



NASA SBIR 2009 Phase I Solicitation

S6.03 Algorithms for Science Data Processing and Analysis

Lead Center: GSFC

Participating Center(s): ARC, JPL, LaRC, MSFC, SSC

This subtopic seeks technical innovation and unique approaches for the processing and the analysis of data from NASA science missions. Analysis of NASA science data enables insights into dynamic systems such as the sun, oceans, and earth's climate in addition to looking back in time to explore the origins of the universe. Complex algorithms and intensive data processing are needed to understand and utilize this data. Advances in such algorithms will support science data analysis and decision support systems related to current and future missions and mission concepts such as:

Current operational missions listed at <http://www.nasa.gov/missions/current/index.html>

- Landsat Data Continuity Mission (LDCM) (<http://ldcm.nasa.gov/>),
- NPOES Preparatory Project (NPP) (<http://jointmission.gsfc.nasa.gov/>),
- Lunar Reconnaissance Orbiter (LRO) (<http://lunar.gsfc.nasa.gov/>),
- Orbiting Carbon Observatory (OCO) (<http://oco.jpl.nasa.gov/>),
- Lunar Atmosphere and Dust Environment Explorer (LADEE) (<http://nasascience.nasa.gov/missions/ladee/>),
- Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) (<http://crism.jhuapl.edu/>),
- HypSPiRI Earth orbiting hyperspectral instrument (<http://hyspiri.jpl.nasa.gov/>),
- Visual Infrared Mapping Spectrometer (VIMS) on Cassini (<http://wwwvims.lpl.arizona.edu/>),
- Moon Mineralogy Mapper (M3) on Chandrayaan (<http://moonmineralogymapper.jpl.nasa.gov/>),
- James Webb Space Telescope (JWST) (<http://www.jwst.nasa.gov/>).

Research proposed to this subtopic should demonstrate technical feasibility during Phase 1, in partnership with scientists, and subsequently show a path toward a Phase 2 prototype demonstration, with significant communication with missions and programs to ensure a successful Phase 3 infusion. Innovations are sought in data processing and analysis algorithms in the following areas:

- Optimization of Algorithms and Computational Methods that increase the utility of scientific research data, models, simulations, and visualizations. Of particular interest are innovative computational methods that will dramatically increase algorithm efficiency as well as the performance of scientific applications. Success will be measured by both speed improvements and output validation.
- Improvement of Data Collection, by identifying data gaps in real-time, and/or derive information through synthesis of data from multiple sources. The ultimate goal is to increase the value of data collected in terms of scientific discovery and application.
- Frameworks and Related Tools for Processing, Analyzing and Fusing image and vector data for the purpose of analyzing NASA's astrophysics, heliophysics, planetary and earth science mission data and therefore enable the advancement of NASA's scientific objectives. Of particular interest are open source frameworks that would enable sharing and validation of tools and algorithms.

Tools and products developed under this subtopic may be used for broad public dissemination or for use within a narrow scientific community. These tools can be plug-ins or enhancements to existing software or on-line data/computing services. They also can be new stand-alone applications or web services, provided that they are compatible with most widely used computer platforms and exchange information effectively (via standard protocols and file formats) with existing, standard or prevalent applications. To promote interoperability, tools shall use industry standard protocols, formats, and Application Programming Interfaces (APIs), including compliance with the Federal Geographic Data Committee (FDGC) and Open Geospatial Consortium (OGC) standards as appropriate.

It is highly desirable that the proposed projects lead to software that is infused into NASA programs and projects.