# EAR To The Ground

Winter 2013

The Division of Earth Sciences (EAR) is part of the Geosciences (GEO) Directorate at the National Science Foundation.

## IN THIS ISSUE



Evolution Valley, South Fork of the San Jaoquin River in the Sierra Nevada Mountains of California. Image Credit Steven Frankforter

## Update from the Division Director

**Wendy Harrison**

I write my letter to you at a time when, in a three-day window, we are simultaneously running three panels - one each for our Hydrologic Sciences, Geobiology and Low Temperature Geochemistry, and Geomorphology and Land Use Dynamics programs. October is normally an intensive month for EAR with the merit review cycle at a high level of activity and compensating for the loss of about three weeks has necessitated some extraordinary efforts both in EAR and within our community to recover our normal 6-month proposal processing target. Having reviewed many proposals and served on multiple panels myself, I am cognizant of the workload that the merit review process places on our scientists and the need to be able to plan and prioritize to enable this extra

responsibility to fit into the duties associated with research and education in your home institutions. To all of you who have adjusted work and travel schedules, written proposal reviews on short notice, and been otherwise impacted by the Agency shutdown in October, I offer my thanks on behalf of our staff. In this public venue I also want to thank my staff, program officers, and administrative professionals, who have willingly taken on the multiple tasks of managing all the rescheduling. I am also aware of the significant efforts that many of our facilities put forth during the government shut down to continue operations despite the disruptions to the funding streams provided by contracts and cooperative agreements. To our facility managers and employees I extend my sincere appreciation for enabling scientific research to continue uninterrupted while at the same time dealing with the financial uncertainties in your own operations.

I usually have a few minutes to welcome panelists to NSF and always use this opportunity to make some comments about the merit review system. The time spent reading and evaluating proposals is a service provided for the betterment of the scientific endeavor that cannot be adequately compensated. There are intrinsic benefits that include broadening one's horizons, seeing opportunities for new collaborations, personal networking, and deepening your capacity to be effective mentors of early career investigators. The review processes in which many of you participate enable NSF to hold a "Gold Standard", globally, in terms of ensuring that the research we support is evaluated fairly on the basis of merit with transparent and ethical practices. Read the **International Statement of Principles for Scientific Merit Review**.

A recurring theme of my letters is budget uncertainty: we are again operating under a Continuing Resolution, which provides us with a temporary operating budget based on the FY13 approved spending plan. Congress needs to resolve budget proposal differences from the subcommittees in the House and Senate that have jurisdiction over NSF's component of the FY 2014 appropriation. A succinct summary provided by the American Institute for Physics can be found here: (**House**) and (**Senate**).

Given the recent reduced budgets in many of EAR's programs, careful expert review of the proposals we receive becomes ever more critical. Strategically we must make funding decisions that will position us well for the future, selecting the most innovative research at the frontiers of earth science knowledge and advancing our mission in education. Merit review enables our goals to be met and many of you participate in this process. Thank you!

## EAR Welcomes New AAAS Science & Technology Policy Fellow Dr. Justin E. Lawrence

Dr. Justin E. Lawrence has joined the Division of Earth Sciences as an American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellow. He served as an environmental education volunteer in the Peace Corps in the Islamic Republic of Mauritania, received a M.S. in Environmental

Sciences from the University of Virginia and a Ph.D. in Environmental Science, Policy & Management from the University of California at Berkeley. Most recently, he worked as a postdoctoral scholar for the NSF Engineering Research Center for Reinventing the Nation's Urban Water Infrastructure, which is a multi-institutional and interdisciplinary collaboration between Stanford, UC - Berkeley, Colorado School of Mines, New Mexico State University, and a suite of industrial partners. The focus of his postdoctoral research was water reuse for ecosystems. He is very excited to join the Division and is eager to get to know the people in this community. Justin will be leading two projects, one is reviewing the portfolio of investments that the Division makes in broader impacts and the other is developing an

interagency initiative related to energy. The latter project will involve Justin's participation in a series of briefings, which will supply the fundamental geoscience information required for effective policy making on topical energy issues.

## Addressing Broader Impacts

The EAR dialogue on broader impacts activity is moving forward with the "Summit on the Future of Undergraduate Geoscience Education" (details below). The objective of this gathering will be to begin the process that would develop a vision and road map for the community on undergraduate geosciences education for the 21st century. In a 2.5 day workshop, participants will bring to the surface key issues that the community needs to work on in order to set a vision that is audacious, well-informed, and implementable. Over the last 17 years since the last community wide effort, significant advances in the geosciences, in technology, and in science, technology, engineering, and mathematics (STEM) education have occurred. This summit will catalyze fresh dialogue on new approaches, techniques, and uses of technology to enhance learning. The participants will represent the breadth of organizations that are invested in the geoscience community, including community colleges, undergraduate serving institutions, research universities, businesses, professional societies, and government. To foster lasting change, input will be sought from administrators, individual faculty members, professional societies, and future employers. The ultimate outcome of the activities will be students from diverse backgrounds, as well as mentors, who are better prepared to identify and address fundamental geoscience needs using innovative technology, tools and techniques. Plenary sessions will be **webcast**.

## Vanguard Workshop: "Summit on the Future of Undergraduate Geoscience Education"

**January 10th-12th, 2014**
**University of Texas at Austin**

The goal of this summit is to develop a high level, community vision and a roadmap for the future of undergraduate geoscience education. Questions that will be explored include: What can we do to broaden the participation of underrepresented groups? What can we do to increase the number of qualified K-12 geoscience teachers? How can we best prepare our undergraduate students for graduate school and/or future careers in the geosciences both within and outside of academia? What should an undergraduate geoscience curriculum cover? What are best practices for student learning and use of technology in the geosciences?

## GEO Delegation on Capitol Hill

Staff from EAR and the other GEO Divisions, recently spent the day on Capitol Hill meeting with Members and Staff as part of an informal training program on how the legislative process works. Members they met with included Senator Warner, and Representatives Costa, Simpson, Moran, McNerney, Holt, Thompson, and staff from Senator Reid's office and Rep. Miller's office.

*EAR Program Officers: Jessica Robin (1st left, 2nd row); Raffaella Montelli (2nd left, 2nd row); Paul Cutler (1st right, back row)*

## 21st Annual Congressional Black Caucus' Science and Technology Brain Trust

Dr. Jessica Robin gave a keynote presentation at the 21st Annual Congressional Black Caucus' Science and Technology Brain Trust. Congresswoman Eddie Bernice Johnson, Ranking Member on the House Science Committee, served as the Honorary Host for the event. This annual event seeks to eliminate barriers that prevent African Americans from becoming tomorrow's scientists and engineers. The Brain Trust brings together prominent celebrities, innovators, community leaders, educators and mentors to encourage youth to pursue STEM careers. The audience includes about 300 students ranging from 11 to 16 years of age. Dr. Robin shared her personal account of living in a third world country while working for the Peace Corps, where no water was readily available. She explained how this real-life situation fueled her interest in water resources and propelled her to a Ph.D. and career in science.

## Petrology and Geochemistry Program (CH) Solicitation Revisions

The Petrology and Geochemistry Program (CH) has updated and revised its solicitation, which is now **NSF 14-501**. The changes come in response to feedback from the community regarding deadline timing, and recommendations from our last **Committee of Visitors** to better explain the range of science funded by CH. Important revisions to note include:

- The proposal due date has been changed from a submission window to a TARGET DATE. The program expects proposals to be submitted by the target date specified in this solicitation. Proposers that require additional time *must contact one of the Petrology and Geochemistry program directors to request approval* to submit after the target date to ensure that the proposal can be considered in the same competition.
- The next two Target Dates are January 21, 2014 and June 09, 2014.
- The program now restricts the number of proposals per person that an investigator may submit to each CH target date.
- We've added language that clarifies the Division of Earth Sciences rule that declined proposals can be resubmitted to any program in the Division only after one year of the original submission date.
- Changes were made to the 'Synopsis', 'Introduction', and especially the 'Program Description' sections to more clearly identify the science funded by this program.

If you have any questions about these changes, or the CH program more broadly, please contact **Sonia Esperança** or **Jennifer Wade**.

## EAR is participating in the NSF SusChEM Initiative

Sustainable Chemistry, Engineering and Materials (SusChEM) initiative proposals are submitted through existing EAR core programs, meaning that the due dates for those individual programs apply. The FY 14 Dear Colleague Letter (**NSF 13-013**), which has been updated, is available **here**. Further information on the NSF SusChEM initiative is available in an ACS Sustainable Chemistry and Engineering **article**.

*Program Officer* **Deborah Aruguete** *is available to answer questions about this initiative through January 2014; otherwise, contact* **CHE-SusChEM@nsf.gov**.

## Instrumentation & Facilities: The National Center for Airborne Laser Mapping (NCALM)

The Instrumentation & Facilities Program of the Division of Earth Sciences (EAR/IF) supports 18 national, multi-user facilities on behalf of the earth sciences research and education community. They provide to their respective research and education communities on a national or regional scale certain complex and expensive technical and logistical capabilities that would otherwise be impractical to make available to individual or small groups of investigators.

In this issue, we bring you a highlight from the National Center for Airborne Laser Mapping (NCALM). NCALM is operated jointly by the University of Houston (UH) and University of California, Berkeley (UCB). NCALM has three primary missions:

- Collect, reduce, and deliver research quality airborne laser swath mapping (ALSM), a.k.a. airborne laser scanning (ALS), to NSF PIs.
- Advance the state of the art of ALS, through the development of advanced data collection and analytical techniques, improved instrumentation, and data products.
- Educate/train students to fill positions in the government, academic institutions, and private industry that require knowledge of the applications and capabilities of ALS for the Earth sciences and related sciences.

During the first decade of operation, NCALM has done 130 projects for 40 PIs and 75 graduate students, covering approximately 25,000 $km^2$, scattered across the U.S., and in Mexico, Belize, and Honduras. NSF recently approved a proposal to extend the operation of NCALM for an additional 5 years, beginning August 1, 2013.

During the past five years NCALM collected data for more than 50 graduate students selected through a competitive proposal/review process, primarily for research leading to MS and PhD degrees in engineering and science. High resolution geodetic ”bare Earth” images, especially of areas hidden beneath dense vegetation, enable researchers to study terrain on landscape scales, at spatial and temporal resolutions never before possible, revolutionizing the study of earthquake deformation fields, fault slip rates, folding mechanisms, landslide dynamics, channel network evolution, soil mantle development, bedrock surface cracking, landscape response to tectonics, lava flow rates, marsh evolution, salmon habitat changes in response to environmental dynamics, beach erosion, forestry dynamics in response to perturbations, and characterization of archaeological sites.

ALS technology continues to develop rapidly, and the improved products made possible by these technological advances open new applications and bring the answers to long standing and new scientific questions within reach of researchers. With NSF funding, and motivated by requests from NSF PIs for mapping of areas covered by shallow water (bathymetric maps), including streams, lakes and coastal waters, NCALM contracted for the construction of an ALS sensor head with a green laser, that penetrates water (see Figure 1 on next page).

Based on the development of the bathymetric sensor head, the NCALM has contracted for the development of a three color ALS system. The new sensor will collect data at all three colors simultaneously, collecting more than a half million points per second. The three color system is the next step toward the eventual development of a multi-color system. It is hoped the multi-color system will enable researchers to identify different species and the health, of vegetation, estimate near surface soil moisture, and delineate boundaries between different surface materials, such as lavas of differing ages.

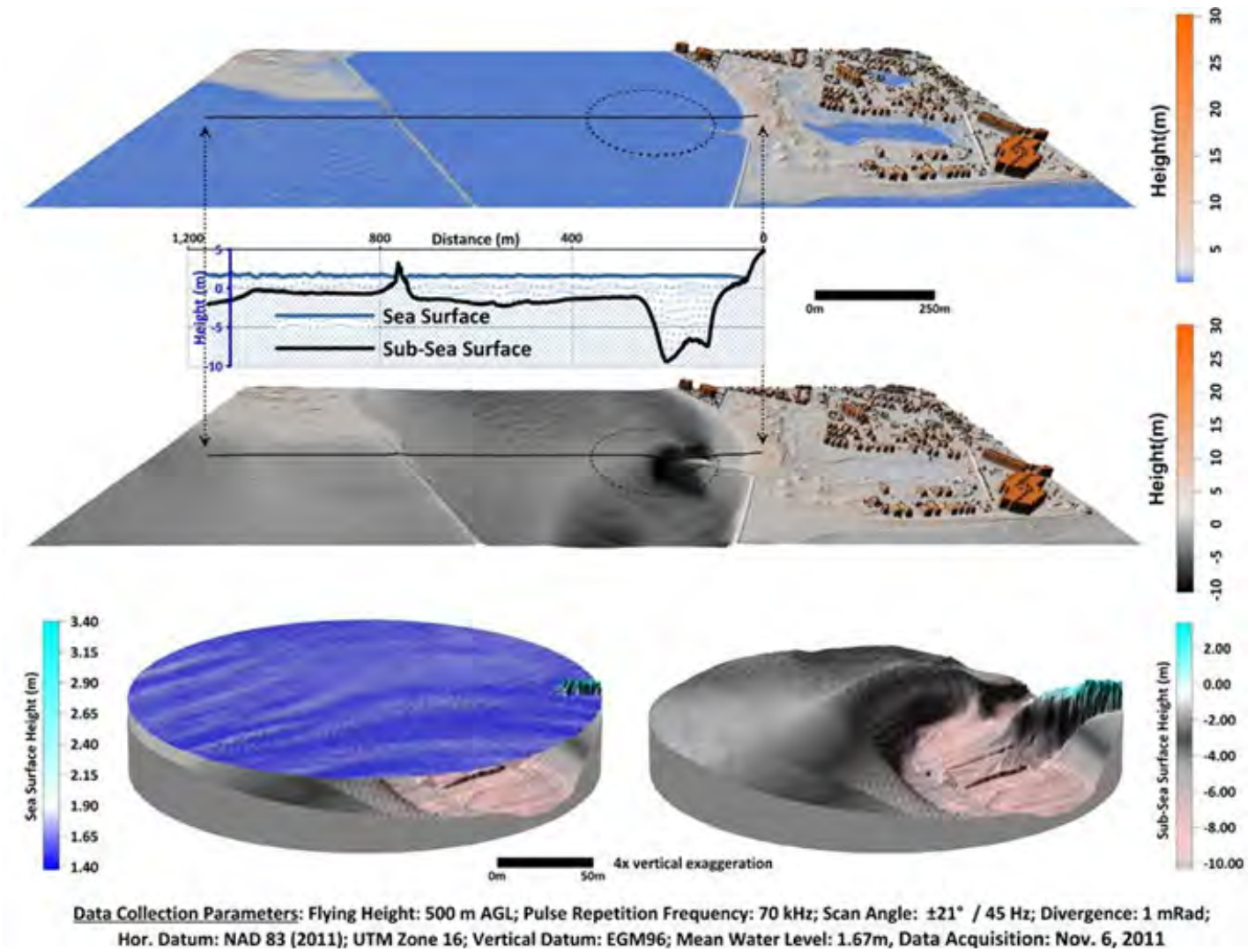


*Figure 1. From top to bottom, are: a false color geodetic image of the inlet, adjoining beaches and sand dunes, and residential area; a cross section of the inlet showing the depth of the water derived from the ALS observations; a shade relief image of the area with the water removed; enlargements of the deep section of the inlet with and without the water.*

NCALM outreach efforts include:

- Organizing and conducting workshops on the analysis of ALS observational data and derived products for a wide variety of applications including: earthquake deformation fields, fault slip rates, folding mechanisms, landslide dynamics, channel network evolution, soil mantle development, bedrock surface cracking, landscape response to tectonics, lava flow fluxes, marsh evolution, salmon habitat, beach erosion, forestry, and archaeological sites.
- Subsidizing support for student participation in NCALM assisted research projects such as travel and lodging expenses to facilitate student research.
- Hosting of a Town Hall meeting at the 2012 American Geophysical Union (AGU) Fall Meeting.
- Collaborating with Open Topography to make ALS observations and derived products available to the wider research community.

- Collaborating with the Institute of Electrical and Electronics Engineers (IEEE) and the Geoscience and Remote Sensing Society (GRSS) for an annual Data Fusion contest using ALS and hyperspectral observations.
- Providing tools for data analysis and visualization of ALS observations and derived products.
- Hosting PIs and graduate students at UH and UCB to teach and assist them in the processing and analysis of ALS observations for their research applications.

Please contact Ramesh Shrestha (**rlshrestha@uh.edu**), director of NCALM, for information about analytical methods, schedules, costs, support letters, etc.

## NSF/SedHeat RCN Hosts Geological Society of America Penrose Conference

SedHeat is an NSF Research Coordination Network (RCN) that is dedicated to addressing the basic science and engineering challenges tied to geothermal energy production from sedimentary basins. SedHeat organized and hosted the Penrose Conference "Predicting and Detecting Natural and Induced Flow Paths for Geothermal Fluids in Deep Sedimentary Basins," October 19th-23rd in Park City Utah. The conference drew 85 registrants, which included a roughly even mix of geologists, engineers, and geophysicists together with social scientists and successfully achieved the target of attracting a similarly equal mix of geothermal researchers, students, and industry and government practitioners. Presentation topics spanned from basin sediment filling and heat transfer processes, rock-mechanics and induced seismicity, to science policy issues. The conference was preceded by a short course on geothermal energy that, along with most of the talks. Some of the issues raised were the need to better understand deep-basin diagenetic alteration and porosity trends, the potential role of siliciclastic flow systems, interaction of induced fracture networks and matrix porosity, hazards of induced seismicity, and keys to defining optimal conditions from predictive basin fill history and basin system modeling.

The diverse needs of geothermal energy production include many basic research drivers and define rich opportunities for new or expanded research directions. Chief among these is the need to accurately predict flow-paths between injection and extraction wells that can transmit heat transfer fluids at sufficient flow rates and recovery temperatures and at depths generally below the more explored oil window. The economic margins of successful geothermal production dictates that these paths must be predicted at a much higher level of accuracy then currently approached and thus the basin processes and mechanics must be much better understood. The conference identified critical research needs and evaluated current successes and failures.

The next phase of the SedHeat RCN is to build upon the current conference with a series of small "incubator" workshops designed to develop specific plans to address critical research needs. In addition, the conference is slated to generate a conference volume from a subset of presented papers. However, contributing a paper to the volume does not require prior attendance at the Penrose. The SedHeat RCN is an open forum that welcomes all those interested in geothermal energy and sedimentary basins. If you would like to be included in the group and be notified of upcoming events, please contact John Holbrook (**john.holbrook@tcu.edu**). The forum would be happy to have you on board!

## Join us at the American Geophysical Union Meeting!

### AGU GEO Town Hall: Opportunities in the NSF Geosciences

**December 9th, 2013**
**6:15 PM-7:15 PM**
**Moscone South Room 305**
**San Francisco, CA**

Please join GEO Assistant Director Roger Wakimoto and the GEO division directors to talk about this expanded GEO portfolio of atmospheric, Earth, ocean, and polar programs as well opportunities for cross-disciplinary research. We will also be talking about and seeking your input on our current strategic planning efforts focused on research, facilities, diversity and education, and cyber-infrastructure.

### AGU Town Hall: NSF Innovation Call, A Suite of Untapped Opportunities

**December 10th, 2013**
**6:15 PM-7:15 PM**
**Moscone West Room 2003**
**San Francisco, CA**
**More information**

NSF GEO is looking for research ripe for commercialization, faculty interested in having students co-advised with industry, and faculty interested in collaborating with their industry counterparts. NSF's Raffaella Montelli will give an overview of programs in the NSF Innovation Suite. These programs are intended to foster academic-industry collaborations on fundamental research. Come discover how to put your entrepreneurial skills into action.

### AGU Workshop: Navigating the NSF System

**December 11th, 2013**
**9:00 AM-12:00 PM**
**San Franciso Marriott Marquis Golden Gate A**
**More Information**

How do you make your proposal as NSF-savvy as possible? How do you best describe your broader impacts? How do you identify the best program for application? This workshop is open to all AGU Fall Meeting attendees and will be particularly helpful to early-career to midcareer participants, graduate students, post-docs, researchers, and tenure-track faculty thinking about applying for NSF funding for the first time.

*The workshop is possible through a partnership of the Earth Science Women's Network and AGU Education.*

### AGU Town Hall: Letting the Rain Hit the Ground: Connecting Atmospheric and Hydrological Processes

**December 12th, 2013**
**6:15 PM-7:15 PM**
**Moscone West Room 2008**
**San Francisco, CA**

The Hydrologic Sciences and Physical and Dynamical Meteorology Programs will host a town hall to inform the community about plans for accepting cooperating projects across the land and atmospheric interface. The goal is to advance knowledge about the coupling of the atmosphere and the land by enabling scientists to address the issues and challenges without confronting the disciplinary walls.

## Career Opportunities: NSF Program Director, Hydrologic Sciences

The Division of Earth Sciences has two Program Director (rotator) positions in the Hydrologic Sciences Program in the Surface Earth Processes Section, beginning in August 2014. These are full-time positions to be filled as initially one-year appointments that can be extended with the consent of both parties to 2 or 3-years. The Program Director will be responsible for implementing the proposal review and evaluation process for Hydrologic Sciences, and providing final review of proposals and recommendation of awards or declinations based on knowledge or resource availability as well as program goals and peer reviewer comments. More details and application instructions are posted at **USAJobs.com** and the **NSF webpage**.

## Upcoming Deadlines and Target Dates

You can find the full list of active GEO funding opportunities on the **Directorate for Geosciences website**, but here are some programs of particular interest to the EAR community:

**Geophysics (PH)**
(**NSF 12-598**) Full Proposal Target Date: December 4, 2013

**Hydrologic Sciences (HS)**
(**NSF 13-531**) Full Proposal Deadline: December 5, 2013

**Innovation Corps Teams Program (I-Corps Teams)**
(**NSF 12-602**) Full Proposal Deadline: December 16, 2013

**Decadal and Regional Climate Predictions using Earth System Models (EaSM)**
(**NSF 13-607**) Full Proposal Deadline: December 23, 2013

**Industry/University Cooperative Research Centers Program (I/UCRC)**
(**NSF 13-594**) Letter of Intent: January 6, 2014

**Tectonics (TE)**
(**NSF 09-542**) Full Proposal Deadline: January 6, 2014

**Geobiology and Low-Temperature Geochemistry (GG)**
(**NSF 09-552**) Full Proposal Deadline: January 16, 2014

**Geomorphology and Land Use Dynamics (GLD)**
(**NSF 09-537**) Full Proposal Deadline: January 16, 2014

**Sedimentary Geology and Paleobiology (SGP)**
(**NSF 12-608**) Full Proposal Deadline: January 16, 2014

**Coastal SEES**
(**NSF 14-502**) Full Proposal Deadline: January 21, 2014

**Petrology and Geochemistry (CH)**
(**NSF 14-501**) Full Proposal Target Date: January 21, 2014

**Catalyzing New International Collaborations (CNIC)**
(**NSF 13-605**) Full Proposal Deadline: January 22, 2014

**Major Research Instrumentation Program (MRI)**
(**NSF 13-517**) Full Proposal Deadline: January 23, 2014

**EPSCoR Research Infrastructure Improvement Program: Track-2 (RII Track-2)**
(**NSF 13-509**) Full Proposal Deadline: January 29, 2014

**Improving Undergraduate STEM Education**
(**PD 14-7513**) Full Proposal Target Date: February 4, 2014

**Alliances for Minority Participation – Student Research Supplements**
(**NSF 14-014** DCL) Deadline February 14, 2014

**Advancing Recruitment and Retention in the Geosciences**
(**NSF 14-015** DCL) Check here for deadlines

**Instrumentation and Facilities**
Full Proposals Accepted Anytime

The revised version of the **NSF Proposal & Award Policies & Procedures Guide (PAPPG), NSF 14-1** is effective for proposals submitted, or due, on or after February 24, 2014.

While this version of the PAPPG becomes effective on February 24, 2014, in the interim, the guidelines contained in the current **PAPPG (NSF 13-1)** continue to apply.

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**This newsletter is designed to share information about NSF's Division of Earth Sciences. If you have comments or questions, please contact Dr. Shemin Ge at f gov**

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This issue of EAR to the Ground was edited by Rachel Thornton and Shemin Ge.