



## Digital Library for Earth System Education (DLESE)

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### Program Solicitation

NSF 02-158

Directorate for Geosciences

### Full Proposal Deadline(s):

November 6, 2002

by 5:00 p.m. submitters local time

### REVISIONS AND UPDATES

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Effective October 29, 2002, the deadline date was changed from October 30, 2002 to November 6, 2002.

### SUMMARY OF PROGRAM REQUIREMENTS

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#### General Information

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#### Program Title:

Digital Library for Earth System Education (DLESE)

#### Synopsis of Program:

The intent of this solicitation is to invite proposals from the community to provide four key DLESE services, which, together with the DLESE Program Center (a fifth core service), will constitute the comprehensive operational facility needed to support the building of the library. The four services addressed in this solicitation are 1) *Collections Services*: Accessioning of high-quality Earth system resources into the library and to facilitating the early establishment of a rigorous peer-review system; 2) *Community Services*: Outreach to the community and nurturing the use of best practices to enable learning about the Earth system; 3) *Data Services*: Engage projects involving the development and use of tools in order to facilitate access via DLESE to Earth system data sets; and 4) *Evaluation Services*: Ongoing monitoring of efficacy of use of DLESE collections and its value in substantively improving learning.

#### Cognizant Program Officer(s):

- Michael A. Mayhew, Program Director, Division of Earth Sciences, Education and Human Resources, 785 S, telephone: (703) 292-8557, fax: (703) 292-9025, email: [mmayhew@nsf.gov](mailto:mmayhew@nsf.gov)

## Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.050 --- Geosciences

### Eligibility Information

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- **Organization Limit:** None Specified.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

### Award Information

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- **Anticipated Type of Award:** Continuing Grant
- **Estimated Number of Awards:** Not Specified.
- **Anticipated Funding Amount:** \$1.2 million in FY 2003 pending availability of funds.

### Proposal Preparation and Submission Instructions

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#### A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:**

Standard Preparation Guidelines

- Standard GPG Guidelines apply.

#### B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

#### C. Due Dates

- **Full Proposal Deadline Date(s):**  
November 6, 2002  
by 5:00 p.m. submitters local time

#### D. FastLane Requirements

- **FastLane Submission:** Full proposal submission is required.
- **FastLane Contact(s):**
  - Brian E. Dawson, Information Technology Specialist, 705 N, telephone: (703) 292-4727, fax: (703) 292-9042, email: [bdawson@nsf.gov](mailto:bdawson@nsf.gov)

### Proposal Review Information

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- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full funding opportunity document for further information.

### Award Administration Information

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- **Award Conditions:** Additional award conditions apply. Please see the full funding opportunity document for further information.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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## I. INTRODUCTION

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The Digital Library for Earth System Education (DLESE) is a distributed, community-based electronic library dedicated to improving the quality, quantity, and efficiency of teaching and learning about the Earth system at all educational levels. It capitalizes on developments in modern information technology to make full use of, and bring order to, the World Wide Web for the purpose of empowering any teacher, learner, or citizen seeking to understand the Earth system to easily discover the right educational materials for their purposes and be assured of their high quality.

DLESE is a product of the wide recognition of the need for improved science education across the national, state, and local levels and greater access to quality science education for all. Emerging information and communications technologies present a means of maximizing investments in science education by providing the necessary integration services and community support to promote synergy across otherwise disparate projects.

DLESE was founded at the seminal 1999 *Portal to the Future* workshop, at which the basic program structure and mechanisms for community-based governance were established. The full program plan was subsequently articulated in the DLESE Community Plan,

which laid out the community's vision for the first stages of library development; the plan was later codified in a DLESE Strategic Plan. Both plans can be found at [www.dlese.org](http://www.dlese.org) under "Documents About DLESE". The Strategic Plan articulates a pathway to a reliable, robust, operational library that is designed to integrate across distributed community collections.

Two NSF awards since 1999 have supported the initial phases of library development. A DLESE Program Center (DPC) was established at the University Corporation for Atmospheric Research (UCAR) as an operational hub to support the development of the technical infrastructure of the library (the scope of the technical support provided by the DPC can be seen at [www.dlese.org](http://www.dlese.org) under "About DLESE"). A collaboration of the DPC, Carleton College, Montana State, and the University of Colorado "in partnership with other important institutions and with extensive community input" has produced a working prototype library. Over 2000 resources in the initial collection can be accessed by a discovery system that enables users to search by grade level, educational resource type, and keyword. This version also contains a Resource Cataloger, community-oriented services such as discussion forums for established working groups and "discussion groups", and a community opportunities and announcements posting tool. The working library prototype can be accessed via [www.dlese.org](http://www.dlese.org).

DLESE has always been conceived as a grass-roots organization, community-built and community-governed. Community governance is effected by the Steering Committee and its four Standing Committees: Users, Collections, Technology, and Services (see [www.dlese.org](http://www.dlese.org) under "About DLESE"). The Steering Committee provides guidance and oversight to an operational core. As DLESE now moves into a fully operational phase, the operational core is to consist of five tightly-integrated service areas headed by an Executive Director. The Executive Director will head a Management Council, on which each of the service areas is represented. The first of the service areas is the DPC, hosted by UCAR. NSF funding for the DPC is being sought through a stand-alone proposal separate from this solicitation. Proposals for operation of the other four service areas are being invited through the present solicitation. These are:

- **Collections Services:** Extensive outreach to individuals and institutions to identify and enable the accession of high-quality Earth system resources into the library and to facilitate the early establishment of a rigorous peer-review system. As presently envisioned, the system will enable multiple pathways to a reviewed DLESE collection.
- **Community Services:** Extensive outreach to individuals and institutions to facilitate the use of and contributions to the library, to enable community interaction via the library, and to nurture the use of best practices to enable learning about the Earth system.
- **Data Services:** Engage projects involving the development and use of tools in order to facilitate access via DLESE to Earth system data sets residing on remote servers, promote exemplary use of data in educational applications, and organize interaction between data providers and data users.
- **Evaluation Services:** Ongoing monitoring of efficacy of use of DLESE collections and its value in substantively improving learning about the Earth system.

The nature of the DLESE core services will be elaborated in the next section.

Although each of the non-DPC services is conceived as a high-priority focus for DLESE in its own right, close interaction among the services and especially between each service and the DPC will be crucial to the effective operation of the DLESE core in building the library. Coordinating and promoting the effective interaction of the core services will be the job of the DLESE Executive Director.

DLESE operates within the framework of the NSF-sponsored National Science, Technology, Engineering, and Mathematics Digital Library (NSDL) ([www.ehr.nsf.gov/ehr/DUE/programs/nsdl](http://www.ehr.nsf.gov/ehr/DUE/programs/nsdl)). DLESE is the geoscience disciplinary component of NSDL. Members of the DLESE community are part of the NSDL leadership. It is a fundamental principle that DLESE collections must be interoperable with NSDL collections, and that in general DLESE technical standards are compatible with NSDL standards. It will be important that each of the DLESE core services interface closely with NSDL.

## II. PROGRAM DESCRIPTION

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The intent of this solicitation is to invite proposals from the community to provide four key DLESE services, which, together with the DLESE Program Center (a fifth core service), will constitute the comprehensive operational facility needed to support the building of the

library. Awardees will be providing a service to the community, not as an isolated activity, but as part of a larger, well-integrated team.

Thus, PIs whose proposals are rated as highly meritorious in peer review will be expected as a condition of award, in a post-review process of negotiation involving the relevant parties and NSF, to coordinate their work through the DLESE Executive Director with other potential projects and the DPC. It is anticipated that a Letter of Agreement (LOA) will be developed between a potential PI's institution and that of the Executive Director that 1) specifies the goals of the service and a time line for achieving them, 2) describes how the PIs will operate their service once it reaches operational readiness, 3) spells out how a particular service will collaborate with and support other services, and 4) specifies how the DPC will support the service. PIs will need to agree via the LOA to adhere to the overall guidance of the Executive Director and also adhere to agreed-on time lines. NSF will assist in the process of generation of draft Letters of Agreement and will approve the final documents.

Lest this guidance seem overly restrictive, within the constraints needed to ensure good coordination and a well-integrated operation, it is also anticipated that PIs will have much latitude to operate creatively on behalf of the community; this will be welcome.

The leader of each function will be expected to participate as a member of the DLESE Management Council (MC). Through regular meetings and conference calls, the MC fosters communication and coordination, assesses progress toward common goals, and develops policy options for consideration by the DLESE Steering Committee.

NSF invites proposals seeking to operate one of the four non-DPC core services: 1) Collections, 2) Community, 3) Data, and 4) Evaluation. The services are described below. Awards are expected to be made for 36 months duration. For expected award amounts and anticipated numbers of awards for the four services, see Section IV ("AWARD INFORMATION") below. NSF plans to issue a new program solicitation during year three to continue support for DLESE core services beyond that time.

Partnerships or collaborations are encouraged. While each service will involve one coherent "project", it may well be collaborative in nature, involving multiple institutions. This may come about via the submission of *a priori* collaborative proposals. Or NSF may encourage collaborations among PIs of independent highly-rated proposals post-review.

Proposers for each of the service areas described below should include in their budgets support for anticipated expertise necessary to support technical interoperability and effective communication with the technical staff at the DPC. They should also build in to their budgets travel expenses for an anticipated two Management Council meetings per year (in Boulder), two Steering Committee meetings per year (location varies), and the annual DLESE Community Meeting (location varies).

### **Collections Services**

Management of the collections service involves extensive outreach to individuals and organizations holding valuable educational materials in digital form and facilitating the process of bringing these materials into the DLESE collection. Such materials will take a wide variety of forms, for example:

- tools to use data in educational applications
- text (scientific papers, summaries, indices and abstracts)
- images, models, simulations
- animations, videos, multimedia
- lesson plans and curricula, including assessment tools
- guided inquiry sets, modules, problem sets, classroom and lab activities
- tutorials about the Earth for students
- interactive mini-tutorials about pedagogy for faculty
- virtual field trips
- student portfolios

Over 2000 individual resources have already been contributed to the DLESE collection. Current accessioning practice for individual resources involves development by the contributor of metadata records following standards that assure interoperability within DLESE, with NSDL, and with other libraries (for information about the process, see the Metadata Working Group site, [dlese.org/Metadata/index.htm](http://dlese.org/Metadata/index.htm)).

It is recognized that it is important for DLESE to have the capability of accessioning large, specialized, thematic collections developed

by organizations such as government agencies, professional societies, and publishers. This will include high-quality content produced through special agency competitions such as NSF's NSDL, Geoscience Education, and Course, Curriculum, and Laboratory Improvement programs at NSF and similar programs of other agencies. The DLESE Collections Standing Committee is heading the development of policies governing the process; the collections core service will be an important contributor to this ongoing effort, and will have an important role in outreach to such organizations.

The DLESE Strategic Plan calls for a two-tiered library containing 1) a "broad" collection consisting of a large number of meritorious resources or collections of resources intended to fill the needs of a wide range of users (which may be in various stages of development and may include valuable "work in progress") and 2) a reviewed collection consisting of resources which have been through a rigorous peer review process. An ongoing process is envisioned in which resources in the broad collection can make their way into the peer review process and potentially be added to the reviewed collection. For DLESE to become the "Portal of Choice" for anyone seeking resources pertaining to the Earth system, attention to quality control is crucial. This applies to the broad collection as well as the reviewed collection.

With regard to the ongoing development of the broad collection, operators of collections services will be expected to :

1. Work with the Collections Committee to develop guidelines for future growth of the broad collection that ensure that the desirability of creating a large, rich collection is balanced against the need for an appropriate degree of selectivity, so that DLESE users can be confident that they can easily find resources that meet their needs and meet some minimum standard of quality.
2. Develop a specific, rational plan--with time lines--for "populating the shelves" and a plan for measuring progress on an ongoing basis. The plan should clearly articulate how collection development efforts will support the DLESE vision of a coherent Earth system approach and include strategies for measuring progress on an ongoing basis.
3. Provide for a small staff dedicated to ongoing cataloging of resources within the established quality control guidelines in order to ensure steady collections growth and fill out the general collection.
4. Work closely with individuals and groups within the community who are developing specialized collections under NSDL or other funding to facilitate the accession of their collections into DLESE consistent with quality control guidelines and an appropriate Earth systems context.

Resources within the DLESE Reviewed Collection will be limited to those that have been through a rigorous peer review process. The peer review system will provide a valuable means for contributors to improve their materials and ultimately gain professional recognition for their contributions. Projects are under way that aim to develop rational pathways to the Reviewed Collection. (see [dlese.ideo.columbia.edu](http://dlese.ideo.columbia.edu) and [www.usra.edu/esse/jesse/nsf9944.html](http://www.usra.edu/esse/jesse/nsf9944.html) ). It is expected that other peer review processes will be developed and become part of the DLESE peer review system. The Collections core function will work closely with them, and with supporting tool development efforts at the DPC, to bring the DLESE peer review system on line at an early date.

Other activities of the collections core service, in collaboration with the DPC, will include, but not be limited to:

- Development of controlled Earth system science vocabularies and thesauri
- Incorporation of tools for building personal collection developed by UC Santa Barbara, NSDL, or elsewhere as they emerge in collaboration with the DPC
- Cataloging for the DLESE Broad Collection, enlisting the aid of professional catalogers where necessary
- Collections partnerships with journals, professional societies, and federal/state agencies
- Cataloging and authoring components for existing resource development tools or course management systems

The collections function will interface strongly with the DLESE Collections Standing Committee in the ongoing process of developing policies and procedures for this area. Proposers should consult the committee's Web site ([www.ideo.columbia.edu/DLESE/collections](http://www.ideo.columbia.edu/DLESE/collections)), which is rich in information on policies (Collections Policy, Scope Policy, Terms of Use) and collections-building concepts.

The DPC will support the collections function through a close collaborative effort. Currently-planned related technical work at the DPC includes:

- Extending metadata resource description framework supporting AAAS Benchmarks, Geography for Life standards, and an expanded Earth System Science vocabulary
- Developing strategic partnerships (including NSDL) to capitalize on emerging automatic metadata generation techniques
- Creating collections development and management tools
- Extending resource characterization tools to support indexing by temporal and spatial dimensions (geo-referenced discovery)
- Developing tools to support community peer review mechanisms
- Refining and automating quality assurance processes

## **Community Services**

The concept of DLESE as a grass-roots organization is of basic importance. The rationale is that substantive participation of the geoscience community in its broadest sense, not only in using the library, but in building it, will result in an operational library that optimally meets the full spectrum of community needs and have the greatest impact on learning.

Community Services is envisioned as having a primary responsibility in this context in three ways: 1) in pursuing an aggressive outreach program aimed at engaging a wide range of individuals and organizations with DLESE, thus building the community, 2) in operating a community center that facilitates the use of a variety of communications networks serving users and builders of the library for the purpose of optimizing its benefit to the community, and 3) increasing diversity in the geoscience community.

While the process of outreach to the community in order to engage individuals and organizations with the library is a large and multifaceted task that necessarily needs to be shared by all components of the DLESE core, Community Services will have special responsibility for leadership in this important area. Proposers should present an outreach plan that extends, not only to individuals and organizations engaged in Earth system education at all levels, but to other important sectors where partnerships are important to building the library, such as companies and groups carrying out IT research related to digital libraries, other digital libraries, publishers, software developers, and the traditional library community. The outreach activity should rapidly increase awareness in the community, promote wide usage, facilitate quality contributions, and bring important external resources to bear on the library-building process.

Beyond providing high-quality educational resources for teaching and learning in Earth system science, DLESE is envisioned as an intellectual commons where users can interact and collaborate in a wide variety of contexts, including the sharing of information on effective methods of teaching that link pedagogy and content, methodologies for assessing impacts on learning, results of research on learning in the geosciences, and special educational initiatives related to focused research programs. Toward such ends, operation of the community center will involve the facilitation of the development and use of effective communications networks.

It is expected that Community Services will work with the DPC in ongoing development of tools to support topical networks called working groups or discussion groups (a number of such groups have already been formed: see "Find/Join a Group" at [www.dlese.org](http://www.dlese.org)) that can address issues, create an information exchange, and generally facilitate discussion. It should be possible for community members to start up new networks of special interest. It will also be important for the community center to work with the DPC to continue to develop a clearing house for sharing community information and opportunities.

It is expected that the community center will support community members in effectively using DLESE resources to improve teaching and learning. Community Services can 1) work with Collections Services to locate, catalog, and promote development of resources that provide information on effective pedagogy, successful teaching practice, and assessment of learning and 2) with the DPC explore mechanisms that support users in integrating this information with their use of DLESE resources; this may extend to organizing workshops--both traditional and virtual--for this purpose.

DLESE has the potential of contributing greatly to the cause of increasing diversity in the geosciences, an important and formidable challenge. Organizing this effort must be an important part of the Community Services part of the DLESE core, and proposers to this element should include a plan for organizing a DLESE diversity initiative. Proposers are encouraged to consider the formation of partnerships that effectively serve this purpose.

The information technology behind DLESE will allow the aggregation of quality materials that are most appropriate and effective for a given learning situation and individual learning styles, thus supporting a wide diversity of learners. It will be possible to disseminate reviewed and tested materials that have proven to enhance learning across a wide spectrum. It can provide a forum for discussion of diversity-related issues, and tools for organizing action addressing particular issues. DLESE can help to overcome the digital divide by identifying components of the collections that are suitable for use by those with limited access to Web technology and by offering

training to educators in use of available technology to access DLESE in order to improve teaching and learning in all venues.

DLESE has made a start toward a diversity initiative and made it a high priority. A diversity workshop was held and a report issued, a focus group was formed, and an initial diversity Web resource was established. Proposers should consult the DLESE diversity site, which can be found via "cross-cutting issues" for the Web site; the discussion area is under Find/Join a Group. They may also wish to consult the NSF Geosciences diversity site at [www.geo.nsf.gov/geo/diversity](http://www.geo.nsf.gov/geo/diversity). A diversity "workspace" is being developed for the NSDL Communication Portal ([comm.nsdlib.org](http://comm.nsdlib.org)), and may be available to proposers.

It is envisioned that Community Services will interface with the Steering Committee in the development of library policies and procedures via the Users Standing Committee ([oceanography.geol.ucsb.edu/dlese](http://oceanography.geol.ucsb.edu/dlese)) and the Services Standing Committee [www.atmos.uiuc.edu/dlese](http://www.atmos.uiuc.edu/dlese).

### **Data Access Services**

Research in the geosciences is typically based on the use of large, rich data sets. Use of such data in Earth system science educational applications is of such high pedagogical value that the challenge of accessing and using such data is included as a DLESE core activity.

DLESE began an initiative in this area by establishing the DATaset Working Group (DAWG). A workshop was held in February, 2001, to organize a collaboration among some formidable partners to pursue the challenges of tool development for data access and easy use in educational applications. Proposers can see the results of this workshop via [www.dlese.org](http://www.dlese.org) under "Find/Join a Group."

Another important data initiative is the NSDL-sponsored Thematic Realtime Environmental Data Distributed Services (THREDDS) project ([www.unidata.ucar.edu/projects/THREDDS/Overview.htm](http://www.unidata.ucar.edu/projects/THREDDS/Overview.htm)), also a collaboration of numerous formidable partners. The idea of THREDDS is that advances in the technologies of scientific data management and digital libraries have made it in principle possible to discover widely distributed data sets and to use subsets of data with analysis tools to 1) visualize complex multidimensional data, 2) integrate and overlay data from multiple sources, and 3) easily deal with multiple coordinate systems, measurable quantities, units, and sampling.

The present solicitation will not support development of data discovery tools or applications *per se*, but rather is aimed at supporting a service that will ensure that existing activities are actively pursued and brought to DLESE in an organized manner. Specifically, the activities of this service on behalf of the DLESE community will include:

- Ongoing support for and organization of the efforts of the DATaset Working Group in pursuit of the goals established at the DAWG workshop.
- Close interaction with the THREDDS initiative--and other such initiatives--to ensure full access via DLESE to the data discovery tools developed.
- Use of the DLESE Resource Cataloger to compile information on existing tools, Web resources, and projects involving integrated access to Earth data for educational purposes and applications of such data in exemplary educational modules.
- Organization of workshops and other meetings that bring together data providers, interface providers, and developers of educational resources.

In short, the intent of this service is to be a catalyst in advancing the frontier of use of "real" data in Earth system science education.

Proposers to this element may wish to consult the NSDL "Using Data in the Classroom" Web site, [usingdata.comm.nsdlib.org](http://usingdata.comm.nsdlib.org).

### **Evaluation Services**

As DLESE evolves, it will be critically important to have ongoing measures of its success, so that the service provided to the community



can be continually improved. This will involve use of metrics and user feedback to evaluate how efficiently and effectively DLESE services are being provided, but must also include analysis of the impact of DLESE on improving student learning in Earth system science and the degree to which DLESE is contributing to the important cause of educational reform. The DLESE Community Plan identifies three key areas for evaluation: community, dimensions (collections, access to data sets, a discovery and distribution system, services for users, and communications networks), and educational improvement. They will constitute the basis for Evaluation Services activities.

The starting point for this element is the DLESE Evaluation Plan ([www.dlese.org](http://www.dlese.org) under "Documents About DLESE/Plans"), which provides a strong platform for proposers under this element to build on. The evaluation plan calls for three types of evaluation work to judge the progress and achievements across the three areas identified in the Community Plan:

1. *Formative evaluation.* This involves action items to inform the development of the dimensions of DLESE, such as:

- Collections through expert review and comparison to requirements
- Access to datasets through expert review and comparison to requirements
- Ongoing application of the DLESE discovery/distribution system for usability testing and expert review
- Services for users through the administration of user satisfaction indices
- Communications networks through expert review and survey of users
- Development of priorities for future development of services

2. *Evaluating the impact of DLESE on science education.* DLESE expects to improve science learning by enabling new teaching practices, access to rich resources for science learning and support for inquiry-based learning. Impact evaluation will document and represent usage, effectiveness and merit of DLESE for improved science learning. Impact evaluation includes:

- Evaluation of the output of tools developed by the DPC for automated processes of counting and tracking usage and associated methods of asking for feedback during and after DLESE user sessions
- Studies of science learning in selected test beds of DLESE implementation
- Studies of samples of science teachers and learners and their reports of use across the broad potential client-base for DLESE

3. *Evolution and engagement* is intended to build the capacity of the DLESE community to engage in long-term and cohesive evaluation; this element calls for:

- Funding of small grants to conduct evaluation by faculty and teachers so as to stimulate evaluation and the sharing of results
- Promoting research in the assessment of teaching and learning in Earth science
- Developing a clear model of expected results

It is envisioned that this element will involve a planning period during the first year that builds on and extends the DLESE Evaluation Plan and that involves one or more community workshops, followed by the implementation of a final plan in years two and three.

It is also envisioned that while Evaluation Services will of necessity interact closely with other parts of the DLESE core, it will also need to establish an independent identity to ensure objective evaluation.

### **III. ELIGIBILITY INFORMATION**

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The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

#### IV. AWARD INFORMATION

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NSF expects to make one overall award for each of the four service elements described in this solicitation. Each overall award may consist of multiple individual awards supporting a collaboration aimed at fulfilling the requirements of the service element. Collaborations may take the form of formal collaborative proposals or agreements to collaborate among PIs having competitive proposals, following proposal review.

Subject to availability of funds, NSF expects to have \$1.2 million available for this activity in FY 2003, \$1.5 million in FY 2004, and \$1.7 million in FY 2005. For FY 2003, the tentative distribution of funds among the four elements is anticipated to be:

- Collections Services: \$400,000
- Community Services: \$350,000
- Evaluation Services: \$300,000
- Data Access Services: \$150,000

Final distribution of funds will depend on the nature and quality of proposals received. Awards will be made as continuing grants, with a duration of up to 36 months. The estimated program budget, number of awards, and average award size and duration are subject to availability of funds.

#### V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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##### A. Proposal Preparation Instructions

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###### Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov). Proposers are reminded to identify the program announcement/solicitation number (02-158) in the program announcement/solicitation block on the NSF *Cover Sheet For Proposal to the National Science Foundation*. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

##### B. Budgetary Information

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###### Cost Sharing:

Cost Sharing is not required in proposals submitted under this Program Solicitation.

##### C. Due Dates

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Proposals must be submitted by the following date(s):

###### Full Proposal Deadline(s) :

November 6, 2002

by 5:00 p.m. submitters local time

## D. FastLane Requirements

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Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

*Submission of Electronically Signed Cover Sheets.* The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see [Chapter II, Section C](#) of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane website at: <http://www.fastlane.nsf.gov>

## VI. PROPOSAL REVIEW INFORMATION

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### A. NSF Proposal Review Process

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Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgements.

#### **What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

#### **What are the broader impacts of the proposed activity?**

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

#### ***Integration of Research and Education***

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

#### ***Integrating Diversity into NSF Programs, Projects, and Activities***

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

### **Additional Review Criteria**

Additional criteria to be used in evaluating proposals submitted to this competition are:

Do the proposed activities align with the guiding principles for the DLESE Strategic Plan? Are the proposed activities likely to expand and diversify the capabilities and numbers of users of and contributors to DLESE? In the case of Collections Services, will any educational resources produced under the proposed work be fully compatible with DLESE Program Center guidelines as expressed in the DLESE "Guide to Contributors and Federated Partners"? Does the proposed budget include adequate funds and clear descriptions of activities to work with other DLESE Core Services, including the DLESE Program Center?

## **B. Review Protocol and Associated Customer Service Standard**

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All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc and/or panel review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 70 percent of proposals. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at its own risk.

## **VII. AWARD ADMINISTRATION INFORMATION**

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### **A. Notification of the Award**

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Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

### **B. Award Conditions**

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An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); \* or Federal Demonstration Partnership

(FDP) Terms and Conditions \* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

\*These documents may be accessed electronically on NSF's Web site at [http://www.nsf.gov/home/grants/grants\\_gac.htm](http://www.nsf.gov/home/grants/grants_gac.htm). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [pubs@nsf.gov](mailto:pubs@nsf.gov).

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at <http://www.gpo.gov>.

### **Special Award Conditions:**

As a condition of award, successful proposers will be required to develop, in collaboration with the DPC, a Letter of Agreement between the PI's institution and that of the DPC [University Corporation for Atmospheric Research (UCAR)] that specifies agreed-upon deliverables of both parties and a schedule for realizing those deliverables. This requirement is aimed at achieving a solid mutual understanding of the requirements of collaboration that are necessary to ensure that service area goals are met.

### **C. Reporting Requirements**

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For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

### **VIII. CONTACTS FOR ADDITIONAL INFORMATION**

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General inquiries regarding this program should be made to:

- Michael A. Mayhew, Program Director, Division of Earth Sciences, Education and Human Resources, 785 S, telephone: (703) 292-8557, fax: (703) 292-9025, email: [mmayhew@nsf.gov](mailto:mmayhew@nsf.gov)

For questions related to the use of FastLane, contact:

- Brian E. Dawson, Information Technology Specialist, 705 N, telephone: (703) 292-4727, fax: (703) 292-9042, email: [bdawson@nsf.gov](mailto:bdawson@nsf.gov)

## IX. OTHER PROGRAMS OF INTEREST

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The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *Custom News Service* (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 or (800) 281-8749, FIRS at 1-800-877-8339.

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- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090 or (800) 281-8749

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Send an e-mail to: [pubs@nsf.gov](mailto:pubs@nsf.gov)

or telephone: (703) 292-7827

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## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

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