

Global Learning and Observations to Benefit the Environment (GLOBE)

2002 Announcement of Opportunity for
Science/Educator Teams

Program Solicitation

NSF 02-013

DIRECTORATE FOR GEOSCIENCES
DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
DIVISION OF ELEMENTARY, SECONDARY, AND INFORMAL EDUCATION

FULL PROPOSAL DEADLINE(S): March 1, 2002



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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Global Learning and Observations to Benefit the Environment (GLOBE)

Synopsis of Program:

GLOBE is a hands-on, school-based science and education program. In the United States, GLOBE is a Federal interagency program sponsored by the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and the Environmental Protection Agency (EPA), in partnership with over 140 colleges and universities, state and local school systems and non-government organizations. GLOBE has been adopted by schools in every state. Internationally, GLOBE is a partnership between the United States and over 95 other countries.

Over a million K-12 students in more than 10,000 schools have taken part in the program, and there are more than 16,000 GLOBE-trained teachers.

GLOBE Students:

1. Take measurements in the fields of atmosphere, hydrology, soils, land cover, and phenology,
2. Report their data through the Internet to the GLOBE student data archive,
3. Create maps and graphs on the [GLOBE Web site](#) to analyze data sets, and
4. Collaborate with scientists and other GLOBE students around the world.

GLOBE Teachers:

5. Receive training at GLOBE professional development workshops,
6. Receive GLOBE teacher's guides and "how-to" videos and other materials, and
7. Receive continuing support from GLOBE's Help Desk, scientists, and partners.

GLOBE Partners:

8. Recruit, train, and mentor teachers, and
9. Provide support to schools and teachers.

GLOBE trains teachers to help K-12 students improve their achievement in science and math, and in the use of computer and network technology.

GLOBE helps teachers and students better achieve state and local education goals and standards.

GLOBE increases student awareness of the environment from a scientific viewpoint, without advocacy relative to issues.

GLOBE student data are used by scientists in their research.

GLOBE helps expand the pipeline of potential future scientists and researchers for industry, academia, and in support of Government programs.

GLOBE improves student understanding of science because it involves them in performing real science - taking measurements, analyzing data, and participating in research in collaboration with scientists.

Cognizant Program Officer(s):

- Paul E. Filmer, Program Director, GEO, OAD, 1070, telephone: 703 292-7858, e-mail: globe@nsf.gov.
- David B. Campbell, Program Director, EHR, ESIE, telephone: 703 292-5093, e-mail: dcampbel@nsf.gov.
- Dixon M. Butler, Chief Scientist, GLOBE Program, telephone: 202 501-3200, e-mail: dbutler@globe.gov.
- Ralph K. Coppola, Chief Educator, GLOBE Program, telephone: 202 501-3200, e-mail: rcoppola@globe.gov.

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

- 47.076 --- Education and Human Resources
- 47.050 --- Geosciences

ELIGIBILITY INFORMATION

- **Organization Limit:**

Special Instructions for Proposals with the participation of Foreign Institutions

Proposals submitted by foreign institutions will undergo merit review, but will not receive U.S. Government funding. If support for U.S. institution(s) is requested as part of an international proposal, a U.S. institution must submit the proposal.

All proposals with participation from institutions outside the U.S. must be accompanied by letters of endorsement from an appropriate funding source, demonstrating a commitment to fund the elements of the investigation or activity to be conducted at non-U.S. institutions, should the proposal be selected.

Proposals with foreign institution participation will be accepted only for Areas 1 and 2 (see Section II below, "Program Description"), and must be submitted in the English language. GLOBE will include the protocols and educational materials that result from international proposals in its materials and support their dissemination throughout the GLOBE community. GLOBE may also accept at any time international proposals that meet the requirements of Area 1 that have already undergone an independent merit review and received financial support.

A separate Agreement will be executed between the selected proposal's institutions, the appropriate funding sources, and the GLOBE Office, outlining the funding conditions, monitoring, and oversight responsibilities.

- **PI Eligibility Limit:** Teams proposed in response to this Announcement may include scientists and educators in multiple countries including partnerships of U.S. and non-U.S. individuals and institutions.
- **Limit on Number of Proposals:** Only one proposal may be submitted by a Principal Investigator and he/she may only collaborate in one other proposal as a co-Investigator.

AWARD INFORMATION

- **Anticipated Type of Award:** Continuing Grant
- **Estimated Number of Awards:** 15 to 40 awards
- **Anticipated Funding Amount:** Approximately \$2 million will be available for this initiative in FY2002, pending availability of funds.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Full Proposals:** 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. Deadline/Target Dates

- **Letters of Intent (*optional*):** None
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** March 1, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
 - Brian E. Dawson, Computer Specialist, GEO, EAR, 785 S, telephone: 703 292-4727, e-mail: bdawson@nsf.gov.
 - Melissa J. Lane, Staff Associate for Information Management, GEO, OAD, 705 N, e-mail: mlane@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

I. INTRODUCTION

The National Science Foundation (NSF) invites the submission of proposals for participation in the Science and Education components of the Global Learning and Observations to Benefit the Environment (GLOBE) Program. The NSF is issuing this Solicitation on behalf of the GLOBE Program, a federal inter-agency program.

The GLOBE program currently supports kindergarten through twelfth grade students at over 4,800 schools who are committed to take environmental observations following established research protocols, and who report their data via the Internet/World Wide Web to the GLOBE Student Data Archive. To date, these students have taken and reported data from more than 6.8 million measurements. Data collected through GLOBE are publicly available. GLOBE also supplies training to teachers and teacher-trainers in the implementation of this program, taking its measurements, and using its educational materials which complement the measurements. A variety of information resources are provided on-line, including visualizations of some data and GLOBEMail, a web-based mail system which allows program participants around the world to communicate with one another. Those interested in responding to this Solicitation may wish to further familiarize themselves with the GLOBE Program by accessing its web site at www.globe.gov.

II. PROGRAM DESCRIPTION

GLOBE is seeking proposals in four specific areas as described in this Solicitation. Principal Investigators, co-Principal Investigators and other senior personnel should have a demonstrated ability to work in a team environment and a strong commitment and ability to collaborate with a multi-disciplinary and inter-disciplinary design group. All team members should be aware of standards-based reform. Proposals should align their content, instructional practices, and assessment strategies with the principles set forth in the standards. (Proposals for educational projects within the United States should demonstrate awareness of science and mathematics standards. See National Research Council, *National Science Education Standards*, Washington, D.C.: National Academy Press, and National Council of Teachers of Mathematics, *Principles & Standards for School Mathematics*, Reston, Virginia: The National Council of Teachers of Mathematics, Inc.)

All proposals must be from scientist-educator teams with the Principal Investigator being either a scientist for proposals in the first area cited below or an educator in the case of the other three areas. GLOBE is an international program and encourages scientists and educators from outside the United States to form teams and respond to this Solicitation in Areas 1 and 2, although no U.S. Federal support will be provided to non-U.S. institutions. Proposals in the other two areas must come from institutions in the U.S.

NSF awards to U.S. institutions and GLOBE Agreements with non-U.S. institutions will be for up to forty-two months with an approximate starting date of August 2002. International teams should pay particular attention to the special instructions which follow, and to any special restrictions in each Section.

Under this Solicitation it is anticipated that 15 to 40 proposals (including international participants) will be selected. Approximately 15 awards to U.S. institutions are expected to total approximately \$2.0 million per year, depending on the quality of the proposals received and the availability of funds. Should affordable proposals of sufficient quality not be obtained to cover the on-going activities of the GLOBE Program, the Government reserves the option of finding cost-effective, alternative approaches to ensure continued support of this program and its objectives.

A description of the on-going measurements included in GLOBE is given at the end of this section. Proposals are solicited for the following program areas:

Area 1 - Scientific Involvement in GLOBE and its Measurements

For scientific involvement in GLOBE, one must propose to:

- conduct environmental research using GLOBE student data culminating in publications in the refereed scientific literature by scientists or teams of scientists, teachers, and students;
- assume responsibility for one or more existing or new GLOBE measurement protocols as follows:
 - modify or establish the protocols, as needed, to assure that the resulting data will meet established standards for use in research;
 - provide an educational justification for new protocols, addressing their relevance to school curriculum at selected grade levels, expected learning outcomes for students using the protocols to collect data, and potential for engaging students in more advanced and/or independent study of the environment;
 - test any new protocols or protocol changes in the field and laboratory setting and in school implementation;
 - resolve any questions pertaining to the protocols;
 - review all data submitted to GLOBE using these protocols and support overall GLOBE data quality control and assurance efforts; and
 - review and establish all instrument specifications and resolve related questions pertaining to instrumentation alternatives and materials;
- support the overall training and outreach activities of GLOBE including scientist participation in:
 - selected training workshops for teachers;
 - interactions with students and teachers, answering their questions, participating in "Web Chats,"

- providing on-line messages and visiting GLOBE schools; and
- mentoring of GLOBE students, particularly in the students' efforts to conduct and publish their own research.

Investigations will be selected to support the on-going measurement protocols listed at the end of this section. Support for new measurements will be considered provided that:

- these measurements are appropriate for, and accessible to, all GLOBE schools at appropriate grade levels except those where location precludes taking the measurements;
- they are of high scientific priority in research to improve the understanding of the global environment;
- they complement the existing measurements and/or extend them within the on-going areas of observation (atmosphere/climate, hydrology, phenology, land cover/biology, and soil); and,
- the cost of any additional equipment required by the schools for the conduct of a new protocol or closely related group of protocols should be at a level appropriate for purchase by individual schools.

All proposals for Area 1 must clearly identify the measurement protocols for which responsibility will be assumed.

It is anticipated that 10 to 30 such proposals will be selected, including those submitted by the international community.

For proposals in Area 1, the scientist-educator team should be led by a scientist who will serve as Principal Investigator, with an additional scientist and one or two educators who will serve as co-Principal Investigator(s). Inclusion of a full-time post-doctoral research associate or similar individual committed to completing research projects using GLOBE data is strongly suggested.

Area 2 - Development of Educational Materials

Proposals for the development of educational materials in support of GLOBE measurements may include:

- development of new educational materials that complement the GLOBE measurement protocols, as well as school-based curricula at appropriate grade levels;
- adaptation of existing educational materials to enhance the inquiry-based approach and/or, the use of the features of the GLOBE Student Data Server, such as GLOBE student data, GLOBE visualizations and GLOBEMail;
- development of student assessment tools that clearly align with student learning outcomes;
- development of other materials and teacher education strategies that will support GLOBE implementation;

All proposals in this Area must include:

- pilot testing of materials in classrooms with master teachers, and field tests that include a broad range of teachers serving students from diverse backgrounds prior to their dissemination by GLOBE;
- provision of educational materials in forms which support their dissemination in print, on the World Wide Web, and in other media as appropriate;
- demonstrated awareness of and alignment with national science and mathematics education standards; (this applies to U.S.-based proposals only) and,
- support for the overall training and outreach activities of GLOBE including teacher training, follow-up with teachers to provide them assistance as needed in effectively using these educational materials.

GLOBE will select efforts in the development of materials which in the aggregate:

- incorporate an inquiry-based approach, including the use of questioning, planning and conducting investigations, formulation of testable hypotheses or answerable questions, use of mathematics to analyze data, development of explanations about conclusions of investigations and communication of results by students;
- involve and encourage use of tools such as modeling, geographic information systems, and visualizations and use of comparisons with remote sensing data in the analysis GLOBE of data;
- take advantage of GLOBE infrastructure by encouraging use of the features of the GLOBE Student Data Server, such as GLOBE student data, GLOBE visualizations and GLOBEMail;
- call for instructional strategies that are appropriate for purposes of lessons and the needs and interests of the students;
- incorporate development of formative assessments that allow teachers to gauge students' attainment of stated learning outcomes;
- support teachers in improving science, mathematics, geography, computer, social science, language, and inter-disciplinary education;
- focus on middle school and secondary school, introducing mathematics and science content that is accurate, significant, and aligned with standards at appropriate grade levels;
- serve as vehicles for the establishment of learning communities within schools, school districts and beyond school districts within countries and internationally.

Proposals will be accepted that focus on development of assessment tools, for inclusion in the GLOBE Teachers' Guide, that will allow teachers to gauge student attainment of GLOBE learning outcomes, as well as allow for formative and summative evaluation of the GLOBE program. Proposals can address existing or newly development materials, and should include:

- assessment instruments and appropriate scoring rubrics to gauge student understanding for learning outcomes relevant to GLOBE, including conceptual

- understanding, understanding of the scientific process, use of protocols and scientific instrumentation, communication and presentation skills, reading, and mathematics;
- assessments that are compatible with the latest research and best practices summarized in the [National Science Education Standards](#);
 - assessment strategies responsive to different ways that students (including non-traditional learners) communicate content understanding;
 - validation of assessment instruments and scoring rubrics in classrooms during both the pilot- and field-testing of instructional materials;
 - provision of sufficient information on assessments and scoring rubrics in relevant sections of the GLOBE Teacher's Guide in forms that support their dissemination in print, on the World Wide Web, and other media as appropriate; and
 - support for the overall training and outreach activities of GLOBE including answering the questions of teachers and providing assistance as needed in effectively using assessment instruments.

It is anticipated that 5 to 15 such proposals will be selected, including those submitted by the international community on a no-exchange-of-funds basis.

For proposals in Area 2, the scientist-educator team should be led by an educator who will serve as Principal Investigator, with an additional educator and one or two scientists who will serve as co-Principal Investigator(s).

Area 3 – Evaluation

Evaluation plans of the GLOBE Program should include:

- establishment of clear indicators, both quantitative and qualitative, by which the effectiveness of GLOBE can be measured with respect to the Program description given in the Introduction of this Solicitation;
- formative and summative program evaluation strategies;
- assessment of GLOBE implementation in classrooms, schools, and communities with respect to established metrics and to the effectiveness and quality of material for students and teachers in terms of information infrastructure, materials, teacher training, and the implementation of the program by GLOBE Partners;
- design of assessment items for state departments of education that have incorporated GLOBE content in their standards;
- development of a strategy how to assess and plan to determine the impact of student participation in GLOBE, based on normative standards and;
- a time-line that allows for the production of evaluation reports, at least annually, with interim reports as needed by GLOBE Program management.

It is expected that only one award will be made for support of GLOBE evaluation. For this area proposals must be from U.S. institutions.

For proposals in Area 3, the scientist-educator team should be led by an educator who will serve as Principal Investigator, with additional educators and a scientist who will serve as co-Principal Investigator(s).

Priority will be given to proposals with Principal Investigators who have strong backgrounds in evaluation. Coordination with the other groups working on the science protocols, educational materials, and student assessment tools, as well as with GLOBE management and GLOBE computer systems teams, will be critical.

These data will be collected for statistical purposes associated with the evaluation of the effectiveness and the refinement of the GLOBE Program.

Area 4 -- Professional Development Activities and Materials for Teachers

Proposals for materials supporting the professional development of teachers in support of the overall GLOBE program should include:

- enhancing the current GLOBE Teacher's Guide and producing those components of the Guide and associated materials which complement the protocols and educational materials and complete and enhance the educational effectiveness of the overall set of GLOBE materials;
- overall integration of materials in and delivery of future editions of the GLOBE Teacher's Guide in print, on the World Wide Web, and in other media as appropriate, up to the point of, but not including, printing, operational dissemination, or reproduction;
- assumption of responsibility for maintaining the current GLOBE Teacher's Guide; including maintaining a digital master version, making and tracking changes as directed by GLOBE management, suggesting enhancements, providing digital or hard copy masters for the printer, liaison with the GLOBE Office and the printer;
- support for interactions and teaming with those selected for scientific involvement and development of educational materials ([Areas 1 and 2](#) above) on the provision of all required inputs for the Teacher's Guide; and
- delivery of professional development and outreach around the Teacher's Guide, including information on the recruitment of teachers, effective strategies and duration of professional development, use of teachers in broader outreach efforts, follow-up support during the school year; answering the questions of teachers and providing them assistance as needed in effectively using the Teacher's Guides.

It is expected that only one award will be made for support of development and integration of educational materials. For this area, proposals must be from U.S. institutions.

For proposals in Area 4 the scientist-educator team should be led by an educator who will serve as Principal Investigator, with an additional educator and one or two scientists who will serve as co-Principal Investigator(s).

GLOBE does not plan to produce a new version of the complete Teacher's Guide during the performance period covered by this Solicitation; selected additions and improvements in the guide and enhanced use of non-print technologies in the delivery of GLOBE materials should be the key focus of proposals in this Area.

Current GLOBE Materials

Currently GLOBE measurements are grouped into five areas or investigations -- Atmosphere/Climate, Hydrology, Land Cover/Biology, Soil, and Phenology. For each of these measurement groups, additional material is provided including background information, and a description of the context for the scientific use of the data, and use of the data in student research and inquiry. Additional sections of GLOBE materials include: Earth as a System, use of GPS receivers, and an implementation guide with specific support for student inquiry.

Generally, only one U.S. group will be selected to support a given set of closely interrelated protocols (e.g. hydrology), but multiple groups are desired to support the same Protocols through international proposals. Proposers should clearly state the protocols which they offer to support and whose data they intend to use. GLOBE may negotiate the scope of activities to achieve the coverage desired within cost and practical constraints.

Current GLOBE Measurements

Atmosphere/Climate

- Cloud cover and cloud type
- Aerosols
- Ozone
- Barometric Pressure
- Relative Humidity
- Precipitation within the previous 24 hours, including snow pack, rain equivalent of snow and snow pack, and pH of rain or melted snow
- Atmospheric temperature within one hour of local solar noon and maximum and minimum temperatures within the previous 24 hours

Hydrology

- Surface water temperature
- pH
- Conductivity of fresh water or Salinity of salt or brackish water
- Dissolved oxygen
- Nitrogen as nitrate and nitrite
- Turbidity of the water column or surface water
- Fresh water macro-invertebrates or marine invertebrate assessments

Land Cover/Biology

Land cover assessment at selected sample sites using the Modified UNESCO Classification system, including where appropriate:

- Extent of canopy and ground cover
- Dominant and sub-dominant species in the canopy and the heights and circumferences of five individuals of each of these species for forest, woodland, or shrubland sites
- Dominant and sub dominant species, and dry biomass of one square meter during the growing season for grassland sites
- Manual and computer-assisted land cover mapping of 15 km by 15 km GLOBE Study Sites centered on each school using Landsat Thematic Mapper data and accuracy assessment of these classifications

Soil

Characterization of each horizon in profiles of the top one meter of soil, including:

- Structure, color, consistence, texture, sand, silt, and clay content, pH, fertility (nitrogen as nitrate, phosphate, and potassium content), bulk density, soil particle density and vertical extent
- Soil moisture in the top 5 cm to one meter of soil
- Infiltration of water into the soil
- Soil temperature at depths of 5 cm, 10 cm and 50 cm

Phenology

- Green-up and Green-down of deciduous terrestrial plants

Detailed GLOBE Measurement Protocols are found in the GLOBE Teacher's Guide and are available at www.globe.gov.

Proposers wishing to have a current copy of the full GLOBE Teacher's Guide in printed form should contact Jean Fitch at GLOBE, Tel: +1 (202) 501-3200 or by e-mail at <mailto:fitch@globe.gov>. Expedited delivery can be arranged at your cost.

III. ELIGIBILITY INFORMATION

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

IV. AWARD INFORMATION

Under this solicitation, proposals may be submitted for periods of performance of up to forty-two months. The program expects to make 15 to 40 continuing grant awards depending on the quality of submissions and the availability of funds. Please refer to each

specific Area description for expected number of awards by Area. Approximately \$2 million will be available for this initiative in FY 2002. Anticipated award date is five months from deadline target date.

Funding of successful proposals is planned to commence in August of 2002, and budgets submitted should be for up to forty-two months, showing an initial six month increment, and annual increments thereafter. Funding will be approved for these increments subject to satisfactory progress and the availability of funds.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal:

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 (301) 947-2722 or by e-mail from pubs@nsf.gov.

Proposers are reminded to identify the program solicitation number (NSF 02-013) in the program announcement/solicitation block on the NSF Form 1207, *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

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

C. Deadline/Target Dates

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

Full Proposals by 5:00 PM local time: March 1, 2002

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program 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 1-800-673-6188 or e-mail fastlane@nsf.gov.

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 certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane website at: <http://www.fastlane.nsf.gov>.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

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.

Proposals will be reviewed against the following general review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Proposers are reminded that both the intellectual merit and the broader impacts of the work to be accomplished should be addressed. While reviewers are expected to address both merit review criteria, each reviewer will be asked to address only considerations that are relevant to the proposal 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?

Principal Investigators should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both of the above-described NSF merit review criteria. NSF staff will give these elements careful consideration 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

Through the review process, priority will be given to applicants who can demonstrate (1) a commitment to and expertise in design, implementation or evaluation of student- and teacher- based science activities that align with standards for content, instruction, and assessment, (2) the ability to deliver their results or products in a timely fashion with excellence, (3) a mutual, strong commitment from a scientist-educator team, (4) cost effectiveness, and (5) a willingness and ability to contribute to the overall GLOBE Program.

Criteria specific to the GLOBE Program are delineated in Section II. **Please note that each of the four areas of opportunity have specific criteria, as outlined in Section II.**

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.

B. Review Protocol and Associated Customer Service Standard

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 Mail Review followed by 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.

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

A. Notification of the Award

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

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. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from 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>.

C. Reporting Requirements

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

General inquiries regarding Global Learning and Observations to Benefit the Environment should be made to:

- Paul E. Filmer, Program Director, GEO, OAD, 1070, telephone: 703 292-7858, e-mail: globe@nsf.gov.
- David B. Campbell, Program Director, EHR, ESIE, telephone: 703 292-5093, e-mail: dcampbel@nsf.gov.
- Dixon M. Butler, Chief Scientist, GLOBE Program, telephone: 202 501-3200, e-mail: dbutler@globe.gov.
- Ralph K. Coppola, Chief Educator, GLOBE Program, telephone: 202 501-3200, e-mail: rcoppola@globe.gov.

For questions related to the use of FastLane, contact:

- Brian E. Dawson, Computer Specialist, GEO, EAR, 785 S, telephone: 703 292-4727, e-mail: bdawson@nsf.gov.
- Melissa J. Lane, Staff Associate for Information Management, GEO, OAD, 705 N, e-mail: mlane@nsf.gov.

IX. OTHER PROGRAMS OF INTEREST

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.

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The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

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.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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, Information Dissemination Branch, 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.

OMB control number: 3145-0058.