A.20 ADVANCED INFORMATION SYSTEMS TECHNOLOGY

Amended June 17, 2008

This final version of Appendix A.20: Advanced Information Systems Technology replaces in its entirety the placeholder version that was released with the ROSES-2008 NASA Research Announcement. The due date for Notices of Intent (NOIs) to propose has been changed to July 15, 2008. The due date for proposals remains August 29, 2008.

1. Scope of Program

1.1   Introduction

The Earth Science Technology Office (ESTO) manages the development of advanced technologies and applications that are needed for cost-effective missions. The ESTO plays a major role in shaping Earth science research and application programs of the future, aggressively pursuing promising scientific and engineering concepts, and ensuring that the program maintains an effective balance of investments in order to advance technology development.

Information technology advances play a critical role in collecting, handling, and managing very large amounts of data and information in space and on the ground. The objectives of the Advanced Information Systems Technology (AIST) program are to identify, develop, and (where appropriate) demonstrate advanced information system technologies that:

- Enable new observations and information products;
- Increase the accessibility and utility of science data; and
- Reduce the risk, cost, size, and development time for Earth science space-based and ground-based information systems.

The AIST program is designed to bring information system technologies to a Technology Readiness Level (TRL) that allows integration into existing or future technology/science research and development programs, or infusion into existing or planned subsystems/ systems to enable timely and affordable delivery of information to users. The TRL scale is used to assess the maturity of a particular technology. The AIST program accepts technology developments at various stages of maturity and advances the TRL through appropriate risk reduction activities such as requirements analysis, conceptual design, prototypes, and proof-of-concept demonstrations. The AIST program also tracks information system technology needed to achieve the goals for future NASA data systems, both in orbit and ground based. The AIST Capabilities and Needs Matrix is documented at the ESTO web site (http://esto.nasa.gov/AIST-ROSES), along with the TRL definitions and information about former AIST solicitations for technology.

1.2   Background and Solicitation Justification

The National Research Council (NRC), in response to a request in 2004 from NASA, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Geological Survey (USGS) published its decadal survey recommendations in 2007. The full NRC report entitled, *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond* may be accessed on the web at http://www.nap.edu/catalog/11820.html. This report is referred to below as the "decadal survey."

The decadal survey proposes an integrated strategy for Earth science and applications from space, from recommended missions to acquire new observations to turning satellite observations into knowledge and information. Among the key elements of the overall program that must be supported to achieve the decadal vision are sustained observations (including space, surface-based, and airborne sensors), models and data assimilation systems to make useful analyses and forecasts, and planning and other activities that strengthen and sustain the Earth observation and information system.

The decadal survey notes on page 2, "The committee found that fundamental improvements are needed in existing observation and information systems because they only loosely connect three key elements: (1) the raw observations that produce information; (2) the analyses, forecasts, and models that provide timely and coherent syntheses of otherwise disparate information; and (3) the decision processes that use those analyses and forecasts to produce actions with direct societal benefits."

The decadal survey calls for improvements in the structure, connectivity, and effectiveness of Earth-observing capabilities, research, and associated information and application systems (page 20). "Improved understanding of the coupled Earth system and global observations of Earth are linked components that are the foundation of an effective Earth information system. Developing such a system will require an expanded observing system, which in turn is tied to a larger global observing system of the kind envisioned in the Global Earth Observation System of Systems (GEOSS)." Providing information system interoperability among new and legacy systems is critical to enable interdisciplinary uses of the recommended observations. Tools to assimilate multi-sensor observations, extract information from disparate sources, and automate access to data are needed.

In discussing the Next Decade of Earth Observations from Space on page 28, the decadal survey notes the need to enable cross-mission synergy. "While past investments in Earth remote sensing have provided spectacular advances, such as in the accuracy of weather predictions, the above list of challenges highlights the class of new, interrelated questions being asked by the public and policy makers as they seek to understand new risks and the vulnerabilities of a rapidly evolving Earth system. Additional issues and questions will emerge from continued system-level study of Earth. The next 20 years must bring a new level of integration in the understanding of Earth-system components."

NASA's Earth Science Division (ESD) has a significant challenge ahead of it to determine how to incorporate the NRC recommendations. New technology will play a key role in enabling many recommended missions and supporting data systems, as well as reducing the cost of future systems. NASA must have an effective long-term data acquisition system to support the needed Earth System science and environmental monitoring and prediction capabilities. This AIST solicitation will facilitate the implementation of the decadal survey recommendations by carefully choosing where to invest in information technologies to get the most benefit from NASA's technology development funds.

1.3   Proposal Research Topics

The AIST program will invest in technology developments to reduce the risk and cost of evolving NASA information systems to support future Earth observations and to transform those observations into Earth information as envisioned by the decadal survey. This solicitation focuses on the information technologies required to enable and facilitate the Earth observation missions and supporting information systems that are described by the decadal survey. Table ES.2 of the decadal survey summarizes the missions recommended to NASA, and Chapter 3 highlights the decadal survey vision for transforming satellite observations to Earth information. Information technology will support scientific breakthroughs resulting from new observations and new ways of using those observations, whether from space, airborne, or in situ sensors. Methods for deriving data and information from multiple observations and sensors, for supporting scientists working in modeling and data assimilation, and for managing data and information to enable low cost distribution of data to users are some of the information system capabilities recommended in the decadal survey.

Priority for selection will be given to those proposals that most clearly demonstrate the potential for making significant contributions to the technology readiness of the Earth science information and mission operations systems recommended by the decadal survey.

This NRA solicits both hardware and/or software technology proposals in either space or ground based systems. For the purposes of this solicitation, all proposed technologies must have an entry TRL between 2 and 6 (see Table 1). The entry TRL must be substantiated in the proposal.

Testbeds needed for testing, verification, or validation of components, subsystems, and/or systems (both hardware and software) can be included and costed as an integral part of a proposed technology effort, but will not be funded as a stand-alone proposal. If any special purpose equipment, facilities, etc., is required, it is the responsibility of the proposer to negotiate its use.

The solicited topic categories are as follows. Proposers must indicate in the proposal to which category they are proposing:

1. ***Sensor System Support*** – These are information systems technologies that broadly support targeted measurements by on-board sensors (flight and in situ), incorporate autonomy or intelligence within the sensing process, allow rapid response to needed measurements, and improve the quality and science value of the data collected. Technology areas include, but are not limited to:

   - Flight operational concepts and precision operations strategies;
   - Technologies to support Earth science operations for geosynchronous sensors;
   - Techniques to support the precision geodetic positioning of spacecraft, aircraft and ground sensors to advance our knowledge of the Earth System;
   - On-board processing systems and strategies;
   - Autonomy and intelligent agents;
   - Data acquisition on-demand (in response to both science and society);
   - Sensor calibration/validation strategies for near real-time operation; and
   - Sensor-to-sensor coordination and interoperability.

   Technologies in this category are intended to increase the effectiveness of Earth observing instruments or missions.

2. ***Advanced Data Processing*** – These are information systems technologies that operate directly on the data produced by the sensor (or instrument) in order to improve or enhance the information extracted from the data stream. Technology areas include, but are not limited to:

   - Pre data assimilation strategies – that is, strategies for combining observations of multiple Earth science variables into numerical models;
   - Model interoperability to enable exploitation of global geophysical models for assessing regional applications and impacts of change;
   - Mining of data for information characteristics or content;
   - Dynamically acquire and fuse data from multiple data sources, including models, satellites, and in situ sensors;
   - Techniques to fuse similar variables from different sensors to exploit the synergies of the Decadal Survey missions;
   - Strategies for providing distributed processing on demand; and
   - Efficient strategies for reprocessing and use of legacy systems.

   Technologies in this category are intended to improve the science value of the data. As a consequence, they have the potential for improving the cost effectiveness of a mission.

3. ***Data Services Management*** **-** These are information systems technologies that broadly support the management of a growing body of Earth science data from NASA missions by enabling the science community to more effectively exchange and share data and information. These technologies can also support and incorporate an increasing number of shared software tools built to handle Earth observation data. This includes software that can create an environment where one software application can execute a function and then automatically pass off the results to another; security and associated data and governance policies should be considered. Technology areas include, but are not limited to:

- Techniques that provide scientists improved access to data and software tools;
- Management of sensor and science data operation workflows; and
- Discover and consolidate shared services for more effective use of data in the science community.

These technologies will have a direct impact by enabling discovery and access to Service Oriented Architecture components and services.

Please note that AIST is not soliciting new sensors that make science measurements; these proposals are funded by the Instrument Incubator Program in ESTO (see ROSES 2007 Appendix A.26). Furthermore, AIST proposals should not focus on enhancing and improving existing components of the NASA data and information systems infrastructure achieved through incorporation of mature technology (TRL 7-9); that work is funded by NASA's Advancing Collaborative Connections for Earth System Science (ACCESS) Program (see ROSES 2008 Appendix A.24). AIST does not fund science algorithm development which is covered by Earth Science Division Research and Analysis or by the missions themselves. Finally, AIST is not funding space communications and navigation technology; that work is funded by NASA's Space Communications and Navigation (SCaN) program within the Space Operations Mission Directorate.

2. Programmatic Information

Proposers should periodically check the solicitation website (http://nspires.nasaprs.com/) for any amendments to the ROSES 2008 NASA Research Announcement (NRA).

This solicitation provides additional details governing the proposed activities that supersede the general guidelines announced in the *Summary of Solicitation* of ROSES 2008.

2.1 Proposal Content and Submission

2.1.1 Proposal Content

2.1.1.1 Proposal Summary

Each proposal shall include a proposal summary, or abstract, that describes the proposal in no more than 4000 characters. The proposal summary shall include: (a) objectives and benefits; (b) an outline of the proposed work and methodology; (c) the period of performance; and (d) entry and planned exit TRL.

2.1.1.2 Project Description

The Project Description must include the following content information in subsections that use the same titles. Failure to provide any of this material may be a cause for the proposal being judged as noncompliant and returned without further review. The Project Description shall be limited to 15 nonreduced, single-spaced typewritten pages. Standard

proposal style formats shall be in accordance with Section 2.2 of the *Guidebook for Proposers*. Proposals that exceed the 15-page limit will be truncated at 15 pages, and only that portion provided to reviewers for evaluation.

1. <u>Applicability to Earth Science missions in the NRC Decadal Survey</u> – Describe the benefits to future Earth science investigations or Earth science missions that could utilize the proposed technology. Proposers shall include a one-page relevancy scenario showing how the proposed technology contributes to a proposed Earth science decadal survey mission(s) of their choosing. Involvement of Earth science researchers in advancing these concepts is highly encouraged. Proposals that fail to include a relevancy scenario may be considered noncompliant and returned without review. The format for the one-page relevancy scenario is as follows and must be strictly adhered to:

   I. Identify applicable NRC Decadal Survey mission or missions, including page number(s).
   II. Indicate whether the technology is on-board the spacecraft, ground based system(s), or both.
   III. Describe how the proposed technology will enable missions and associated Earth science information system challenges.
   IV. Indicate how the entry TRL and proposed exit TRL will position the proposed technology to meet mission schedules.

2. <u>Description of Proposed Technology</u> – Provide a description of the proposed element, system, or subsystem technology. Describe the technical approach and include an operational concept of the proposed technology that addresses Earth science needs. Discuss any possible commercial benefits.

3. <u>Comparative Technology Assessment</u> – Describe the anticipated advantages of this element, system, or subsystem technology compared to those currently in use, e.g., reduction of size, mass, power, volume or cost, improved performance, or enabling of a new capability not previously possible. Review the current state of the art and relate it to the proposed work.

4. <u>TRL Assessment</u> – Provide the current TRL assessment of the technology and the anticipated progression of TRL levels throughout the proposed effort. The TRL shall advance by at least one during the first two years of performance of the activity. If the proposed activity duration is for multiple years, advancement of one TRL per year is desirable.

   For this solicitation, the entry TRL shall be between 2 and 6. This solicitation is intended to support technology development for near-term as well as mid- and late-term missions proposed in the decadal survey. Table 1 provides high-level definitions for information system technology TRLs. More detailed TRL definitions can be found at http://esto.nasa.gov/AIST-ROSES. The proposer shall identify the entry TRL, the planned exit TRL, and success criteria in their

proposal. Past and ongoing work on the research activity should determine the entry TRL; the proposer shall substantiate the entry TRL in the proposal. Proposals that fail to include and substantiate the entry TRL may be considered noncompliant and returned without review.

Table 1. High-Level TRL Definitions

TRL	Definition
1	Basic principles observed and reported
2	Technology concept and/or application formulated
3	Analytical and experimental critical function and/or characteristic proof-of-concept
4	Component/subsystem validation in laboratory environment
5	System/subsystem/component validation in relevant environment
6	System/subsystem model or prototyping demonstration in a relevant end-to-end environment (ground or space)
7	System prototyping demonstration in an operational environment (ground or space)
8	Actual system completed and "mission qualified" through test and demonstration in an operational environment (ground or space)
9	Actual system "mission proven" through successful mission operations (ground or space)

5. Research Management Plan – Provide a statement of work that concisely describes each task or milestone to be accomplished in the course of the research and development. Define the success criteria associated with each task or milestone. Also include a milestone schedule chart that identifies critical milestones. At least two milestones per 12-month period must be defined.

   Subcontracting portions of the research project is acceptable and is the responsibility of the proposing organization to manage and include in reporting.

6. Personnel – Include a list of key personnel and identify experience related to the proposed activity. The Key personnel list is included in the overall page count and must include, as a minimum, the Principal Investigator (PI). Optionally, one-page resumes for Key Personnel may be supplied; these resumes are not included in the overall page count.

7. Facilities and Equipment – Describe significant facilities and equipment required to complete the work. Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative.

8. Special Matters – Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal.

2.1.2 Proposal Submission

Proposals shall be submitted electronically via NASA's master proposal database system, NSPIRES, as described in the *Guidebook for Proposers* (see Chapter 3 for details). Late proposals will not be accepted for review.

2.2 Award Information

2.2.1 Funding

Proposers are encouraged to offer cost sharing. If a cost sharing arrangement is proposed, appropriate data rights that recognize the proposer's contributions, as well as the Government's rights to acces,s will be negotiated prior to award.

The funding available for each award under this solicitation will limit the number and magnitude of the proposals awarded. The ESTO expects that a total of 16 to 30 proposals will be selected and awards issued, with values in the approximate range of $150K to $500K per year per award. No award shall exceed $500K per year. No additional funds beyond the negotiated award value will be available. NASA does not allow for payment of profit or fee to commercial firms under grant awards (see section 2.2.3).

2.2.2 Period of Performance

The minimum period of performance is 12 months. The total proposed period of performance must not exceed 36 months. Grants may be awarded for up to a three-year period of performance. Annual reviews will be held according to the criteria specified in the *NASA Grants and Cooperative Agreement Handbook* (14 CFR 1260). Proposals must define clear, measurable milestones to be achieved for each year of performance in order to warrant continuation of the second and third years.

2.2.3 Type of Award

All selected proposals will result in the award of grants, cooperative agreements, or intra- or inter-Government transfers, as appropriate. Contracts are specifically excluded as an award vehicle for this solicitation. Grants and cooperative agreements will be subject to the provisions of the *NASA Grants and Cooperative Agreement Handbook*. Commercial organizations see Section D, Provision 1274.204, of the *Grants Handbook*.

2.3 Evaluation Criteria

The first criterion, relevance to NASA's objectives, includes the applicability of the proposed investigation to Earth science missions and technology needs (33% of total evaluation weight) and specifically includes the following factors:

1. The proposal's relevance and potential contribution to NASA's scientific and technical areas of emphasis, including the potential to enable new information products and/or measurements which are part of the decadal survey mission

concepts. The proposal's required one-page relevancy scenario will be used to support this assessment. *Priority for selection will be given to those proposals that most clearly demonstrate the potential for making significant contributions to the technology readiness of the Earth science information and mission operations systems recommended by the decadal survey.*

2. The potential for the element or subelement technology development to reduce the risk, cost, size, and development time of Earth science systems. Potential cost reductions should be clearly stated and substantiated to the extent possible, with supporting analysis that indicates scalability.
3. The potential of the element or subelement technology to be integrated, once matured, into a NASA Earth science program, e.g., mission, model, or other information system.
4. The potential for the element or subelement to have commercial benefits.

The second criterion, intrinsic merit, includes the technical merit of the proposed investigation (33% of total evaluation weight) and specifically includes the following factors:

1. Feasibility and merit of the proposed technical approach to achieve the technology development objectives.
2. Degree of innovation of the proposed study or technology development concepts and approach.
3. Substantiated justification and appropriateness of the entry and exit TRL. For this solicitation, the entry TRL must be between 2 and 6 inclusive, with the exit TRL no higher than 7.
4. Feasibility of obtaining the potential reduction in risk, cost, size, and development time with the proposed element or subelement, and measurable TRL increase. The TRL must advance by at least one (1) level during the life of the project.

The third criterion, cost realism and reasonableness (33% of total evaluation weight), specifically includes the following factors:

1. Adequacy and realism of proposed milestones and associated success criteria.
2. Realism and reasonableness of the proposed cost and comparison of costs to available funds.
3. Adherence to sound and consistent management practices appropriate to the TRL level of the proposed task.
4. Past performance and related experience in the proposed area of technology development.
5. Qualifications of key personnel and adequacy of facilities, staff, and equipment to support the proposed activity.
6. Commitment of the organization's management to the proposed technology development (evidenced by cost and resource sharing, prior teaming arrangements, etc.). Proposers should identify any previous investment by the organization/program and provide supporting documentation.

2.4   Technical Reporting Requirements

All status information, presentation material, and report deliverables applicable to this AIST solicitation shall be submitted to the web-based ESTO AIST-08 Award Administration e-Book located at http://esto.reisys.com/esto/. A user account on the ESTO e-Book will be provided to the PI upon award. All submissions shall be made in PDF (preferred), Microsoft Word, Microsoft Excel, or Microsoft PowerPoint.

The following deliverables shall be required of awarded proposals. In cases where subcontract arrangements exist, consolidated project reports are the responsibility of the PI. The proposed budget should provide for these reporting requirements. In this context, "Annual" refers to a twelve-month task effort that commences at award.

2.4.1   Initial Plans and Reports

Within 15 days of award, the PI shall prepare a Project Plan, initial Quad Chart, and initial TRL assessment. The project plan, initial (entry) Quad Chart, and initial TRL assessment (and supporting data) shall be uploaded to the appropriate locations in the ESTO e-Book for this solicitation.

The project plan shall identify plans for all technical, schedule, and resource activities for the proposed life of the project.

The Quad Chart shall contain the following information:
- First Quadrant: A visual, graphic, or other pertinent information
- Second Quadrant: "Description and Objectives"
- Third Quadrant: "Approach" and "Co-Is/Partners"
- Fourth Quadrant: "Milestone Schedule" and "Entry TRL."

The Quad Chart shall be updated at least annually, more often if appropriate. A template is available in the ESTO e-Book under "Information" and "File Templates."

An initial TRL assessment, and the basis for that assessment, shall be provided for the critical technology developments of the activity. The TRL assessment shall be updated at least annually, more often if appropriate.

2.4.2   Quarterly Technical Reports

The quarterly technical report shall focus on the preceding three month's efforts. Quarterly reports are only required on those quarters that an Interim or Annual/Final Review is *not* due, e.g., 3rd, 9th, etc. Each report shall address:

1. Technical status: The PI shall summarize accomplishments for the preceding three months, including technical accomplishments (trade study results,

requirements analysis, design, etc.), technology development results, and results of tests and/or demonstrations.

2. <u>Schedule status</u>: The PI shall address the status of major tasks and the variance from planned versus actual schedule, including tasks completed, tasks in process, tasks expected to complete later than planned, and tasks that are delayed in starting, with rationale for each, and recovery plans as appropriate.

Quarterly Technical Reports shall be uploaded to the appropriate location in the ESTO e-Book starting on the three-month anniversary date of the signing of the award vehicle, and every six months thereafter. Reports shall be submitted in PDF, Microsoft Word or PowerPoint compatible formats by the required due date, or by close of business of the first workday following the due date if the due date falls on a weekend or a holiday. A teleconference or brief meeting may be conducted between the ESTO and the PI to review and discuss each report

2.4.3 <u>Interim Reviews</u>

The PI shall provide an Interim Review at the end of the first 6-month calendar period, commencing from the date of award, and at twelve-month intervals thereafter. Interim Reviews are required annually. The PI must provide a presentation summarizing the work accomplished and results leading up to this Interim Review and must:

1. Describe the primary findings, technology development results, and technical status, e.g., status of elements, construction of breadboards or prototype implementations, results of tests and/or proof-of-concept demonstrations, etc.

2. Describe the work planned for the remainder of the project and critical issues that need to be resolved to successfully complete the remaining planned work.

3. Summarize the cost and schedule status of the project, including any schedule slippage/acceleration. A schedule milestone chart of all major task activities shall be created and maintained and shown at all reviews. A cost data sheet shall be created and maintained showing total project costs, planned versus actual for the life of the project, along with a graphical representation of the project cost run outs since inception.

4. At the second and subsequent Interim Reviews, address the comments and recommendations prepared by the Independent Reviewer participating in the most recent Annual Review.

The ESTO will conduct the Interim Review via teleconference. The presentation shall be uploaded to the appropriate location in the ESTO e-Book at least two (2) working days prior to the review. Following the review, the presentation, updated in accordance with comments and discussion resulting from the review, will constitute the Interim Report

and shall be uploaded to the appropriate location in the ESTO e-Book within 10 days after the review.

2.4.4 Annual or Final Review

The PI shall provide an Annual Review at the end of each 12-month calendar period, commencing from the date of award, and a Final Review at the completion of the activity. The PI shall provide a review summarizing the work accomplished and anticipated results at the end of the task. Each review must include:

1. A description of the work accomplished and the results leading up to this review.

2. A summary of the primary findings, technology development results, and technical status, e.g., status of elements, construction of breadboards or prototyping implementations, results of tests and/or demonstrations, etc. The PI may provide a laboratory demonstration, if appropriate, to show technical results and status.

3. A summary of the planned versus actual costs and comprehensive milestone schedule status of the project since inception.

4. The Final Review must provide conclusions of the work performed and make recommendations for follow-on activities that should be pursued, with estimates of the cost and schedule to achieve TRL 7.

5. Report any educational and outreach components of the project, e.g., graduate degrees, educational activities; technology infusion or patents applied for or granted; journal or conference publications; presentations at professional conference, seminars and symposia; demonstrations; media exposure; and, other activities that contributed to the overall success of the research project.

The ESTO will conduct the review at the PI's facility, or a mutually agreed to location, with length of presentation tailored as appropriate, depending on the amount of work to be discussed. The Annual or Final Review should be comprehensive, and should include a discussion of the planned content of the written report. The review package shall be uploaded to the appropriate location in the ESTO e-Book at least two (2) working days prior to the review. Hardcopy handouts shall be provided by the PI at the review. The presentation, updated in accordance with comments and discussion resulting from the review, together with the separate Annual Report, shall constitute the Annual Report deliverable and shall be uploaded to the appropriate location in the ESTO e-Book within 10 days after the review.

2.4.5   Annual or Final Report

The Annual or Final Report shall include the following:

1. Results of all analyses, element, subsystem, or system designs, breadboards, and/or prototyping implementations and designs.

2. Performance analysis results of tests and/or demonstrations; estimation of reduction(s) in size, mass, power, volume and/or cost; improved performance; description of newly enabled capability; and documentation of technology dependencies.

3. Tables, graphs, diagrams, curves, sketches, photographs, and drawings in sufficient detail to comprehensively explain the results achieved.

4. An updated TRL assessment, including a rough order of magnitude cost and a description and estimate of the duration of the follow-on activities necessary to achieve TRL 7.

5. Updated Quad Chart.

6. At the end of the period of performance, the PI shall provide a final Accomplishments Chart which contains the following information (a template is available in the e-Book):
   - Upper Right: A visual, graphic, or other pertinent information
   - Upper Left: "Description and Objectives"
   - Middle: "Accomplishments"
   - Bottom: "Co-Is" (name and affiliation), "Entry TRL," and "Exit TRL."

The Annual or Final Report, updated Quad Chart or Accomplishments Quad Chart, and updated TRL assessment shall be uploaded with the updated Annual or Final Review presentation to the appropriate locations in the ESTO e-Book within 10 days of the review.

2.4.6   Earth Science Technology Conference and Workshops

The awardee is encouraged to participate in the annual Earth Science Technology Conference (ESTC). The ESTC is an opportunity for NASA planners, managers, technologists, and scientists to review the research funded by the ESTO. It is also an opportunity for researchers from NASA, academia, and industry to meet with their peers and to better understand NASA Earth science requirements.

Travel expenses will be provided for non-Government awardees selected to participate in the ESTC. A travel charge number will be provided to NASA awardees selected to participate; an invitational travel order will be issued to other (non-NASA) Government awardees selected to participate. Therefore, no travel costs for participation in the ESTC

should be included in the proposal. If selected for participation in the ESTC, the awardee should be prepared to make a presentation, provide a paper, or create a poster providing a description of the project, the objectives, approach, technical status, and schedule information.

3. Summary of Key Information

Expected annual program budget for new awards	~ $8 M (Section 2.2.1 above)
Number of new awards pending adequate proposals of merit	~ 16-30 (Section 2.2.1 above)
Maximum duration of awards	Minimum 1-year / Maximum 3-year awards
Due date for Notice of Intent to propose (NOI)	July 15, 2008
Due date for proposals	August 29, 2008
Page limit for the central Science-Technical-Management section of proposal	15 non-reduced single-spaced typewritten pages; see also Chapter 2 of the *2008 NASA Guidebook for Proposers*
NASA strategic objective(s) which proposals must state and demonstrate relevance to	Every proposal must address one or more strategic goal or research objectives from Table 1 in the *ROSES Summary of Solicitation*. See also Sections I(a) and IV(e) of the *ROSES Summary of Solicitation*.
General information and overview of this solicitation	See the *ROSES Summary of Solicitation*.
Detailed instructions for the preparation and submission of proposals	See the *2008 NASA Guidebook for Proposers* at http://www.hq.nasa.gov/office/procurement/nraguidebook/.
Submission medium	Electronic proposal submission is required; no hard copy is required or permitted. See also Section IV of the *ROSES Summary of Solicitation* and Chapter 3 of the *2008 NASA Guidebook for Proposers*.
Web site for submission of proposal via NSPIRES	http://nspires.nasaprs.com/ (help desk available at nspires-help@nasaprs.com or (202) 479-9376)
Web site for submission of proposal via Grants.gov	http://grants.gov/ (help desk available at support@grants.gov or (800) 518-4726)
Funding opportunity number for downloading an application package from Grants.gov	NNH08ZDA001N -AIST

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