EAR TO THE GROUND

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

NSF 15-060

SPRING EDITION

IN THIS ISSUE

Mt. Moran, Teton Range Wyoming

UPDATE FROM THE DIVISION DIRECTOR

NSF operates on a fiscal year that starts on October 1. As has been common in recent years, the agency operated on a continuing resolution while Congress crafted the appropriations bill that funds federal government budget. When the omnibus bill was passed on December 15, the news for the EAR division and the GEO directorate was disappointing: EAR and GEO budgets were held level, even though the budget for NSF as a whole went up by 2.3% over the prior year.

The future, however, looks more hopeful. On February 2, President Obama announced his budget request for FY 2016. GEO is slated for an increase

UPDATE FROM THE DIVISION DIRECTOR

of 4.7%, and EAR for +6.2%. These increases will allow for 1) increased funding of our core research programs, and 2) support for GEO and EAR participation in two new NSF-wide emphasis areas. The first, called PREEVENTS (Prediction of and Resilience against Extreme EVENTS), involves EAR research into geologic hazards, including earthquakes, volcanic eruptions, landslides, and floods. EAR is also at the center of the second initiative, INFEWS (Innovations at the Nexus of Food, Energy, and Water Systems). EAR is very pleased that its program directors Greg Anderson and Tom Torgersen are leading these initiatives for the GEO directorate.

NSF PROPOSAL SUBMISSION DOCUMENT UPDATES

Dr. Sonia Esperanca

The newest NSF Proposal and Award Policies & Procedures Guide (PAPPG) http://www.nsf.gov/pubs/policydocs/pappguide/nsf15001/nsf15_1.pdf released in December, 2014 (NSF 15-001) includes some significant policy changes both in proposal submission guidelines (Part I: Grant Proposal Guide or GPG) and award administration (Part II: Award and Administration Guide or AAG). The overall document was revised to implement 2 CFR § 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards (Uniform Guidance). Other important changes are summarized in the first 7 pages of the PAPPG and explained in more detail in the body of the document. Please pay special attention to these changes when preparing proposals as we will return proposals without review for non-compliance. Significant changes to note in the GPG relate to Administrative and Clerical Salaries & Wages; Travel; Participant Support Costs; Materials and Supplies; Indirect Costs; and Risk Management. Significant changes to note in the AAG relate to NSF Award Conditions; Notifications and Requests; and Cost Sharing.

EAR Program staff check proposals for compliance and a Program Officer may return a proposal without review if it is deemed not compliant with either the GPG or the relevant program solicitation. The main areas that we have found proposals to deviate from compliance are:

a) Results from Prior Support: The summary of results must be separately described under two headings, Intellectual Merit and Broader Impacts.

b) Broader Impacts: The Project Description must contain a separate section (with the title “Broader Impacts of the Proposed Work”) that contains an explanation of the broader impacts of the proposed research as described in GPG.

c) Biographical Sketches: These should comply with the specific format listed in the GPG, and fit within two pages. The use of “et al.” is not allowed.

d) Budget Justification: The 3 pages allotted to the budget justification should be carefully constructed to conform to the significant changes in the guidance for several areas of the budget, such as those for travel. For proposals that contain subawards, each subaward must include a separate budget justification of no more than 3 pages.

e) Unfunded Collaborations: Any substantial collaboration with individuals not included in the budget should be described in the Facilities, Equipment and Other Resources section and documented in a letter of collaboration from each collaborator.

f) Facilities, Equipment and Other Resources: This section should describe only those resources that are directly applicable and should include an aggregated description of the internal and

external resources (both physical and personnel) that the organization and its collaborators would provide to the project.

g) Letters of collaboration: Letters of collaboration should be limited to stating the intent to collaborate and should not contain endorsements or evaluation of the proposed project.

SURFACE EARTH PROCESSES PROGRAM DEADLINE UPDATE

Dr. Alexandra Isern

Updated solicitations for programs in the Surface Earth Processes Section are currently in clearance and will be released soon. The revised solicitations will no longer have submission deadlines. As such, the relic summer deadlines stated in the existing solicitations for Hydrologic Sciences, Geobiology & Low Temperature Geochemistry, Geomorphology & Land-Use Dynamics, and Sedimentary Geology & Paleobiology should be disregarded in lieu of the guidance provided in the Dear Colleague Letter (DCL) NSF 15-020. Thank you for your patience as the Surface Earth Processes Section transitions to a new no deadline submission model.

The number of proposals received by programs in the Surface Earth Processes Section has increased significantly over the last few years. This increase has intensified the workload on reviewers, panelists, and NSF staff in the processing of proposals. To address this issue, we will remove deadlines for proposal submissions to the Geobiology & Low-temperature Geochemistry, Hydrologic Sciences, Geomorphology & Land-use Dynamics, and Sedimentary Geology & Paleobiology Programs. By accepting proposals at any time, we hope to give investigators more time to prepare quality proposals and level administrative workloads associated with proposal review. We feel this change will enhance our potential to support transformative scientific discoveries and will increase the success rates for submitted proposals.

We continue the EAR policy that proposals which were declined are not eligible for resubmission for one year from the original date of submission (http://www.nsf.gov/geo/ear/resubmission_policy.jsp). A proposal that has not been substantially revised will be returned without review as outlined in the NSF Grant Proposal Guide. Programs in the Surface Earth Processes Section will continue evaluating proposals using the highest standards of merit review, including ad-hoc mail and panel reviews.

Only solicitations for the Geobiology & Low-temperature Geochemistry, Hydrologic Sciences, Geomorphology & Land-use Dynamics, and Sedimentary Geology & Paleobiology Programs will be affected by this change. All other submissions will continue to follow deadlines outlined in their respective solicitations.

Read the full DCL here: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf15020

SEES: INTERACTIONS OF FOOD SYSTEMS WITH WATER AND ENERGY SYSTEMS

Alicia Armstrong

NSF established the Science, Engineering, and Education for Sustainability (SEES) investment area in 2010 to lay the research foundation for decision capabilities and technologies aimed at mitigating and adapting to environmental changes that threaten sustainability. SEES investments advance a systems- based approach to understanding, predicting, and reacting to stress upon and changes in the linked natural, social, and built environments. In this context, the importance of understanding the interconnected and interdependent systems involving food, energy, and water (FEW) has emerged.

Through this Dear Colleague Letter (DCL), NSF aims to accelerate fundamental understanding and stimulate basic research on systems that extend beyond the interests of the SEES Water Sustainability and Climate (WSC) program to include couplings to energy and food systems where NSF already has established presence.

Read the full DCL here: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf15040

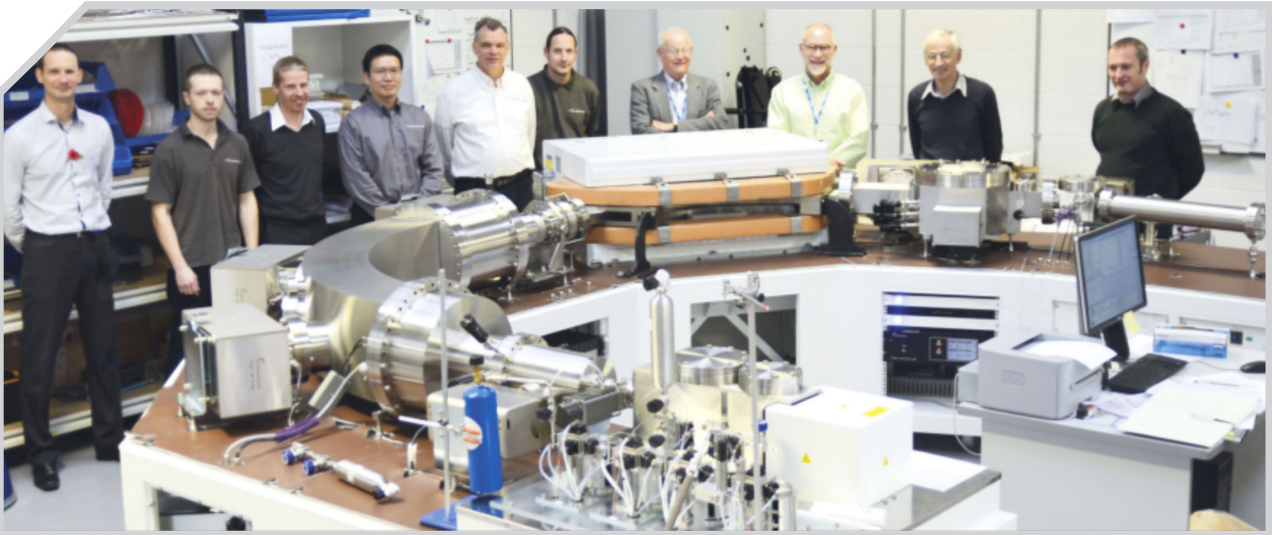
THE PANORAMA PROJECT
Dr. David Lambert

The Instrumentation & Facilities Program of the Division of Earth Sciences (EAR/IF) accepts proposals seeking support for the development or refinement of new instrumentation, techniques and software that extend current research capabilities in the Earth sciences. In this issue of EAR to the Ground, we highlight the development of a new instrument called Panorama, a high resolution mass spectrometer for the measurement of isotope ratios of single- and double-substituted isotopologues of atmospheric, crustal, and hydrospheric gas samples.

A group of researchers gathered on 10 November 2008 at the Geophysical Laboratory, Washington, DC, to plan for the development of a mass spectrometer capable of both single- and doubly-substituted isotopologues. Once funding was secured, the unique instrument design was refined at a meeting on 17 February 2011 at the Nu Instruments Ltd. factory, Wrexham, Wales, UK. Construction continued through 2014. Delivery to UCLA will be in March 2015.

Panorama (Fig. 1), a high-resolution mass spectrometer designed explicitly to resolve singly- and doubly-substituted isotopologues of gases that are closely similar in molecular weight. The instrument generates

Figure 1: Panorama and its design and production team, Nu Instruments Ltd. factory, Wrexham, Wales, UK.



left-right: A. Burrows, A. Roberts, S.Hollins, P. Li A. Taylor J. Bendall, D. Rumble E. D. Young, P.A. Freedman, M. Mills

The Panorama design has achieved its goal of resolving isotopologues of the gas molecules CH4, N2, O2, N2O, NO2, CO2, SO2, and OCS. The capability of analyzing these gases opens new research opportunities. In experimental simulations of the atmosphere of Venus to investigate the role of OCS in its atmospheric chemistry, for example, Panorama will supply the necessary measurements of isotope ratios. Panorama will provide analyses of singly- and doubly-substituted isotopologues of SO2 in an investigation of ozone destruction caused when megatons of SO2 are injected into the stratosphere by Plinian volcanic eruptions. A study of photosynthesis by plants under controlled conditions will benefit from analysis of isotopologues of O2 and CO2 by Panorama.

Panorama has already succeeded in demonstrating its capabilities by analysis of methane gas samples. Methane, a valuable source of energy, may be synthesized by thermal degradation of organic matter, by microbes, by Fischer-Tropsch reactions, and by reduction of carbonate minerals. Questions arise in studying natural occurrences of methane as to which of these processes, or some combination of them, was the source. Measurement of the relative abundances of both 13CDH3 and 12CD2H2 is likely to advance our understanding of the provenance of methane gas in its various occurrences. Independent measurement of two doubly-substituted isotopologues provides a definitive test as to whether or not isotopic exchange equilibrium was attained and preserved in the gas sample. If equilibrium was not attained, measurement of the two rare isotopologues will identify the causes for the departures from equilibrium, including reaction kinetics, diffusive transport, or mixing of isotopically distinct reservoirs. With experimental calibration, a two-isotopologue disequilibrium may fingerprint a kinetic isotope effect in a specific reaction mechanism.

Use of Panorama for research will be open to qualified researchers, as administered by an Advisory Board. Applications in geochemistry, cosmochemistry, atmospheric, and marine chemistry are anticipated. Please consider the opportunities afforded by the high-resolution capabilities of Panorama in planning your research projects.

BROADER IMPACTS – EXAMPLES FROM THE GROUND

Dr. Justin Lawrence

In collaboration with EAR Program Directors, we have compiled a list of examples of quality broader impacts that we continue to share with you in coming issues of EAR to the Ground. One striking pattern we observed through text-mining proposals in the NSF is that terms related to broadening participation occur less frequently in Geoscience awards than in awards in all the other domains of science. Because of this troubling pattern, we are focusing several examples in EAR to the Ground on this important type of broader impact. However, our intent is not to have all the broader impacts in EAR look alike, and not all broader impacts are broadening participation. We are seeking a balanced broader impacts portfolio in EAR with the broader impacts being as focused, well planned, and implemented as intellectual merit.

GEOLOGY FIELD TRIP FOR STUDENTS AT A NAVAJO COLLEGE

Award Number: 1250447

Reconciling Different Deformation Mechanisms in Adjacent Sedimentary Lithologies at Raplee and Comb Folds, Monument Upwarp, UT PIs: David Pollard (Stanford University)

Navajo students discuss their observations and interpretations with Solomon Seyum (bottom right), Ph.D. Student, Stanford University

Research: Focusing on deformation mechanisms in sedimentary strata, the PIs investigate mechanisms operating during kilometer-scale folding when elastic bending leads to inelastic buildup of large curvature and finite strain.

Broader Impacts Activity: This project supported Soloman Seyum, an African American Ph.D. Student in Geological and Environmental Sciences. Soloman and the PI work with Professor Margaret Mayer at Diné College to organize field trips to geologic folds in the project study area, which extends into the Navajo Nation. These field trips provide an opportunity for Navajo students to learn about the geology of their land, geology as a profession, and opportunities for higher education at Stanford University.

Implementation: Soloman Seyum and the PI organized and led a Raplee Anticline Field trip on April 12, 2014. A fold in the earth's surface, the Raplee Anticline reveals 300 million years of geology. The students on the field trip were taking the Historical Geology course taught at the Navajo college.

Impact: Students from underrepresented groups learned about the geology of an area of high cultural significance to them, they gained hands on experience with scientific reasoning and methods for characterizing stratigraphy and structures, they recorded observations of attributes in sedimentary rock, and they discussed interpretations of the formation mechanisms of the geologic structures observed in the field. Soloman Seyum served as a role model for other students from underrepresented groups.

Scientific progress comes in all shapes and sizes. Disparate fields, researchers and methods united by one thing: potential. Every NSF grant has the potential to advance knowledge and benefit society--what we call broader impacts. Find more in our new broader impacts section of NSF's webpage or check out #broaderimpacts on twitter.

STUDENT SPOTLIGHT
Britta Voss

Britta Voss, a Massachusetts Institute of Technology (MIT)/ Woods Hole Oceanographic Institution (WHOI) Joint Program student, is studying carbon transport in the Fraser River basin. While dissolved carbon dominates carbon export to the ocean, quantification of particulate carbon is much more difficult as it requires temporally and spatially resolving water flow velocities together with the characterization of mass and biogeochemical composition of suspended sediment and bed load. In collaboration with colleagues at Simon Fraser University in Vancouver, Britta has found that sediment sources vary seasonally from Coast Range-dominated sources in the winter and spring to a stronger influence by the Rocky Mountains during summer and fall.

Shed spotlight on your student! Send a photo & description (100 word max) of their involvement in an EAR-funded project to rthornto@nsf.gov subject: "Student Spotlight".

CAREER OPPORTUNITIES
NSF Program Director (Rotator), Hydrologic Sciences

The Division of Earth Sciences has multiple vacant Program Director (rotator) positions in the Hydrologic Sciences Program in the Surface Earth Processes Section beginning as early as July 2015. 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 in this Dear Colleague Letter (EAR 15-002). http://www.nsf.gov/publications/pub_summ.jsp?ods_key=ear15002

UPCOMING DEADLINES AND TARGET DATES

EarthCube	(NSF 13-529)	Full Proposal Deadline for EarthCube Integrated Activities EarthCube Research Coordination Networks (RCN)	March 19, 2015; Accepted Anytime
Genealogy of Life (GoLife)	(NSF 15-520)	Full Proposal Deadline	March 25, 2015
National Science Foundation Research Traineeship Program (NRT)	(NSF 15-542)	Letter of Intent Deadline Full Proposal Deadline	March 25, 2015 May 6, 2015
National Nanotechnology Coordinated Infrastructure (NNCI)	(NSF 15-519)	Full Proposal Deadline	April 3, 2015
Partnerships for International Research and Education (PIRE)	(NSF 14-587)	Invited Full Proposal Deadline	May 15, 2015
Research Experiences for Undergraduates (REU)	(NSF 13-542)	Full Proposal Deadline	May 22, 2015
Hydrologic Sciences (HS)	(NSF 15-020)	Pending revised solicitation	See DCL for submission guidance
Geophysics (PH)	(NSF 12-598)	Full Proposal Target Date	June 3, 2015
Petrology & Geochemistry (CH)	(NSF 15-520)	Full Proposal Target Date	June 8, 2015
Innovation Corps Sites Program (I-Corps Sites)	(NSF 14-547)	Full Proposal Deadline	June 9, 2015
Science & Technology Centers Integrative Partnerships	(NSF 14-600)	Full Proposal Deadline	June 16, 2015
Earth Sciences: Instrument-ation & Facilities (EAR/IF)	(NSF 15-516)	Full Proposals Accepted	Anytime
Tectonics	(NSF 14-609)	Full Proposal Target Date	June 22, 2015
Industry/University Cooperative Research Centers Program (I/UCRC)	(NSF 13-594)	Letter of Intent Deadline	June 26, 2015

GeoPrisms Program	(NSF 15-564)	Full Proposal Deadline	July 1, 2015
Geobiology and Low-Temperature Geochemistry	(NSF 15-020)	Pending revised solicitation	See DCL for submission guidance
Geomorphology and Land Use Dynamics	(NSF 15-020)	Pending revised solicitation	See DCL for submission guidance
Sedimentary Geology and Paleobiology (SGP)	(NSF 15-020)	Pending revised solicitation	See DCL for submission guidance

Proposal & Award Policies & Procedures Guide (PAPPG), (NSF 15-001) has been issued and became effective on December 26, 2014.

@NSF_EAR : Earth Science news from the Division and beyond
@NSF : News and highlights from all directorates at NSF
@EarthScopeInfo : News, updates, and fun facts from the EarthScope Office
@GeoPRISMS : News and updates from the GeoPRISMS Office

The Division of Earth Sciences
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This issue of EAR to the Ground was edited by Rachel Thornton and Yusheng "Chris" Liu.

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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 Yusheng "Chris" Liu at yliu@nsf.gov

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