NASA SBIR 2004 Phase I Solicitation

**E4.02 Advanced Educational Processes and Tools**

Lead Center: GSFC

This subtopic focuses on innovation in effective applications related to classroom- or museum-ready software tools for display and/or analysis of Earth science information for learners in both formal and informal settings, and tools for organization and dissemination of NASA's Earth science educational materials to a wide array of educational audiences. The Earth science educational program covers a wide range of audiences from students to adults in both classroom settings, such as public schools or continuing education venues, to all matter of informal learning settings such as radio, television, museums, parks, scouts, and the Internet. In these venues, the learning focuses on the scientific discoveries by the ESE, the technology innovations and the applied use of these discoveries and technologies for improved decision making by all.

The areas of interest (described below) cross-cut the three programmatic areas within the ESE program (formal, informal, and professional development) and hence, are anticipated to have utility in at least two of these areas and most likely in all three areas.

The first area of interest focuses on innovation in the application of digital library technologies to educational materials and audiences. NASA's Earth Science Education Program currently collaborates with the Digital Library for Earth System Education (DLESE). The successful proposal must be able to integrate with, or be integrated into, existing educational digital library efforts within NASA and/or make contributions to DLESE. These proposals will advance the use and usability of globally distributed, networked information resources, and encourage existing and new communities to focus on innovative applications areas. Collaboration between Earth scientists, formal or informal education community professionals, and computer scientists is required for these proposals to demonstrate useful results. Areas of interest include:

- Extend the current Joined Digital Library (JOIN) effort by developing additional Jini applications. (JOIN is a collection of tools based on Sun's Jini technology used to implement efficient, decentralized, and distributed computing systems and follows "the network is the computer" philosophy.)
- Development of formal and informal education audience-specific interfaces (e.g., specific interfaces for students, park interpreters, TV producers, curriculum developers, etc.).
• Development of interfaces to promote diversity within educational audiences (e.g., age, ethnicity, cultural, urban/rural, etc.).

• Development of accessibility tools for disabled users to interact and search digital libraries.

• Development and access to educational materials including new resources for science, mathematics, and engineering education at all levels.

• Development of interoperability tools to integrate dissimilar library archives.

• Development of tools to administer and manage end-user expectations and satisfaction.

• Develop applications that enhance the general functionality of existing digital libraries by providing new general-purpose tools for archive management, metadata ingestion, intelligent search, and retrieval.

• Tools to support online community interaction, which could include new means for gathering, interacting, and communicating with other library users.

The second area of interest focuses on innovation in effective software and related development techniques, and in highly practical methods for maintaining and disseminating software for use by educational audiences engaged in teaching or learning about Earth science. The specific areas of greatest interest are highly-portable, classroom-ready software for analysis, visualization, and processing of Earth science satellite data, and methods to provide long-term support and viability for educational software. Collaboration between Earth scientists, educators, computer scientists, and "business" model experts is required for these proposals to demonstrate useful results. Areas of interest include:

• Extend the current Image 2000 effort by developing additional plug-in applications and modifying core software if necessary. Image 2000 is a Java/Java Advanced Imaging (JAI)-based image processing package being developed at GSFC.

• User-friendly, extensible, Earth science satellite image processing software for multiple operating systems, for educational use in K–12, undergraduate and continuing education venues.

• Techniques and software for integrating vector and raster data for the visualization and analysis of geo-spatial Earth science data.

• Tutorials geared toward the use of image processing software for visualization and analysis of Earth science related satellite imagery.

• Infrastructure and startup of an Internet based user-supported support and development network, in the spirit of "Open-Source," to ensure continued maintenance and development of Earth science satellite image processing software and tutorials for educational audiences.