

A.32 EARTH SYSTEM DATA RECORDS UNCERTAINTY ANALYSIS

1. Scope of Program

1.1 Introduction

The Earth Science Division (ESD) uses NASA's unique capabilities in space to study the fundamental Earth processes that power climate, weather, and natural hazards, and the impact of those processes on the quality of life. In pursuit of its objectives in Earth system science research, NASA is generating Earth system data of unprecedented quality and quantity and developing data processing and modeling capabilities to transform these data into products, information, and, ultimately, new knowledge of our planet. NASA Earth science data, data products and data processing algorithms are stored in archives at centers across the United States and linked by the Internet for data access and distribution.

A major need stated in the NASA Earth science research strategy is to develop long-term, consistent, and calibrated data and products that are valid across multiple missions and satellite sensors.

NASA has invested in the creation of consistent time series satellite data sets over decades, through both mission science team-based and measurement-based data product reprocessing and through solicitations for merged data products (most recently ROSES 2006 Making Earth Science data records for Use in Research for Earth Science, or MEaSUREs, Program). The Earth Science Division has focused on data sets creation for particular Earth science research measurement needs, and has defined a term for data sets to be used these needs: Earth System Data Records (ESDRs), including Climate Data Records (CDRs). An ESDR is defined as a unified and coherent set of observations of a given parameter of the Earth system, which is optimized to meet specific requirements in addressing science questions. These data records are critical to understanding Earth System processes, are critical to assessing variability, long-term trends and change in the Earth System, and provide input and validation means to modeling efforts.

The Earth System Data Records Uncertainty Analysis program seeks to extend and enhance the use of Earth System Data Records, including Climate Data Records, through rigorous estimation of error in Earth System Data Records used by NASA communities. Earth System Data Records Uncertainty Analysis projects increase the science value of Earth System science measurements by identifying and validating systematic errors, and improving error estimations. The Earth System Data Records Uncertainty Analysis program contributes to supporting agency research and applied science goals and objectives.

1.2. Types of Proposals

The Earth System Data Records Uncertainty Analysis program provides support for indepth analysis of the properties of long-term data sets, with a focus on detecting systematic error, better quantifying error, and properly attributing uncertainty sources. A second focus is to resolve known issues of such data sets. In so doing, projects may orchestrate correct (and appropriate)

methodologies, and may utilize advanced algorithms, techniques, and technologies that advance the understanding of uncertainties in Earth system science measurements. Resultant tool development is a third focus of the program.

The scope of problems that Earth System Data Records Uncertainty Analysis projects address include:

- Estimating, validating, and conveying measurement differences between sensors or between sensors, validation measurements and/or models;
- Estimating, validating, and conveying measurement errors in merged data products;
- Estimating, validating, and conveying systematic errors in long-term Earth system science data records; and
- Other contributions to the determination, validation, and conveyance of Earth science measurement quality and quantification of uncertainties.

The data methodologies or techniques employed by Earth System Data Records Uncertainty Analysis projects and their applicability to the problems being solved must be scientifically rigorous, peer-recognized, and substantiated.

To minimize project risk, any technologies employed by Earth System Data Records Uncertainty Analysis projects for disseminating new capabilities must have high technology readiness levels (TRL), 6 or higher, and it must be made clear how the technologies will improve community understanding of the data records, broaden data use or increase data usability, and support research science or applied science goals.

Any resultant software tool development shall fall under the scientific software of Earth Science Alternate Data Rights, which will be incorporated into the Cooperative Agreement, which shall be the award instrument for NASA- and selected Projects. (See the *Other Documents* section on the NSPIRES index page for this program element appendix.)

2. Programmatic Information

2.1 Proposal Requirements

In addition to the proposal requirements given in the *NASA Guidebook for Proposers*, proposals to the Earth System Data Records Uncertainty Analysis program must address these additional requirements:

- Identify the particular data set to be analyzed and the Earth Science research or applied science need or use for this data set. Proposers should cite documentation of current validation status of the particular data set, and known uncertainty and quality attributes.
- Identify all challenges in the uncertainty analysis and describe the effort required.
- The period of award for these projects is nominally three years. Shorter and longer timescales may be proposed as appropriate. Proposal plans and deliverables described

must state the length of effort and provide milestones and deliverables within the timeline.

2.3 Award Type and Funding

The vehicle for projects selected through this solicitation will be a Cooperative Agreement (CA). Proposers should be aware of the differences between a CA and other vehicles such as grants. See the *NASA Guidebook for Proposers* for guidance.

2.4 Relationship to Other NASA Program Elements

This Earth System Data Records Uncertainty Analysis solicitation is not a duplicative call for activities described in other ROSES solicitations, including algorithm development and maintenance and data analysis under the Science of Terra and Aqua program (ROSES-09 Appendix A.41), science data product generation under the MEaSUREs integrated system solutions (Appendix A.33), solution network development through the Applied Sciences Program: Decision Support (ROSES-09 Appendix A.29), technology deployments solicited through Advancing Collaborative Connections for Earth System Science (Appendix A.34), or information systems development solicited through the Advanced Information Systems Technology program (Appendix A.37). Proposers should carefully consider their planned work in relation to the Earth System Data Records Uncertainty Analysis program guidelines before submitting.

2.5 Education and Public Outreach Opportunities

NASA policy strongly encourages participation in Education and Public Outreach (E/PO) activities by members of the science community. You may be eligible to propose a supplemental Education or Outreach effort if your research proposal is selected for award. The research award must have more than 12 months remaining at the time of submission of the supplement proposal. For additional details concerning the submission of Outreach or Education supplement proposals, please see Supplemental Outreach Awards for ROSES Investigators (Appendix E.5) and Supplemental Education Awards for ROSES Investigators (Appendix E.6).

3. Summary of Key Information

Expected program budget for first year of new awards	~ \$6M
Number of new awards pending adequate proposals of merit	~ 12 - 20
Maximum duration of awards	4 years (nominally, awards are for 3 years)
Due date for Notice of Intent to propose (NOI)	See Tables 2 and 3 in the <i>ROSES Summary of Solicitation</i> .
Due date for proposals	See Tables 2 and 3 in the <i>ROSES Summary of Solicitation</i> .
Planning date for start of investigation	6 months after proposal due date.

Page length for the central Science-Technical-Management section of proposal	15 pp; see also Chapter 2 of the <i>NASA Guidebook for Proposers</i>
Relevance to NASA	This program is relevant to the Earth science strategic goals and subgoals in NASA's <i>Strategic Plan</i> ; see Table 1 and the references therein. Proposals that are relevant to this program are, by definition, relevant to NASA.
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 Section IV of the <i>ROSES Summary of Solicitation</i> and Chapter 3 of the <i>NASA Guidebook 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 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	NNH10ZDA001N-ESDRERR
Point of contact concerning this program	Ms. Martha Maiden Earth Science Division Science Mission Directorate National Aeronautics and Space Administration Washington, DC 20546-0001 Telephone: (202) 358-1078 E-mail: martha.e.maiden@nasa.gov