

# EAR TO THE GROUND

Fall 2014  


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

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*Badlands National Park, SD*

## Update from Acting Division Director

**Sonia Esperança**

### FY 2014 Close Out

Three months have passed since EAR's last newsletter and staff have been actively working on the 'close out' of expenditures. Every year, a large number of EAR awards are recommended for funding in early August, providing NSF's Division of Grants and Agreements approximately two months to make awards and disperse remaining funds for the fiscal year. This year's close out was expedited so NSF

could implement a new financial system to improve grant, contract and cooperative agreement management. EAR spent \$177 million this fiscal year, approximately the same budget as last year.

### Committee of Visitors

According to NSF policy, programs need to convene a Committee of Visitors (CoV) every three years to evaluate the merit review process and to assess if funding decisions made by Division staff were justified. This year, CoVs were held for research programs in the Surface Earth and Deep Earth Processes sections. The resulting reports and the NSF response are made available to the public after approval by the NSF Advisory Committee for Geosciences. CoVs are an integral part of NSF's commitment to improve the merit review process and maintain the community's trust in NSF program management. Approved CoV reports are available at [http://www.nsf.gov/geo/acgeo\\_cov.jsp](http://www.nsf.gov/geo/acgeo_cov.jsp).

### Changes in EAR Personnel

Summer is also a time when we bid farewell to a number of EAR colleagues and welcome new staff in their stead. Four program officers have recently departed.

- Deborah Aruguete, an excellent colleague involved in a number of Division and Cross-Directorate activities, left the Geobiology and Low-Temperature Geochemistry (GG) program. Her can-do attitude will be missed by her EAR colleagues.
- Raffaella Montelli, Program Officer for Geophysics since 2012, accepted a new position as Program Director for the Division of Industrial Innovation and Partnerships in NSF's Directorate of Engineering. EAR sorely misses her enthusiasm for bridging science and industry. Fortunately, she remains at NSF to advise EAR on such issues. We currently have an open advertisement to fill her position in the Geophysics program.
- Two colleagues left the Hydrology (HS) Program. Shemin Ge returned to her home institution, the University of Colorado. She was an extraordinary colleague with an extremely optimistic attitude. Her additional duties included *EAR to the Ground* editor, member of the Science Leadership Committee and co-manager of the Water, Sustainability and Climate program. We are pleased to report that Chris Liu now serves as co-editor of this newsletter in her stead.
- Ni-Bing Chang returned to his academic position at the University of Central Florida. In addition to working in the HS program, Ni-Bing was involved in the Cyber-SEES program during his tenure at NSF. His expertise and commitment were much appreciated.

### EAR Welcomes Program Director

### Hailiang Dong



**Hailiang Dong** joins the Geobiology and Low Temperature Geochemistry program from his Professor position in the Department of Geology and Environmental Earth Science at Miami University of Ohio. After serving as a post-doctoral researcher at Princeton University, Hailiang joined Miami University as an assistant professor. His main research areas include mineral-microbe interactions; groundwater and soil remediation; and microbial life in extreme environments such as saline lakes, deep continental subsurface, hot springs, deserts and oceans. He employs a suite of analytical techniques including microscopy, spectroscopy, cultivation and molecular microbiology, and bioinformatics. He serves as Associate Editor for the *Clays and Clay Minerals* and *Geomicrobiology Journals* as well as an editorial board member for other journals. Hailiang looks forward to serving the EAR community while at NSF.

**EAR Welcomes Program Officer****Dennis Geist**

**Dennis Geist** joined the Deep Earth Processes program. Dennis has been Professor of Geological Sciences at the University of Idaho since 1990 and is former department Chair. He is President of the Charles Darwin Foundation, which is dedicated to research in support of conservation of the Galápagos Islands. His research focuses on volcanology, petrology, geophysics and tectonics of the Galápagos and Snake River Plain. More recently, he has explored the relationships between the geologic history of ocean islands and their biodiversity and biological evolutionary patterns. He has been awarded the University's Research Excellence award and College of Science Distinguished Faculty Award. He looks forward to applying his broad experience to both focused and interdisciplinary programs in deep-earth processes.

**EAR Welcomes Program Officer****Janet Herman**

**Janet S. Herman** is professor at the University of Virginia in the Department of Environmental Sciences and Director of an inter-departmental group of faculty and students from Environmental Sciences, Civil Engineering and Chemical Engineering in the Program of Interdisciplinary Research in Contaminant Hydrogeology. Her research focuses on the evolution of the chemical composition of groundwater through water-rock interactions, and she collaborates with microbial ecologists and hydrogeologists in the study of contaminated soils and aquifers. She is particularly interested in interactions between surface water and groundwater as applied to karst terrains and coastal

aquifers. Her recent research focuses on emerging contaminants in water supplies, i.e., the environmental fate of contaminants in agricultural watersheds and in urban stormwater systems. She serves as Councilor for the Geological Society of America and the International Association of GeoChemistry. She is also currently serving as President of the Karst Waters Institute. She looks forward to working in the Hydrological Sciences program.

**EAR Welcomes Program Officer****John (Jack) Sharp**

**John M. (Jack) Sharp, Jr.**, joins the Hydrological Sciences program from his position as the Carlton Professor of Geology in Department of Geological Sciences at The University of Texas. Jack is a Fellow of the Geological Society of America (GSA) and the Alexander von Humboldt-Stiftung Foundation. His research covers flow in fractured and carbonate rocks, thermohaline free convection, sedimentary basin hydrogeology, subsidence and coastal land loss, groundwater management and the effects of urbanization. He has been President of the GSA and an officer in the American Institute of Hydrology (AIH) and International Association of Hydrogeologists (IAH). Honors include GSA's Meinzer, AIH's Thesis, IAH's Presidents', Association of Engineering Geologists' Publication Awards, Phi Kappa Phi and Tau Beta Pi. Hobbies include gardening, genealogy, fishing, duck hunting, Australia, opera and University of Texas football.





## Student Spotlight

## Devon Orme



**Devon Orme** is a PhD student at the University of Arizona. Her stratigraphic and geochemical research on the tectonic history of the archetypical Xigaze forearc in Tibet has provided new insights into continental dynamics processes preceding and during continent-continent collision. Results from her research form the basis of a paper recently published in *Basin Research* (Orme et al., 2014). Devon has also been involved in significant outreach initiatives with K12 students at local Tuscon schools.

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

## EAR Welcomed Summer Intern

## Margaret Doyle

**Margaret Doyle** is a senior at Yorktown High School in Arlington, Virginia. She joined EAR as an intern this past summer working under the mentorship of Science Assistant Rachel Thornton. She is interested in the deep earth and hopes to study geophysics in college. Her recent research activities were biochemistry related involving isolating and identifying the larvicidal agent in sweet potato leaves at George Mason University using flash chromatography & gas chromatography- mass spectrometry. In May she went to Los Angeles to share her research at Intel ISEF. Doyle has been President of the Virginia Junior Academy of Science, and she currently serves as an Alum Chair. During her time at NSF, she checked postdoc proposals for compliance, helped out with a polar panel and compiled a social media report for EAR. She enjoys playing field hockey, lacrosse and running track for Yorktown, as well as serving as Head Editor of her school's newspaper. She is very grateful for her time at NSF, and she loved learning about earth science every day.



## GSA Town Hall "Challenges & Opportunities in Geochronology: The User Perspective"

### Sonia Esperança

This town hall will be conducted by a team of geochronologists who is attempting to gather input on what the user community sees as gaps in the access to infrastructure for geochronology that limit the research conducted in the different areas of geosciences research. The Town Hall will take place Tuesday, 21 October 2014: 12:00 PM-1:30 PM, at the Hyatt Regency, in the Prince of Wales meeting venue in Vancouver, BC. This will be an open discussion with the participation of NSF Program Directors and individuals that run laboratories that serve the broader community. This Town Hall is the second geochronology-related activity funded by NSF, and follows another workshop conducted at the Goldschmidt Conference in Sacramento earlier this year.

## Sustainability: Water is Recipient of 2014 Outstanding Achievement Award Terry Davies



*Sustainability: Water*, an informative online video series produced by NBC Learn in partnership with NSF, is the recipient of the Renewable Natural Resources Foundation's (RNRFF) 2014 Outstanding Achievement Award. The award recognizes a project,

publication, piece of legislation or similar accomplishment in the natural resources field. Tom Torgersen will accept the award on behalf of NSF on October 2, 2014, at the annual meeting of the RNRFF Board of Directors in Potomac, Maryland.

NBCNews.com featured the Ogallala Aquifer story on its homepage. The series is available online at <http://nbclearn.com/Water>. Available cost-free to teachers, students and the public, the series serves as a timely educational tool.

*Sustainability: Water*, a seven-part series, explains significant challenges to water supply management in selected U.S. regions and cities. The series advance public understanding of the effect of human activity and climate variability on water and its distribution systems. Each video features an NSF-supported scientist explaining a scientific challenge and how these challenges are affecting the water supply.

Topics include: Ogallala Aquifer water management plans; measuring snow pack and snow melt for better water management; beetle-killed tree impact on water quantity and quality; better understanding of the urban water cycle; the impacts agricultural runoff and precipitation changes have on nutrient flow and algal blooms; efforts to reduce water imports by capturing, storing and reusing water; and flow and storage processes in the water cycle.

## New IF Facility: Continental Scientific Drilling Coordination Office David Lambert

The [Instrumentation & Facilities Program](#) of the Division of Earth Sciences (EAR/IF) supports eighteen national, multi-user facilities on behalf of the earth sciences research and education community. Although ranging widely in the scope and cost of their individual operations, all of the facilities share a common attribute. They provide to their respective basic 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.



*EAR to the Ground* is continuing to highlight some of these facilities, to make the community aware of the incredible capabilities sponsored by EAR/IF. You can download the guide to multi-user facilities [here](#). In this issue, we highlight the Continental Scientific Drilling Coordination Office (CSDCO).

As of July 2014, the University of Minnesota-Twin Cities began operating the Continental Scientific Drilling Coordination Office (CSDCO). This new facility builds on the resources and experience of the personnel at LacCore (<http://lrc.geo.umn.edu/laccore/>), another facility supported by EAR.

*The new Continental Scientific Drilling Coordination Office (CSDCO) provides coordination, leadership and technical support in subsurface sampling and monitoring on Earth's continents*

CSDCO provides coordination, leadership and technical support in subsurface sampling and monitoring on Earth's continents. Through collaboration with the U.S. academic research community and other national and international organizations (particularly the International Continental Scientific Drilling Program, or ICDP), CSDCO coordinates research project development and infrastructure and cyberinfrastructure advancements to enable scientific drilling and coring and a deeply-embedded outreach, diversity and education program to maximize project profiles and engagement of scientific and broader communities. Together with the associated LacCore Facility for support of operations, core processing and analysis, and sample and data curation and dissemination, CSDCO provides integrated project support for scientists using core samples and boreholes to address research goals.

Any scientist can request support of CSDCO, for example, to determine appropriate drilling or coring techniques for projects; solicit and review bids to determine project budgets; address project logistical requirements; plan for project execution support and downstream analytical, curatorial and data management aspects; coordinate development and/or acquisition of infrastructure or cyberinfrastructure; develop and execute a meaningful plan for project-specific broader impacts; and form funding strategies and refine proposals.

The scientific focus of continental scientific drilling and coring projects are varied and involve aspects of many geoscience domains, including paleoclimate and paleoenvironment, tectonics, magmatism, hydrology, geomorphology, cryosphere, fault zones, geothermal, critical zone, seismology, biogeochemistry and impact structures. Materials cored and drilled range from soft sediments and soils to hard rock.

CSDCO can coordinate quick access to rental equipment for soft-sediment coring through the LacCore equipment pool, and maintains and operates a small, portable Winkie Drill for shallow drilling. The Winkie is particularly useful for drilling at remote sites with difficult access, for outreach and training, and for low-cost initial drilling to generate samples for preliminary analyses and justification for deployment of larger, more expensive drilling systems to reach deeper intervals. For deep drilling, CSDCO solicits bids from drilling contractors to deploy the equipment and expertise required.

CSDCO personnel are engaged in the NSF EarthCube initiative and are collaborating with ICDP and NSF-supported data facilities to develop integrated cyberinfrastructure to address several longstanding data management needs in the continental scientific drilling and coring community. These include building a scientific drilling and coring data repository; establishing linkages to registration services such as the International Geo Sample Number (IGSN) for globally unique and persistent sample identifiers and to permanent data archives (e.g. National Geophysical Data Center, NGDC); and linking to visualization tools supporting standard community workflows such as CoreWall/Corelyzer (core-data visualization), PSICAT (lithologic description), Correlator (stratigraphic correlation and core-log integration), and TMI/Tool for Microscopic Identification (sedimentary microscopic component identification, interpretation and description).

CSDCO strives to increase participation of underrepresented groups, engages the public with scientific activities, collaborates with federal agencies and private industry, enhances workforce development and expands access to training and infrastructure. Continental scientific drilling and coring projects offer an opportunity for local residents near drilling and coring sites to partner with the project and take ownership in some of its goals. CSDCO collaborates with project scientists to engage members of the



*The Winkie Drill is particularly suited to drill in the most remote locations: high mountains, deserts, arctic tundra and dense jungles*

public at the earliest stages of project planning, and to develop community-driven research in parallel with project scientific goals. Stakeholders may include primary and secondary education institutions, nonprofits, state and county agencies, business leaders and representatives, and indigenous peoples and tribal governments.

In addition to community-driven research, CSDCO coordinates Research Experiences for Undergraduates (REU) activities that utilize the associated LacCore facility; a summer institute for graduate students; an informal training program for local schoolteachers during major core processing parties to provide perspective on projects and content that can be used in classroom activities; and numerous facility tours, field experiences and school visits to the facility.

Scientists are encouraged to contact Anders Noren ([noren021@umn.edu](mailto:noren021@umn.edu)/612-624-3298), CSDCO Director, to discuss opportunities to utilize the CSDCO resources to support research and educational goals.

## Earth-Life Transitions

Rich Lane

Earth-Life Transitions (ELT) is an effort within the Sedimentary Geology and Paleobiology Program: 1) to stimulate synergistic activities and teams of multi-disciplinary scientists to address critical questions about Earth-Life interactions in Deep Time and 2) to enable team-based interdisciplinary projects on the sedimentary crust involving stratigraphy, sedimentology, paleontology, proxy development, calibration and application studies, geochronology and modeling at appropriately resolved scales of time and space in order to understand major linked events of environmental, climate and biotic change.

In the first competition in the spring of 2013, the community responded with the submission of 37 projects for consideration. Of those submissions, 9 projects were awarded that were distributed through all parts of the geologic column.

ELT awardees were invited by the China University of Geosciences to present project overviews and initial outcomes at the 3rd International Geobiology Conference in Wuhan, China in June of 2014. All but two of the awardee projects had representatives who traveled to Wuhan to participate in the ELT session.

ELT planned activities over the next year include:

1. T131. Critical Earth-Life Transitions: The Marine Perspective - Vancouver GSA, October, 2014
2. T133. Critical Earth-Life Transitions: The Terrestrial Perspective - Vancouver GSA in October 2014
3. Innovative Approaches to Studying Organisms and Environments in Deep-Time - Society for the Advancement of Native Americans in the Sciences Annual (SACNAS) Conference - Seattle, WA in October 2014. Hosted by STEPPE
4. Innovative Approaches to Studying Critical Transitions in Earth's History - American Association for the Advancement of Science (AAAS) Annual Meeting - San Jose, CA in February 2015. Hosted by STEPPE

## **STEPPE Progress Report**

**Rich Lane**

The STEPPE coordinating office is working to support new research synergies and the development of infrastructure that will encourage the community to contemplate big problems that need to be solved. The office will also facilitate the formation of collaborative research teams to tackle identified problems.

In addition to hosting ELT activities at the SACNAS and AAAS meetings (see above), STEPPE is co-hosting a workshop at the GSA Annual Meeting with the EarthCube-funded Cyber for Paleogeosciences group. This interactive workshop, entitled “Cyberinfrastructure Resources for Paleobiology and Paleoecology,” will allow researchers to interact with data and learn more about the tools that are available through the Paleobiology Database, the Neotoma Database and iDigBio – all of which are NSF-funded initiatives. STEPPE is collaborating with several partners to plan future workshops and events, as well as providing an up-to-date calendar of upcoming events relevant to the deep-time sedimentary crust community. Go to <http://steppe.org/> for more information.

## **NSF Solicitations: TCUP & HBCU-UP**

**Lina Patino**

Two NSF solicitations specifically call for proposals from the geosciences community to improve education and diversity: Tribal Colleges and Universities Program and Historically Black Colleges and Universities Undergraduate Program.

The [NSF 14-572 Tribal Colleges and Universities Program](#) (TCUP) has a new track for Partnerships for Geoscience Education (PAGE) to provide support for collaborations between TCUP and other academic institutions. Goals include improving TCUP institutions' instructional capacity in geosciences; attracting, retaining and supporting TCUP students in internships and research endeavors deemed to be necessary for a complete curriculum offering; and engaging partner universities to provide an academic grounding and a successful transition for students who wish to study or attain degrees in geosciences.

- Proposals due on March 16, 2015
- Project Length: Up to five years
- Award Size: Up to \$5,000,000 per award; up to \$825,000 per institution (up to \$165,000 per institution per year, not to exceed \$1,000,000 per project per year)
- Eligible Institutions: (a) single TCUP institutions or (b) a consortium of institutions (including other TCUP institutions, universities or research organizations) submitting a collaborative project. In collaborative projects, it is expected that one TCUP institution is identified to take the lead on organizational activities, although each institution will independently manage its portion of the award.

The [NSF 14-513 Historically Black Colleges and Universities Undergraduate Program](#) explicitly encourages submission of innovative proposals to address severe underrepresentation of African American students in the geosciences, engineering and physics.

HBCU-UP invites proposals in multiple tracks: Research Initiation Awards, Targeted Infusion Projects, Broadening Participation Research Projects, Achieving Competitive Excellence Implementation Projects and Implementation Projects. Letters of Intent (LOI) are required. LOI and full proposal deadlines vary by track. Budget limitations vary by track. Proposals may only be submitted by accredited HBCUs offering STEM degrees, but collaborations with other institutions are allowed through sub-awards. Other eligibility limitations apply.



**XSEDE****Rachel Thornton, Margaret Doyle**

From earthquake visualizations to data collection storage, Earth Scientists often face a need for high performance computing. Researchers may experience challenges with acquiring access to supercomputers or have questions about using them most effectively. When such issues arise, programs such as the Extreme Science and Engineering Discovery Environment ([XSEDE](#)) lend a hand.

XSEDE, a virtual cyber infrastructure, offers access to distributed computing resources at a variety of scales. The program provides a variety of training classes to help users jump high-tech hurdles. XSEDE is free to the scientific community, including non-NSF grantees. In order to use XSEDE's services, a researcher must first apply from their U.S.-based institution. XSEDE follows the protocol that is outlined in the current NSF Grant Proposal Guide. The XSEDE website has a [video](#) that details how to write a competitive proposal, along with [examples](#) of requests at <https://portal.xsede.org/successful-requests>.

One long-term goal of XSEDE is to connect to every scientific community through shared computational resources at a campus, regional or national level. It does this through the [Campus Champions Program](#). XSEDE Campus Champions provide a source of knowledge at each partner institution about high-performance computing and XSEDE resources. If your institution could benefit from a campus champion, check out the list of partner institutions [here](#).

The XSEDE course calendar offers dates of training classes on topics ranging from science visualizations to parallel computing. XSEDE also has a [news page](#) where upcoming conferences and workshops are advertised. For more information, contact the XSEDE support system ([info@xsede.org](mailto:info@xsede.org)) or check out the getting started guide at <https://www.xsede.org/using-xsede>. A compilation of recent XSEDE highlights (2012- 2013) can be found [here](#).

**Early-Career Geoscience Faculty Visit NSF****Richard Yuretich**

A group of 61 geoscience faculty members in the early stages of their academic careers came to NSF on June 27 as the culminating event of the 2014 Workshop for Early-Career Geoscience Faculty sponsored by the National Association of Geoscience Teachers (NAGT). The four-day workshop was held at the University of Maryland campus in College Park.

Although the participants' research interests were diverse, encompassing many GEO disciplines and unrelated disciplines, the large majority were focused on the Earth Sciences.

Margaret Cavanaugh, Deputy Assistant Director for GEO, and Susan Singer, Division Director for Undergraduate Education, opened the workshop with a welcome and introduction. Participants then headed to small group meetings with program officers.



*Early-Career Geoscience Faculty Workshop participants await the start of the introductory session in the National Science Board Conference Room. Photo courtesy of Adriana Potra*

The EAR program sessions, which provided a general overview of program goals and the proposal evaluation process, generally had five to ten faculty participants. The faculty then fanned out to a number of concurrent sessions on various topics, including Earth Sciences Instrumentation and Facilities, Paleo Perspectives on Climate Change, the CAREER program, and Earthscope. A complete view of the program is available at the Early Career [web site](#).

An important part of the day consisted of individual meetings of workshop participants with program officers in their research areas. Ten EAR program officers and seven from other Divisions spent much of the afternoon in one-on-one conversations discussing research projects and providing advice on proposal preparation.

Exit interviews indicated that this experience was highly valued by all who participated. The participants also indicated that the knowledge they gained during the workshop will help them as they develop their future careers. Plans are in the works to reprise this visit for the workshop in 2015.

### Community Outreach with ReSET: A Personal Experience

**Rachel Thornton**

A group of science assistants and I visited Barrett Elementary of Arlington Public Schools as NSF volunteers with the Washington-DC-based volunteer organization [ReSET](#) to perform a series of science demonstrations. We developed hands-on classroom demonstrations and engaging lectures to deliver in the form of 40-minute classroom visits with Barrett's fifth graders. Lessons included enzyme catalysts with carrots, metabolism with yeast and cave formation (speleothems) with borax crystals and sugar cubes.

ReSET motivates children to discover and explore STEM fields. The organization provided demonstration supplies to enable Barrett's science enrichment teachers Susan Garman and Allyson Greene to incorporate the activities into the school's science enrichment curriculum.



*Student Brian McVicker (left) and NSF volunteer Rachel Thornton (right) with borax crystal experiment*



*Students Michaela Donovan (left) and Samantha Tran (right) with borax crystal creations*

Garman felt the volunteers, ranging in expertise from a geologist, marine biologist, mechanical engineer, physicist, environmental engineer and bioengineer, helped to spark student interest and curiosity. She stated, "In our classes we teach hands-on science as part of the curriculum, but the children view us rather like their parents. With the volunteers they get something different. The scientists talk about their jobs and unique career experiences, not only sharing knowledge in their area of discipline, but their enthusiasm as well. We as teachers learn as much as the students."

She continued, "I felt that seeing scientists in plain clothing rather than with lab coats or equipment talking candidly to students about their path made STEM careers more real to them."

One student timidly approached me at the end of the class to tell me she had been interested in Earth Science since her first rock collection at 5 years old and is now convinced that she wants to be a Geoscientist when she grows up.

**Broader Impacts - Examples from the Ground****Justin Lawrence**

In collaboration with EAR Program Directors, we have compiled a great list of examples of broader impacts that we continue to share with you in coming issues of *EAR to the Ground*. These examples range in scope, audience, and approach. However, they share some common traits: engaging relevant partners during the planning of the activity, implementation focused on the audience, and follow up activities. These examples include broader impacts activities related to outreach to the scientific community, undergraduate education, instrumentation, international collaborations, broadening participation, K-12 education, informal science education, and applications of research results. Our intent is not to have all the broader impacts in EAR look alike, but to have the broader impacts be as well informed, planned, and executed as the research projects.

**Protecting Human Safety & Mitigating Economic Losses through Research on Natural Hazards**

Award Number: 1160355

*Collaborative Research: Towards Elucidating the Transport Mechanisms of Fine Volcanic Ash*

PIs: Alexander Proussevitch, Joseph Klewicki, Gopal Mulukutla, Christopher White (University of New Hampshire), Dork Sahagian, Kimberly Genareau\* (then Lehigh University now University of Alabama).

**Research:** This tests the viability of using novel instrumentation to determine the transport properties of fine volcanic ash in the atmosphere. The team is exploring how the different sizes and shapes of ash particles, not just their density, affect ash transport in the atmosphere.

**Broader impact activity:** Volcanic ash clouds present a hazard to the aviation industry. Tiny ash particles can abrade the outer covering of airplanes and coat internal engine parts, which can result in loss of thrust. This is clearly a public safety concern and can cause billions of dollars in economic losses when planes cannot fly. Better knowledge of volcanic hazards, as well as other natural hazards, such as floods, earthquakes, and tsunamis, can both protect public health and minimize future economic losses.



*Volcanic ash can seriously disrupt air travel.  
Credit: Greg Waite, Michigan Tech*

**Implementation:** This project engages researchers at multiple institutions with a well-defined plan for sharing cutting-edge facilities, including the giant low-turbulence, slow-flow wind tunnel at University of New Hampshire and the Center for Optical Technologies at Lehigh University. It also establishes an interdisciplinary collaboration between volcanologists and fluid dynamics engineers.

**Impact:** These researchers are conducting experiments and developing computer models to forecast how ash moves in the atmosphere. Such knowledge and tools may allow prediction of how long it will take for skies to clear following volcanic eruptions and how long before planes can fly safely again. This is a specific, desired societal outcome with direct relevance for the aviation industry.

## Upcoming Deadlines and Target Dates

[Paleo Perspectives on Climate Change](#)  
([NSF 13-576](#)) Full Proposal Deadline:  
October 15, 2014

[Advancing Digitization of Biodiversity Collections](#)  
([NSF 13-569](#)) Full Proposal Deadline:  
October 17, 2014

[Partnerships for International Research and Education](#)  
([NSF 14-587](#)) Preliminary Proposal Deadline:  
October 21, 2014

[Graduate Research Fellowship Program](#)  
([NSF 14-590](#)) Full Proposal Deadline:  
November 4, 2014

[East Asia and Pacific Summer Institutes for U.S. Graduate Students](#)  
([NSF 13-593](#)) Full Proposal Deadline:  
November 13, 2014

[Integrated Earth Systems](#)  
([NSF 12-613](#)) Full Proposal Deadline:  
November 14, 2014

[Instrumentation and Facilities](#)  
Full Proposals Accepted Anytime



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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](mailto:YLIU@nsf.gov)

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This issue of *EAR to the Ground* was edited by Margaret Doyle, Rachel Thornton, Yusheng "Chris" Liu, Neysa Call and Melissa Lane