



National Science Foundation
4201 Wilson Boulevard
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NSF 14-015

Dear Colleague Letter: Advancing Recruitment and Retention in Geosciences (ARRG) - Supplemental Funding to Advance Recruitment and Retention in the Geosciences

Date: November 21, 2013

This is the *second* of two Dear Colleague Letters being released by the Directorate for Geosciences (GEO) with a focus on cultivating and preparing a diverse geoscience workforce for the future and strengthening geoscience education (also see Dear Colleague Letter [NSF 14-014](#)). A well-prepared, innovative science, technology, engineering and mathematics (STEM) workforce is crucial to the Nation's health and economy. Many recent national policy reports¹ and actions have drawn attention to the opportunities and challenges inherent in increasing the number of highly qualified STEM graduates, including STEM teachers. Priorities include educating students as leaders and innovators in emerging and rapidly changing STEM fields, as well as educating a scientifically literate populace; both of these priorities depend on the nature and quality of the undergraduate education experience. In addressing these STEM challenges and priorities, the National Science Foundation invests in research-based and research-generating approaches to understanding STEM learning; to designing, testing, and studying curricular change; to wide dissemination and implementation of best practices; and to broadening participation of individuals and institutions in STEM fields. The goals of these investments include: increasing student retention in STEM; preparing students well to participate in science for tomorrow; and, improving students' STEM learning outcomes.

Recognizing disciplinary differences and priorities, NSF's investment in research and development in undergraduate STEM education encompasses a range of approaches. These approaches include: experiential learning; assessment/metrics of learning and practice; scholarships; foundational education research; professional development/institutional change; formal and informal learning environments; and undergraduate disciplinary research. Both individually and integrated in a range of combinations, these approaches can lead to outcomes, including: developing the STEM and STEM-related workforce; advancing science; broadening participation in STEM; educating a STEM-literate populace; improving K-12 STEM education; encouraging life-long learning; and, building capacity in higher education.

GEO's broad strategic priorities for education and diversity can be found in the 2012 addendum to the *GEO Vision Report*, entitled [Strategic Framework for Education and Diversity, Facilities, International Activities, and Data and Informatics in the Geosciences](#).

For Fiscal Year 2014 (FY14), GEO has identified a subset of high priority objectives within this strategic framework that focus on: engagement of undergraduate students in geoscience research; broadening participation of traditionally underrepresented students and minority-serving institutions in the geosciences; leveraging GEO-sponsored research infrastructure for education and training; and, disseminating best practices for geoscience education and diversity. To address these priorities, GEO encourages Supplemental Funding requests for existing GEO-funded awards and new proposals from the geoscience research and education community that address them. We particularly encourage the engagement of students in STEM-related activities at critical decision points in their educational pathways, particularly during the first two years of undergraduate school. Providing students with authentic research experiences, augmented through mentoring and sustained engagement with the

scientific community, has been shown to be a highly effective strategy for recruitment and retention in STEM. Strengthening student preparation in core disciplinary content and basic scientific skills is also essential for motivating students to remain in STEM pathways and giving them the confidence and tools needed to succeed. Effective preparation and professional development for K-16 educators are important factors for improving student learning. Partnerships between Four-Year Colleges and Universities and Minority-Serving Institutions (MSIs), including Two-Year Colleges (2YCs), may be particularly effective for building capacity and providing opportunities for students from traditionally underrepresented groups in STEM.

Authentic research experiences, particularly in the first two years of college, can have a profound impact on the discipline and career pathways taken by students. Existing programs, such as the [Research Experiences for Undergraduates \(REU\)](#) program and the [Advanced Technological Education \(ATE\)](#) program, have successfully engaged thousands of students through mentored, cohort-based research experiences or training. These opportunities have been shown to be especially valuable for undergraduate students coming from smaller institutions, including 2YCs and MSIs, which often lack significant research infrastructure or geoscience expertise on the faculty.

Large facilities, science and technology centers, and long-lived research programs and coordination networks offer unique opportunities for both short- and long-term education and workforce development activities. These sustained 'hubs' of research and education activities facilitate the development of long term relationships with partner organizations and local stakeholders. Furthermore, many large facilities include sophisticated instrumentation that can expose learners to both cutting edge research infrastructure and the data they generate. Students participating in ATE programs at 2YCs may benefit especially from such access.

GEO has made significant investments over the past decade in efforts that have strengthened our understanding of how to increase the impact of geoscience education materials for all learners, as well as how to prepare K-12 teachers and faculty to be more effective in their roles as educators. Important insights have been gained regarding the most effective strategies for engaging students from diverse backgrounds and cultures into STEM fields in general and the geosciences in particular. Many of these projects have had documented outcomes in improving the quality of geoscience education and increasing the participation of minority students in geoscience career paths, but more widespread dissemination and adoption of these evidence-based best practices is needed to achieve the desired impact.

One challenge to broadening participation of a diverse student population in the geosciences is the lack of geoscience degree programs or research infrastructure at most MSIs and 2YCs. Lack of access to geoscience content and faculty role models poses an important barrier during the most critical stage for recruitment of undergraduate students into geoscience degrees and careers. Although some MSIs have added geoscience undergraduate programs in the past few years, most institutions lack the resources to build and sustain stand-alone geoscience programs. Authentic partnerships between MSIs or 2YCs and Four-Year Colleges and Universities with well established geoscience degree programs can help to address these deficits and establish relationships that create articulated pathways for undergraduate students seeking to pursue baccalaureate or post-baccalaureate degrees in the geosciences, as well as improve the research capacity of faculty at partnering MSIs or 2YCs.

With these priorities and challenges in mind, GEO encourages Supplemental Funding Requests for currently active GEO awards that address the following goals.

- I. Augmentation of Existing REU Site Awards - Requests must be submitted by January 10, 2014
 - A. Increase the total number of students supported at an existing REU Site, with priority given to recruitment of underrepresented students. [Type IA]
 - B. Extend the experience of promising summer REU students by providing academic year

- follow-on geoscience research and mentoring activities, and a second summer of research experiences. [Type IB]
- C. Broaden the disciplinary focus of an existing REU Site to be more inclusive of the various fields that define the geosciences (i.e., earth, atmospheric, ocean, polar, and geo-space sciences), thereby increasing the number of faculty mentors and students participating. [Type IC]
 - D. Engage faculty from MSIs or 2YCs as guest research mentors at existing REU sites by providing up to 2 months of summer salary and benefit support. [Type ID]
- II. Leveraging Large GEO Facilities, Centers, Programs and Networks for Educational Purposes
 - A. Engage undergraduate students in research and/or use of data generated by the facility, with participation of underrepresented students strongly encouraged. [Type IIA]
 - B. Provide practical technical experience related to the geosciences to students from 2YCs with ATE program funding relevant to the geosciences. [Type IIB] A list of ATE programs can be found at: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464
 - III. Dissemination of Best Practices for Geoscience Education and Diversity
 - A. Disseminate lessons learned by bringing talented minority students or educators who participated in activities conducted through the original (“parent”) awards from GEO, to professional meetings of the geosciences (e.g., GSA, AGU). [Type IIIA]
 - B. Disseminate pedagogical best practices for undergraduate geoscience education and/or broadening participation of underrepresented minorities in undergraduate geoscience programs through professional development activities for geoscience faculty, researchers, and administrators. [Type IIIB]
 - IV. Capacity Building Through Partnerships
 - A. Strengthen educational opportunities in the geosciences at MSIs/2YCs, such as through development of articulation or dual-enrollment agreements or participation in online courses and cross-institutional cohorts. [Type IVA]
 - B. Enable faculty members from predominantly minority-serving institutions, including 2YCs, to pursue research as visiting scientists at the home institution of GEO-supported investigators. These research opportunity awards are intended to increase the visitor's research capability and effectiveness, to improve research and teaching at his or her home institution, and to enhance the NSF-funded research of the host PI. [Type IVB]

ANTICIPATED TYPE OF AWARD

Supplements to currently active GEO awards.

ELIGIBILITY

Only PIs of currently active awards funded by GEO are eligible to submit Supplemental Funding requests to address these goals. PIs without active GEO awards who are interested in submitting a new proposal to address one of these priority areas especially those with strong records of achievement in the recruitment and retention of underrepresented minorities - should contact one of the program officers listed below to discuss the possibility of submitting an unsolicited proposal.

PREPARATION OF AN ARRG REQUEST

PIs are strongly encouraged to contact one of the following GEO program officers before preparing and submitting a Request for Supplemental Funding in response to this Dear Colleague Letter:

- General Inquiries: Dr. Jill Karsten, jkarsten@nsf.gov
- AGS: Dr. Gannet Hallar, ahallar@nsf.gov
- EAR: Dr. Lina Patino, lpatino@nsf.gov

- OCE: Ms. Elizabeth Rom, elrom@nsf.gov
- PLR: Dr. V. Celeste Carter, vccarter@nsf.gov

Information about preparation of Supplemental Funding Requests is contained in Part II Section I.E.4 of the NSF Proposal and Award Policies and Procedures Guide (PAPPG) available online at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp

Requests for Supplemental Funding for an existing GEO award submitted in response to this Dear Colleague Letter should be submitted in [FastLane](#) in accordance with the guidelines found in the PAPPG and subject to the following instructions.

- The first line of the project summary should state that the proposal is being submitted in accordance with NSF Dear Colleague Letter [NSF 14-015](#) and specify the Type (e.g., Type IIB) as defined above.
- Partnership-focused proposals must show clear evidence of collaboration in the form of letters of commitment from all participating organizations.
- Budget requests to support undergraduate students should follow the allowable cost guidelines described in the Research Experiences for Undergraduate (REU) program. Allowable costs include stipends, travel, and research-related expenses. Undergraduate tuition is not an allowable cost.

For questions related to the use of FastLane to submit the supplemental funding request, contact the FastLane Help Desk: email fastlane@nsf.gov or telephone 1-800-673-6188.

REVIEW PROCESS

An award decision will be based on internal review by NSF program officers and on availability of funds. Program officers may make decisions regarding whether or not to recommend a small supplement without external review of the supplemental request. Requests for larger supplements may require external merit review.

AWARD DURATION

When submitting a supplemental funding request for ARRG support, Principal Investigators may ask to extend the duration of an existing award by up to six months. The term of the ARRG supplement may not exceed that of the parent award (including extensions).

SUBMISSION DEADLINE

Requests for Type I ARRG Supplemental Funding to augment existing REU Sites must be submitted to NSF by January 10, 2014. NSF expects to notify Principal Investigators about funding recommendations for Type I requests in March 2014. Requests for all other Types of ARRG Supplemental Funding will be accepted on a rolling basis anytime between now and May 1, 2014, with funding recommendations made quarterly, pending the availability of funds. Requests for Supplemental Funding should not be submitted after May 1, 2014 without pre-approval by one of the Program Officers identified above.

Sincerely,
Roger Wakimoto
Assistant Director
Directorate for Geosciences

¹ “Expanding Underrepresented Minority Participation: America’s Science and Technology talent at the Crossroads” (National Research Council, 2011); “Engage to Excel: Producing One Million Additional

College Graduates with Degrees in Science, Technology, Engineering, and Mathematics” (President’s Council of Advisors for Science and Technology, 2012); and, “Federal Science, Technology, Engineering, and Mathematics (STEM) Education 5-Year Strategic Plan” (National Science and Technology Council, Committee on STEM Education, 2013).