This document describes OSS's overall approach to implementing its Education/Public Outreach strategy.

Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria (April 1999)

Answers to frequently asked questions, elaboration of each of the OSS E/PO criteria. Document is intended to give a flavor of what exemplary E/PO can be.

The Space Science Enterprise Integrated Technology Strategy (October 1998)

Describes efforts to manage technology infusion into future OSS missions and to promote technology transfer to the private sector.

Space Science Roadmaps

The science themes of the NASA Office of Space Science, through the Space Science Advisory Committee and its subcommittees, have developed Roadmaps. These planning documents prioritize the space science goals for NASA for the years 2000-2020. The following Roadmaps apply to the Explorer program:

Sun-Earth Connection Roadmap, Strategic Planning for the Years 2000 - 2020 (April 1997)

The Evolving Universe, Structure and Evolution of the Universe Roadmap 2000 - 2020 (April 1997)

Search for Origins Roadmap (April 1997)
A paper copy may be obtained by sending an E-mail with name and address to <hthronson@hq.nasa.gov>.

Space Science Supporting Documents

A Science Strategy for Space Physics (1995)

National Research Council report. A paper copy may be obtained by sending an E-mail with name and address to <cchamber@nas.edu>.

NAS/NAC Report: A New Science Strategy for Space Astronomy and Astrophysics (1997)

Report of the Task Group on Astronomy and Astrophysics. A study undertaken by the Space Science Board to determine the principal scientific issues that the discipline of space science would face during the period 1995-2015.

HST and Beyond. Exploration and Search for Origins: A Vision for Ultraviolet - Optical - Infrared Space Astronomy (May 1996)

Report of the "HST and Beyond Committee."

Exploration of Neighboring Planetary Systems (ExNPS) Study (August 1996)

Jet Propulsion Laboratory report. Mission and technology road map; presentation to the Townes Blue Ribbon Panel.

Recommended Priorities for NASA's Gamma-Ray Astronomy Program 1996-2010 (1997)
Report synopsis of the Gamma Ray Astronomy Program Working Group.

15-Year Plan for X-Ray Astronomy 1994 - 2008 (June 1994)
Report of the X-Ray Astronomy Program Working Group. A paper copy may be obtained by sending an E-mail with name and address to <lou.kaluzienski@hq.nasa.gov>.

NAS/NRC Report: Opportunities in Cosmic-Ray Physics and Astrophysics (1995)
Report of the Committee on Cosmic-ray Physics. A review was undertaken by the Board on Physics and Astronomy to review the field that addresses both experimental and theoretical aspects of the origin of cosmic radiation from outside the heliosphere.

NAS/NRC Report: Cosmology, A Research Briefing (1995)
Report of the Panel on Cosmology. A research briefing by the Board on Physics and Astronomy to reassess the opportunities for scientific advances in cosmology.

SMEX Guidelines and Requirements Documents

SMEX Expendable Launch Vehicle Opportunities
Provides information on opportunities to propose a mission on an expendable launch vehicle.

SMEX Space Shuttle Launch Opportunities
Provides information and points of contact for proposers interested in launching a payload on the Space Shuttle.

SMEX Long Duration Balloon Opportunities
Describes the constraints and cost of proposing a long duration balloon mission.

GFE Spacecraft
Provides information and points of contact for proposers interested in utilizing a Government Furnished spacecraft

International Space Station Opportunities
Provides information and points of contact for proposers interested in proposing Mission of Opportunity investigations on the International Space Station

NASA's Mission Operations and Communications Services
Describes the service categories and costing policy of NASA-provided operations and communications services.

SMEX Safety, Reliability, and Quality Assurance Requirements
Describes the responsibilities of the PI with regard to Safety, Reliability, and Quality Assurance.

SMEX - Sample Terms and Conditions for the Phase A (Concept Study) Contract

Guidelines and Criteria for the Phase A Concept Study

Describes the criteria to be used by NASA for the evaluation of the Concept Study Report and provides guidelines for the preparation of the Report.

SMEX - Available GSFC Services

Describes services available from the Goddard Space Flight Center under a partnering arrangement.

General Guideline and Requirements Documents

Example Mission Definition and Requirements Agreement

Example of such an agreement.

NPG 7120.5A--NASA Program and Project Management Processes and Requirements (April 1998)

This document provides a reference for typical activities, milestones, and products in the development and execution of NASA missions.

ISO 9000 Series

The following ISO 9000 quality documents describe current national and NASA standards of quality processes and procedures.

American National Standard, "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing," ANSI/ASQC Q9001-1994.

"Quality Management and Quality System Elements - Guidelines," ANSI/ASQC Q9004-1-1994.

"Quality Management and Quality Assurance Standards - Guidelines for Selection and Use," ANSI/ASQC Q9000-1-1994

"ISO 9000 and NASA," Code Q presentation, April 24, 1995.

Note: The first three ISO 9000-related documents are copyrighted and cannot be reproduced without appropriate compensation. For copies contact:

American Society for Quality Control (ASQC)
P.O. Box 3066
Milwaukee, WI 53201-3066
800-248-1946

Explorer Program Background

Assessment of Recent Changes in the Explorer Program (December 1996)

Report by the Space Studies Board of the National Research Council. A paper copy may be obtained from:

Space Studies Board
National Research Council
2101 Constitution Avenue, NW
Washington, DC 20418

MIDEX Lessons-Learned Workshop Report (August 1996)

Proceedings from the Medium-class Explorer (MIDEX) Lessons-Learned Workshop held in June 1996.

Procurement-related Information

Electronic versions only are available for the following:

Federal Acquisition Regulations (FAR) General Services Administration
(URL: http://www.arnet.gov/far/)

NASA FAR Supplement Regulations
(URL: http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm)

NASA Financial Management Manual
(URL: http://www.hq.nasa.gov/fmm/

NPG 5800.1D -- Grant and Cooperative Agreement Handbook (July 1996)
(URL: http://procure.msfc.nasa.gov/grcover.htm)

Other

NASA Technology Database
(URL: http://technology.gsfc.nasa.gov/technology)

APPENDIX D

REGULATIONS GOVERNING PROCUREMENT OF FOREIGN GOODS OR SERVICES

The following Federal Acquisition Regulation (FAR) clauses cover the purchase of foreign goods and services. Versions in effect on the contract date may be included in contracts resulting from this Announcement of Opportunity:

52.225-3 Buy American Act -- Supplies (January 1994)

52.225-7 Balance of Payments Program (April 1984)

52.225-9 Buy American Act -- Trade Agreements -- Balance of Payments Program (January 1996)

52.225-10 Duty-Free Entry (April 1984)

52.225-11 Restrictions on Certain Foreign Purchases (May 1998)

52.225-18 European Union Sanction for End Products (January 1996)

52.225-19 European Union Sanction for Services (January 1996)

52.225-21 Buy American Act -- North American Free Trade Agreement Implementation Act -- Balance of Payments Program (January 1997)

The proposer is directed to the Federal Acquisition Regulation and the NASA FAR Supplement for further information on these regulations. Access information for these documents is given in the Explorer Program Library (see Appendix C).

APPENDIX E

CERTIFICATIONS

Included for reference only. Submission of the signed printout of web page as directed for the Cover Page/Proposal Summary certifies compliance with these certifications.

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

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

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

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

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

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 14 CFR Part 1265.

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;

(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.

Certification Regarding Lobbying

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, 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.