

A.48 IN-SPACE VALIDATION OF EARTH SCIENCE TECHNOLOGIES

1 Scope of Program

1.1 Introduction

NASA's Earth Science Technology Office (ESTO) manages the development of a range of advanced technologies to meet future Earth science measurements and operational requirements. ESTO technology investments attempt to address the full science measurement process: from instruments needed to make observations to data systems and information products that make those observations useful.

There has been and continues to be a need for some new technologies to be validated in space prior to use in a science mission. This is necessary because the space environment imposes stringent conditions on components and systems, some of which cannot be fully tested on the ground or in airborne systems. The In-Space Validation of Earth Science Technologies (InVEST) program element is intended to fill that gap. Validation of Earth science technologies in space will help reduce the risk of new technologies in future Earth science missions. This program seeks to advance the readiness of existing Earth Science-related technology and reduce risks to future missions through space flight validation. The details of this program are described below.

This ESTO solicitation is focused on in-space, orbital technology validation only. Airborne, balloon or sounding rocket flight validations are expressly excluded. Selected technologies will only be those that require validation in space. Proposers are responsible to provide their own access to space. Proposals that require procurement of launch services from foreign suppliers will not be considered for funding. Only instrument subsystems or instruments that can make or advance the technology to enable relevant Earth science measurements will be accepted; components are specifically excluded from this call.

Technologies must be ready for launch within two years after award. Once on-orbit, the maximum time for validation of the technology must be one year or less. No science measurement is required. Demonstration of a science measurement is permitted if it is required to validate the technology. Science investigations are expressly excluded and will not be funded.

This solicitation is exclusively targeted towards the demonstration of future Earth science measurements from small satellites. These small satellites are restricted to those that comply with Cal Poly CubeSat Developer's specifications, found at <http://cubesat.calpoly.edu/index.php/documents/developers>. Concepts that do not comply with the Cal Poly CubeSat and Poly Picosat Orbital Deployer (P-POD) standards will be determined to be nonresponsive.

NASA's Technology Readiness Level (TRL) is an ordinal classification system that allows comparison of the degree of maturity of technologies under development. TRLs range from 1 to 9 (see Section 2.1.2.2, Table 1 for TRL definitions) and indicate completion of increasingly demanding proof-of-performance criteria at various stages of a technology development.

Figure 1 shows the progression of TRL goals for current ESTO programs and for flight validation under this solicitation.

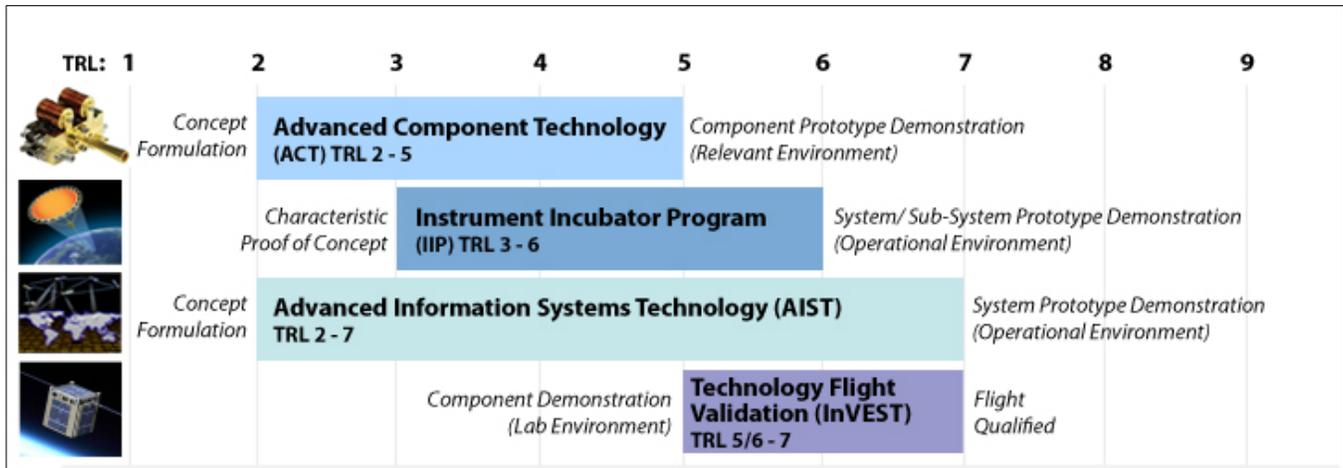


Figure 1. TRL Ranges for Technology Development Programs

Proposer’s instrument subsystems or small instruments must be at a TRL 5 or 6 upon entry to the InVEST program. The intent of this solicitation is only technology maturation through on-orbit validation. Funds are for form/fit/function to the spaceflight environment, launch, operations and postflight evaluation of the demonstration only. Proposers must clearly provide evidence of the claimed entry TRL of the instrument subsystem or instrument proposed for the technology validation.

Current ESTO program lines generally advance technologies to TRL-6: System/subsystem prototype demonstration in the relevant environment (ground or space). ESTO’s new program line will flight qualify technologies through successful spaceborne demonstrations to TRL-7.

1.2 Background and Solicitation Justification

The following documents identify the relevant missions, measurements and programs for this solicitation:

- *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 hereafter referred to as the “*Decadal Survey*.”
- *Responding to the Challenge of Climate and Environmental Change: NASA’s Plan for a Climate-Centric Architecture for Earth Observations and Applications from Space* may be accessed on the web at http://science.nasa.gov/media/medialibrary/2010/07/01/Climate_Architecture_Final.pdf. This report is hereafter referred to as the “*Climate-Centric Architecture*.”

- *Earth Science and Applications from Space: A Midterm Assessment of NASA's Implementation of the Decadal Survey* may be accessed on the web at <http://www.nap.edu/catalog/13405.html>. This report is hereafter referred to as the "Midterm Assessment."

New technology will play a key role in enabling many of the measurements recommended in the Decadal Survey and the Climate-Centric Architecture and helping to reduce the cost of other measurements. This InVEST Program solicitation will facilitate the implementation of the recommended measurements by carefully choosing where to invest in flight validation of instrument subsystems and small instruments using CubeSats to ensure the greatest benefit from NASA's technology development funds.

1.3 Proposal Research Topics

The Decadal Survey and Climate-Centric Architecture recommend an integrated strategy for Earth science and applications from space. This InVEST Program solicitation focuses on flight validation of instrument subsystems and small instruments to enable the science measurements that are described by the Decadal Survey and Climate-Centric Architecture. The measurements called out in these two documents include such things as radiation balance; soil moisture; ice sheet height; surface deformation; vegetation structure; land surface composition; carbon dioxide column integrals; ocean, lake, and river water levels; atmospheric gas columns; ocean color; aerosol and cloud profiles; land surface topography, temperature and humidity sounding; gravity fields; snow accumulation; ozone and trace gas profiles; and tropospheric winds. This list is illustrative only; proposers should refer to the Decadal Survey and Climate-Centric Architecture for clarification of the exact measurements desired. Priority will be given to those proposals that most clearly address technology validation for one or more of these science measurements and their associated missions.

2 Programmatic Information

This section provides additional details governing the proposed activities that supersede the general guidelines announced in the *NASA Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreement (CAN)* and incorporated by reference into this ROSES solicitation. This document is hereafter referred to as the *NASA Guidebook for Proposers*. The most recent edition of this Guidebook may be accessed on the web at <http://www.hq.nasa.gov/office/procurement/nraguidebook/>.

2.1 Proposal Content and Submission

2.1.1 *Notice of Intent to Propose*

A Notice of Intent (NOI) to propose is encouraged, but not required, for the submission of proposals to this solicitation. The information contained in the NOI is used to help expedite the proposal review activities and, therefore, is of considerable value to both NASA and the proposer. We request that NOIs be submitted electronically via NASA Solicitation and Proposal Integrated Review and Evaluation System ([NSPIRES](#)) by the due date given in [SECTION 3](#).

However, since NOIs submitted after the deadline may still be useful to NASA, late NOIs, as well as indications of intent NOT to propose on an earlier NOI submission, may be submitted by email to the point of contact for this solicitation (see [Section 3](#)).

2.1.2 Proposal Content

2.1.2.1 Proposal Summary

Each proposal shall include a proposal summary that describes the proposed work in no more than 300 words. 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.

2.1.2.2 Scientific/Technical/Management Section

This section completely replaces Section 2.3.5 of the *NASA Guidebook for Proposers*.

The Scientific/Technical/Management Section, or Project Description, must include the following content information in subsections that use the same titles. Failure to provide any of this material may be 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 *NASA Guidebook for Proposers*. Proposals that exceed the 15-page limit will be truncated at 15 pages.

1. **Applicability to Earth Science Measurements** – Describe the benefits to future Earth Science missions or measurements that could utilize the technology proposed for flight validation. Proposers shall include a one-page relevancy scenario showing how the proposed technology and flight validation contributes to one or more Earth Science measurements. Proposals that fail to include a relevancy scenario may be considered noncompliant and will be returned without review.

2. **Description of Proposed Technology and Flight Validation** – Provide a justification for why this particular technology or science measurement approach requires space flight validation. Describe the instrument subsystem or instrument to be flown, including spacecraft accommodation. Provide estimates of the mass, power, and data rate for the proposed subsystem or instrument.

3. **Launch and Operations Plan** - Technologies must be ready for launch within two years of award. Once on-orbit, the maximum time for validation of the technology must be one year or less. No science measurement is required; however, a demonstration of a science measurement is permitted if it is needed to validate the technology. Science campaigns are expressly excluded and will not be funded.

Since these awards will be limited to only in-space validation, proposers must clearly describe their approach for access to space (e.g. dedicated launch, secondary payload, etc.), as well as the

orbit required. Also describe the success criteria for flight validation and how they will be evaluated. This information will be evaluated for realism (technical, schedule, and cost). It is understood that an exact launch date will not necessarily be known at the time of proposal submission. However, details regarding the exact procedures, processes, and steps that will be required to be ready for launch in two years after award initiation must be provided in the proposal. Describe your plan for the spacecraft for the period after which you have completed the build and when the launch provider is willing to accept delivery of your spacecraft.

4. Comparative Technology Assessment – Describe the anticipated advantages of the technology to be flight validated 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. Reference the current state of the art and relate it to the proposed work.

5. TRL Assessment – Define the starting point for the instrument technology or measurement technique and the exit or success criteria for the proposed activity. The TRL shall advance by at least one level during the period of performance of the activity

For this solicitation, the entry TRL shall be between 5 and 6. Table 1 provides high-level definitions for instrument system TRLs. More detailed TRL definitions can be found at <http://esto.nasa.gov/files/TRL.doc>. The proposer shall identify the entry TRL, the planned exit TRL, and success criteria in their proposal. The proposer shall substantiate the entry TRL in the proposal. Proposals that fail to include and substantiate the entry TRL will be considered noncompliant and will be returned without review.

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 and/or breadboard validation in laboratory environment
5	Component and/or breadboard validation in relevant environment
6	System/subsystem model or prototyping demonstration in a operational environment
7	System prototyping demonstration in a operational environment
8	Actual system completed and "flight qualified" through test and demonstration
9	Actual system flight proven through successful mission operations

Table 1. TRL Definitions Summary

6. Research Management Plan – Provide a statement of work that concisely describes each task and milestone to be accomplished in the course of the flight validation project. Define the success criteria associated with each task or milestone. Also include a schedule chart that identifies critical milestones. The schedule should indicate any dependencies, a critical path and margins, and must be consistent with the proposed budget. A sufficient number of milestones per twelve-month period must be defined to ensure understanding of the effort for the performance period.

Subcontracting portions of the research project is acceptable, but overall management and reporting are the responsibility of the proposing organization.

7. Personnel – Provide a list of key personnel and identify experience related to the proposed activity. Proposers should be sure to include science, instrument subsystem or instrument development, CubeSat, and spaceflight experience on the team. 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.

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

9. Special Matters – Include a brief description of the organization, its facilities, and previous work experience in the field of the proposal.

Proposers shall also provide a summary chart (Quad Chart) that contains the following information. This quad chart is not included in the overall page count.

- Upper Left Quadrant: “Description and Objectives”
- Lower Left Quadrant: “Approach” and “Co-Is/Partners”
- Upper Right Quadrant: visual, graphic, or other pertinent information
- Lower Right Quadrant: “Milestone Schedule” and “Entry TRL.”

A template and example of the quad chart can be downloaded from http://esto.nasa.gov/files/EntryQuad_instructions_template.ppt.

2.1.3 Proposal Submission

Proposals shall be submitted electronically via NSPIRES using the procedures described in Chapter 3 of the *NASA Guidebook for Proposers* or via *Grants.gov* using the funding opportunity number provided in the summary table of key information. Proposals submitted after the due date will not be evaluated or selected.

2.2 Award Information

2.2.1 Funding

Funds are not currently available for awards under this solicitation. The Government’s obligation to make award(s) is contingent upon both the availability of new appropriated funds from which payment can be made and the receipt of proposals that NASA determines are acceptable for award under this solicitation. 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).

The funding available for this solicitation will limit the number and magnitude of the proposals awarded. Based on the availability of funding, the ESTO expects that a total of 1 to 3 proposals will be selected. The ESTO anticipates funding of approximately \$3 to \$4 million per year for the InVEST program.

Any reserves (schedule and funding) must be expressly noted and will be evaluated in the context of the complete proposal.

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 (subject to launch availability). Grants may be awarded for up to a three-year performance period. 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 in 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. If a commercial organization wants to receive a grant or cooperative agreement, cost sharing is required unless the commercial organization can demonstrate that it does not expect to receive substantial compensating benefits for performance of the work. If this demonstration is made, cost sharing is not required but may be offered voluntarily (see also Section D, Provision 1274.204, of the Grants Handbook). If a cost sharing arrangement is proposed, appropriate data rights that recognize the proposer's contributions, as well as the Government's rights to access, will be negotiated prior to award.

2.3 Evaluation Criteria

Evaluation criteria are given in Section C.2 of the *NASA Guidebook for Proposers*.

The first criterion, intrinsic merit, includes the technical merit of the proposed investigation. In addition to the factors given in the *NASA Guidebook for Proposers*, the evaluation criterion "intrinsic merit" specifically includes the following factors:

- Feasibility and merit of the proposed technical approach to achieve the technology validation objectives;
- Feasibility and technical merit of the proposed acquisition of launch services;
- Degree of innovation of the proposed technology validation concepts and approach;
- Substantiated justification and appropriateness of the entry and exit TRL;

- Feasibility of obtaining the potential reduction in risk, cost, size, and development time, or making the newly enabled measurement, with the proposed sensor or instrument; and feasibility of making a demonstrable TRL increase. The TRL must advance by at least one (1) level during the performance period of the project.
- Qualifications of key personnel and adequacy of facilities, staff, and equipment to support the proposed activity. This factor includes evaluation to ensure that the team has strong subsystem and instrument development skills

The second criterion, relevance to NASA’s objectives, includes the applicability of the proposed investigation for in-orbit technology validation needs in support of Earth Science measurements. In addition to the factors given in the *NASA Guidebook for Proposers*, the evaluation criterion “relevance to NASA's strategic goals and objectives” specifically includes the following factors:

- The proposal’s relevance and potential contribution to NASA’s scientific and technical areas of emphasis, including the potential to contribute to future Earth science instruments to make measurements which are part of the Decadal Survey measurements concepts or support other compelling Earth science measurements.
- The potential for the subsystem or instrument technology development to reduce the risk, cost, size, and development time of Earth science instruments or to enable new Earth science measurements. Potential cost reductions should be clearly stated and substantiated to the extent possible, with supporting analysis that indicates scalability;
- The potential of the subsystem or instrument technology to be integrated, once matured, into future NASA Earth Science missions.

The third criterion is cost realism and reasonableness. In addition to the factors given in the *NASA Guidebook for Proposers*, the evaluation criterion “cost realism” specifically includes the following factors:

- Adequacy and realism of proposed milestones and associated success criteria;
- Adequacy and realism of proposed acquisition of launch services;
- Realism and reasonableness of the proposed cost and comparison of costs to available funds;
- Adherence to sound and consistent management practices appropriate to the TRL of the proposed task;
- Past performance and related experience in the proposed area of technology development;
- Commitment of the organization’s management to the proposed technology development. Proposers should identify any previous investment by the organization that bears directly on the proposed project and provide supporting documentation.

Cost sharing is not part of the cost criteria, but cost sharing may become a factor at the time of selection when deciding between proposals of otherwise equal scientific and technical merit.

2.4 Technical Reporting Requirements

Once awarded, all status information, presentation material, and report deliverables applicable to this InVEST solicitation shall be submitted to the web-based ESTO InVEST-12 Award Administration e-Book located at <https://esto.reisys.com/ebooks/ebooks/index.jsp>. A user account on the ESTO e-Book will be provided to the PI upon award. Due to NASA Information Technology (IT) security requirements, all PIs must register with NASA's Identity Management and Account Exchange (IdMAX) system before a user account on e-Book will be established. In order to create an IdMAX account, some personal information will be required. All submissions to e-Book 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 provide 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:

- Upper Left Quadrant: "Description and Objectives"
- Lower Left Quadrant: "Approach" and "Co-Is/Partners"
- Upper Right Quadrant: A visual, graphic, or other pertinent information
- Lower Right Quadrant: "Milestone Schedule" and "Entry TRL."

The Quad Chart shall be updated at least annually and 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 within 15 days of award for the critical technology developments of the activity. The TRL Assessment Spreadsheet is available in the ESTO e-book under "Information" and "File Templates." The TRL assessment shall be updated at least annually, more often if appropriate.

2.4.2 *Bimonthly Technical Reports*

The bimonthly technical report shall focus on the preceding two month's efforts. Each report shall address:

- Technical status: The PI shall summarize accomplishments for the preceding two months, including technical accomplishments (trade study results, requirements analysis, design, prototype build, environmental testing, flight unit build, etc.), technology development results, and results of tests and/or demonstrations.
- Schedule status: 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.

Bimonthly Technical Reports shall be uploaded to the appropriate location in the ESTO e-Book at two-month intervals, starting on the second-month anniversary date of the signing of the award vehicle.

In months for which the PI is providing interim or annual review, the requirement for a bimonthly report is superseded by the interim or annual review requirements discussed in the next two sections.

Reports shall be submitted in PDF, Microsoft Word, or Microsoft PowerPoint compatible file 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 *Interim Reviews*

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

- Describe the primary findings, technology development results, and technical status, e.g., status of proto-flight, or flight systems, results of tests (e.g.; shock, vibe), etc.;
- 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;
- Summarize the cost and schedule status of the project, including any schedule slippage or acceleration. A schedule milestone chart of all major task activities shall be created and maintained and shown at all reviews. A financial data sheet shall be created and maintained, showing total project costs incurred and, for NASA and JPL projects only, obligated and costed, along with a graphical representation of the project cost profile to completion (a template is provided in the ESTO e-book under “Information” and “File Templates”);
- Provide a summary of anticipated results at the end of the task; and
- At the second review and subsequent reviews, address the comments and recommendations prepared by the reviewers participating in the most recent 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 ten days after the review.

2.4.4 *Annual Review*

The PI shall provide an Annual Review at the end of each twelve-month calendar period commencing from the date of award. The Annual Reviews are similar to the Interim Reviews and include all of the products required at an Interim Review with the following differences:

- The review is held at the PI's facility or a mutually agreed to location.
- The review is attended by an independent technical reviewer from an organization separately funded by ESTO.
- Hardcopy handouts shall be provided by the PI at the review.
- The PI may provide a laboratory demonstration, if appropriate, to show technical results and status.
- 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 conferences, seminars and symposia; demonstrations; media exposure; and, other activities that contributed to the overall success of the research project.
- The Quad Chart shall be updated to be current as of the date of the Annual Review, and shall reflect the TRL shown in the annual TRL Assessment Spreadsheet. The Quad Chart shall be included as the first page following the cover page of the review presentation.
- The TRL Assessment Spreadsheet shall be updated to be current as of the date of the Annual Review and shall be included as an appendix to the review presentation.

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. The presentation, updated in accordance with comments and discussion resulting from the review, shall constitute the Annual Report deliverable, and shall be uploaded to the appropriate location in the ESTO e-Book within ten days after the review. The updated Quad Chart and TRL Assessment Spreadsheet shall also be uploaded separately to their respective locations in the ESTO e-book within ten days after the review.

2.4.5 *Final Review and Final Report*

The PI shall provide a Final Review at the completion of the activity. The Final Review is similar to the Annual Reviews and includes all of the products required at an Annual Review with the following differences:

- The Final Review must provide conclusions of the work performed and make recommendations for follow-on activities that should be pursued.
- As this is the Final Review, there is no need to present future work plans.

The PI shall provide a written Final Report at the completion of the activity. The Final Report shall include the following:

1. Background of the project, including the science rationale for conducting this technology validation;
2. Assessment, and performance analysis results of the validation activities;
3. Tables, graphs, diagrams, curves, sketches, photographs, and drawings in sufficient detail to comprehensively explain the results achieved;
4. An updated TRL Assessment Spreadsheet;
5. A final Accomplishments Chart which contains the following information (a template is available in the e-Book):
 - a. Upper Left: "Description and Objectives."
 - b. Middle: "Accomplishments."
 - c. Upper Right: A visual, graphic, or other pertinent information.
 - d. Bottom: "Co-Is" (name and affiliation), "Entry TRL" and "Exit TRL."

The Accomplishment Chart shall be included as the first page following the cover page of the review presentation.

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

2.4.6 Earth Science Technology Forum and Workshops

The awardee is encouraged to participate in the annual Earth Science Technology Forum (ESTF). The ESTF 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 ESTF. 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 ESTF should be included in the proposal. If selected for participation in the ESTF, 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 program budget for first year of new awards	Up to \$3M
Number of new awards pending adequate proposals of merit	1-3
Maximum duration of awards	Minimum 1-year / Maximum 3-year awards (subject to launch availability)
Due Date for Notice of Intent to Propose (NOI)	October 17, 2012
Due date for delivery of proposals	November 27, 2012
Planning date for start of investigation	May 1, 2013
Page length for the Science-Technical-Management section of proposal	15 pages; see also Chapter 2 of the <i>NASA Guidebook for Proposers</i> . See Section 2.1.2.2 of this appendix.
Relevance to NASA	This program is relevant to the Earth science strategic goals and sub-goals in NASA's <i>Strategic Plan</i> ; see Table 1 in ROSES-12 and the references therein. Proposals that are relevant to this program are, by definition, relevant to NASA. See Section 2.1.2.2 of this appendix.
General information and overview of this solicitation	See the <i>ROSES Summary of Solicitation</i> .
Detailed instructions for the preparation and submission of proposals	See the <i>NASA Guidebook for Proposers</i> 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 <i>ROSES Summary of Solicitation</i> and Chapter 3 of the <i>NASA Guideline for Proposers</i> .
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 proposals 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	NNH12ZDA001N-InVEST
NASA point of contact concerning this program	Michael Pasciuto Earth Science Technology Office Science Mission Directorate NASA Headquarters Telephone: (301) 286-0006 E-mail: Michael.P.Pasciuto@nasa.gov

