National Mobile Doppler Radar Facility

PROGRAM SOLICITATION
NSF 13-571

National Science Foundation

Directorate for Geosciences
Division of Atmospheric and Geospace Sciences

Full Proposal Deadline(s) (due by 5 p.m. proposer's local time):

September 25, 2013

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 13-1, was issued on October 4, 2012 and is effective for proposals submitted, or due, on or after January 14, 2013. Please be advised that the guidelines contained in NSF 13-1 apply to proposals submitted in response to this funding opportunity.

Please be aware that significant changes have been made to the PAPPG to implement revised merit review criteria based on the National Science Board (NSB) report, National Science Foundation's Merit Review Criteria: Review and Revisions. While the two merit review criteria remain unchanged (Intellectual Merit and Broader Impacts), guidance has been provided to clarify and improve the function of the criteria. Changes will affect the project summary and project description sections of proposals. Annual and final reports also will be affected.

A by-chapter summary of this and other significant changes is provided at the beginning of both the *Grant Proposal Guide* and the *Award & Administration Guide*.

Please note that this program solicitation may contain supplemental proposal preparation guidance and/or guidance that deviates from the guidelines established in the Grant Proposal Guide.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

National Mobile Doppler Radar Facility

Synopsis of Program:

The Division of Atmospheric and Geospace Sciences (AGS) at the National Science Foundation (NSF) funds numerous research programs that require the use of various lower atmosphere observing facilities. Among these are field projects that use a variety of radars to study severe weather, storm development and associated in-cloud processes. Through its Lower Atmosphere Observing Facilities (LAOF) program, AGS supports a mobile Doppler radar facility. This solicitation seeks proposals to provide and operate such a facility for both research and educational purposes.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Linnea M. Avallone, Lower Atmosphere Observing Facilities Manager, telephone: (703) 292-8521, email: lavallon@nsf.gov

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

- 47.050 --- Geosciences

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 1 - The Division of Atmospheric and Geospace Sciences anticipates supporting one award for a mobile Doppler radar facility, pending results of the review process and availability of funds.

Anticipated Funding Amount: $4,500,000 - The Division anticipates a five-year cooperative agreement with an annual budget around $800,000. The award may be renewed for another five years depending on budget and programmatic considerations and

successful performance by the facility. After ten years, if there is a continued community need for the facility's services, a re-competition will be held.

Eligibility Information

Organization Limit:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

PI Limit:

The PI should be a scientist with expertise in radar technology and applications of radar to atmospheric science research.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg.
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  September 25, 2013

Proposal Review Information Criteria

Merit Review Criteria: National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

Reporting Requirements: Standard NSF reporting requirements apply.

TABLE OF CONTENTS

I. INTRODUCTION

The Division of Atmospheric and Geospace Sciences (AGS) at the National Science Foundation (NSF) funds numerous research programs that require the use of observing facilities. Since 2005, AGS has supported more than 80 field programs - including twelve large (often international and/or multi-agency) projects as well as numerous single-PI experiments and a substantial number of educational deployments - for an average of more than 10 per calendar year across all deployment types. To enable these research projects, AGS maintains a suite of national facilities under the auspices of its Lower Atmosphere Observing Facilities (LAOF) program. The LAOF includes an array of sensors and platforms, such as the CSU-CHILL radar, NSF/NCAR Gulfstream-V and C-130 aircraft, University of Wyoming King Air, Cloud Radar and Cloud Lidar, and a mobile Doppler radar facility presently operated by the Center for Severe Weather Research (CSWR).

The cooperative agreement for the current mobile Doppler radar facility was awarded in 2008. Since that time, it has been the most-requested of the NSF/AGS national LAO facilities, having been sought by members of the research community on average 13 times per calendar year and awarded through the facilities allocation process on average 8 times per year. The mobile Doppler radar facility has participated in large campaigns such as Verification of the Origins of Rotation in Tornadoes (VORTEX and VORTEX-2), as well as in smaller projects and in approximately 20 deployments for education and public outreach. The facility receives base support through the cooperative agreement as well as supplemental funds to cover project-specific costs for each approved deployment.

In accordance with NSF policy that all facility awards must be re-competed after an appropriate period of operation (NSB-08-12 and NSB-08-16), this solicitation seeks proposals to provide and operate a mobile Doppler radar facility for both research and educational purposes for the next five years. Assuming continuing community need for such a facility, successful performance by the facility and taking into consideration budgetary constraints, renewal of the award may be considered for an additional five years.

II. PROGRAM DESCRIPTION

Description of Services Required:

The Division of Atmospheric and Geospace Sciences is seeking proposals that maintain the level of service provided by the current facility. Upgrades or expansions may be possible over the life of the award as budgets, community needs and improved technologies allow.

Proposals for acquisition of mobile radars will not be accepted; proposers are expected to own and operate a least one mobile Doppler radar currently and to make these facilities available to the community on a competitive basis. A description of the services currently required by the atmospheric science community and expected by NSF is given below.

A. Expected Categories of Facility Requests

1. NSF-supported Projects

a. Deployment for Field Research Projects

The primary responsibility of the mobile Doppler radar facility is to provide support to AGS-funded principal investigators. Projects can range from short, single-investigator studies to large, complex, multi-investigator projects. Some projects may require deployment outside the continental United States. While scientific collaboration between the proposing PI(s) and the facility staff is possible, it is not essential to the use of the facility. Facility providers may use the facility assets for their own research purposes **only** with consent of the NSF Lower Atmosphere Observing Facilities (LAOF) manager.

b. Deployment for Educational and Outreach Purposes

NSF entertains requests from educators to gain access to observational facilities for classroom instruction and hands-on learning experiences. Instruments can be made available for graduate, undergraduate and K-12 education, including the deployment of a facility to a university for a limited period of time, as well as for public outreach activities at museums and conferences. While not always required, facility staff often actively participate in these deployments by, for example, teaching students how to use the facility, giving public lectures, and/or carrying out data analysis activities. The mobile Doppler radar facility is expected to be available for educational and outreach deployments as requested by PIs and approved by the LAOF manager.

2. Non-NSF-Supported Projects

Under some circumstances, NSF-sponsored observing facilities may be allocated for use by non-NSF-sponsored projects on a cost-recovery basis. All costs for these projects must be provided by the sponsoring agency and are recovered by the facility. To be allocated, such projects must occur on a non-interference basis and must represent a good use of the facility by supporting or enhancing the science objectives of the NSF-sponsored community, by meeting a national need and/or by providing desirable training opportunities for facility staff. As with NSF-sponsored deployments, the decision to allocate facilities for "cost-recovery" projects rests with NSF. Disposition of the funds recovered by the facility from these types of projects is also at the discretion of NSF.

B. Scope of Responsibilities

Both NSF- and non-NSF-supported researchers request the facility through a process managed by the AGS LAOF Program Officer. Details of this process may be found at the following URL: http://www.eol.ucar.edu/deployment/request-info; any necessary clarification may be obtained from the LAOF Program Officer. Facility staff are expected to be fully engaged in this process and to provide relevant information about facility capabilities, availability and cost to all proposing Principal Investigators as they prepare their scientific proposals and facility requests. Facility staff are expected to interact with the staff of the National Center for Atmospheric Research Earth Observing Laboratory to prepare for the biannual Observing Facilities Assessment Panel (OFAP) meetings. Appropriate facility staff are expected to participate in these panel meetings to discuss the feasibility of proposed experimental designs. Shortly following these meetings, the Facility Manager will submit to NSF a written statement on the feasibility of all requests in a format to be determined by NSF. Final decisions on the allocation of facilities are made by the NSF.

The facility is expected to have adequate staff to deploy the mobile radar facility for domestic and international projects. The facility should be able to support the preparation and execution of field projects up to six weeks in length using base staff (see Section II.E. Budget).

C. Facility Management

A single manager or director must have overall responsibility for the facility. Duties related to instrument operation and maintenance, data processing and management, etc., should be divided among facility staff as appropriate. The director should be a scientist with expertise in radar technology and applications of radar to atmospheric science research. Up to four co-PI's may be listed on the proposal and their CVs are required. CVs for all other key personnel should be included in the Supplementary Documents.

In the event that a consortium of institutions proposes to provide and operate the facility, the project must be managed by a single organization with other organizations involved via sub-awards. Collaborative proposals must be submitted using the "single proposal" method as described in Chapter II.D.4.a of the GPG. If the collaborative mechanism is chosen, an organizational chart and clear guidelines for management of a distributed facility must be included in the Supplementary Documents.

In addition to serving as the director of the facility's activities, the facility manager is expected to interact with AGS program officers and the LAOF manager on a regular basis, keeping them informed about the status of the facility and about issues that arise during deployments. The facility manager is typically the main point of contact for PIs interested in using the facility and s/he also interacts regularly with other facility managers. The facility manager should expect to be the spokesperson for the facility, making its capabilities and availability known through discussions and presentations at appropriate national and specialty conferences, through publications and through a publicly accessible web presence.

D. Data services and management

Because Doppler radars produce enormous amounts of data when they are in operation, the facility is expected to maintain an adequate data storage and back-up capability to manage this data during field studies and in the near-term post-project. The ultimate repository for the field data should be determined in consultation between the PI and the facility manager. Care must be taken to abide by NSF's policies about dissemination and sharing of research results (Chapter VI.D.4 of the Award and Administration Guide).

Most PIs will also need help from facility staff to process the raw data obtained from the Doppler radar into quantities and/or analysis products of interest.

E. Budget

In constructing the budget for this proposal, the Principal Investigator should include costs for staff necessary to maintain the facility in an operational status (e.g., funds required for routine, home-site operations, maintenance costs, etc.), as well as to provide all required pre-project support described in Section II.B above. The budget should include staff time that would be required nominally to deploy and operate the facility on a remote project. Out-of-pocket, episodic costs required to deploy the facility on a project should not be included, as they will normally be covered through supplemental awards from the LAOF "Deployment Pool". Examples of costs that would fall under Deployment Pool support are transport of the facility to the research location, site preparation, overtime staff charges, gasoline for vehicles and generators, etc. Estimates of the costs for prescribed hypothetical deployments should be submitted as requested in Section V.A.10.D of this solicitation, Special Information/Supplementary Documentation.

F. External oversight

NSF will conduct at least one mid-award review to assess the overall management and operations of the facility. This review may involve a site visit. The mid-award review may factor into subsequent decisions by NSF about renewal of support for the facility.

III. AWARD INFORMATION

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 1 - The Division of Atmospheric and Geospace Sciences anticipates supporting one award for a mobile Doppler radar facility, pending results of the review process and availability of funds.

Anticipated Funding Amount: $4,500,000 - The Division anticipates a five-year cooperative agreement with an annual budget around $800,000. The award may be renewed for another five years depending on budget and programmatic considerations and successful performance by the facility. After ten years, if there is a continued community need for the facility's services, a re-

competition will be held.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Organization Limit:

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

PI Limit:

The PI should be a scientist with expertise in radar technology and applications of radar to atmospheric science research.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program 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 website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program 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.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

Important Proposal Preparation Information: FastLane will check for required sections of the full proposal, in accordance with *Grant Proposal Guide* (GPG) instructions described in Chapter II.C.2. The GPG requires submission of: Project Summary; Project Description; References Cited; Biographical Sketch(es); Budget; Budget Justification; Current and Pending Support; Facilities, Equipment & Other Resources; Data Management Plan; and Postdoctoral Mentoring Plan, if applicable. If a required section is missing, **FastLane will not accept the proposal.**

Please note that the proposal preparation instructions provided in this program solicitation may deviate from the GPG instructions. If the solicitation instructions do not require a GPG-required section to be included in the proposal, insert text or upload a document in that section of the proposal that states, "Not Applicable for this Program Solicitation." Doing so will enable FastLane to accept your proposal.

Proposal Preparation:

1. Cover Sheet: Choose Division of Atmospheric and Geospace Sciences (AGS) and Mobile Radar Facility

2. Project Summary: This section must contain a summary of the project, not to exceed one page. Per the GPG, the project summary must include, in separate sections, an overview, a description of the Intellectual Merit and a statement on the Broader Impacts of the project. Proposals that do not include the Project Summary, including the three required elements, may not be accepted by FastLane or will be returned without review (1 page).

3. Table of Contents

4. Project Description: The proposal project description must include the following sections (page lengths are approximate, but the overall project description may not exceed 15 pages):

A. Introduction and explanation of the expertise of the PI and senior staff who will be associated with the management of the facility (2 pages)

B. Statement describing the general level of service(s) to be provided by the proposed facility, given the anticipated demand for the facility as described in section I. (2 pages)

C. Description of facilities to be provided and operated (6 pages) including:

1. Existing facilities available for immediate use and their capabilities

2. Possible upgrades that might be needed or desired during the five year award period and their likely impact on the facility's performance and availability

D. Description of services to be provided during a typical research deployment (2 pages)

E. Description of services to be provided during a typical educational deployment (2 pages)

F. Description of data services and management (1 page)

Please note that per guidance in the GPG, the Project Description must contain, as a separate section within the narrative, a discussion of the broader impacts of the proposed activities. You can decide where to include this section within the Project Description.

Total pages (15)

5. References Cited

6. Biographical Sketches - see requirements under Facility Management section.

7. Budget - see information in Section II.E of this solicitation

8. Current and Pending Support

9. Facilities, Equipment and Other Resources: When completing this required section of the proposal, please enter the statement "See full proposal for information about the facilities, equipment and other resources available to support the project."

10. Special Information/Supplementary Documentation

A. Facility Management Plan, if necessary based on the guidelines in the Facility Management section above.

B. CVs of any key staff who are not PIs or co-PIs

C. Description of required routine and special maintenance, including annual and five-year calendar of such

D. Estimated budget to support each of the following deployment scenarios

i. *Two-month domestic research deployment*: A university PI requests the mobile radar facility as part of a project to study land-falling hurricanes in the Outer Banks of North Carolina during September and October 2014.

ii. *Six-week international research deployment*: A PI requests the mobile radar facility to support a project examining orographically-modulated convection in a remote (but cellular-served) area of the Altiplano region near the town of Oruro, Bolivia. Anticipated operations will occur 8 hours per day and up to 5 days each week.

iii. *Six-week educational deployment*: A professor from a small liberal arts college in Maine requests the mobile radar facility to provide a hands-on data gathering experience for students in the undergraduate meteorology major and to attend two public outreach events at a local science center.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

  September 25, 2013

D. FastLane / Grants.gov Requirements

- **For Proposals Submitted Via FastLane:**

  Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: https://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. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

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. Further instructions regarding this process are available on the FastLane Website at: https://www.fastlane.nsf.gov/fastlane.jsp.

- **For Proposals Submitted Via Grants.gov:**

  Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www07.grants.gov/applicants/app_help_reso.jsp. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

  Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the core strategies in support of NSF's mission 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 variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which 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.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of

the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

1. Experience and qualifications of PI, senior staff and technical staff to operate and maintain the proposed facility;
2. Quality of management plan and organizational structure and the probability that the facility will be able to provide services as requested in the solicitation;
3. Quality of instrumentation available within the facility and of any planned upgrades;
4. Reasonableness of base budget and estimated deployment costs;
5. Reasonableness of maintenance plan.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review 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.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's 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 Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

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 their 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 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.B. 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 (GC-1); * or Research Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Linnea M. Avallone, Lower Atmosphere Observing Facilities Manager, telephone: (703) 292-8521, email: lavallon@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-

mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "My NSF" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "My NSF" also is available on NSF's website at http://www.nsf.gov/mynsf/.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

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 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

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; and 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 proposer 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 or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; 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," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (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 the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

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