

EAR TO THE GROUND

Spring 2013

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

IN THIS ISSUE

Update from the Division Director	1	EarthCube Domain Workshop Update	6
Broader Impacts – Examples from the Ground	3	Instrumentation & Facilities Highlight: The Arizona LaserChron Center	6
Suresh Named Carnegie Mellon President	4	Upcoming NSF Proposal Deadlines and Target Dates	8
New Program Officer Dr. Zheng-Kang Shen	5	Supplementary Issue: GEO Innovation Newsletter	10
Farewell to Dr. Tobias Fischer	5		
Water Sustainability and Climate	5		



Joshua Tree National Park

Update from the Division Director

As my time at NSF lengthens, I am beginning to appreciate the dynamic environment of our scientific staffing: although most of you know that we hire temporary staff as program officers under the Intergovernmental Personnel Agreement (IPAs or “rotators”), you may be unaware of some of the other opportunities that arise for our permanent staff as their careers unfold. We are pleased to announce that **Eva Zanzerkia**, Program Officer in the Geophysics Program, has accepted a short-term assignment to lead the development of EarthCube for the Geosciences Directorate. To cover Eva's responsibilities, EAR is pleased to welcome **Dr. Zheng-kang Shen**, UCLA, to our geophysics program. We said farewell to **Tobias Fischer** in January: Tobias was a program officer in Instrumentation and Facilities and has returned to his home institution, University of New Mexico, Albuquerque.

Despite my comment to you in the Fall, that perhaps there would be better clarity to our budget by now, the landscape remains uncertain. We continue to operate under a Continuing Resolution based on the FY12 budget which expires March 27, 2013, and as do many other agencies, face the potential for

budget “sequestration” which is set to take effect in March, 2013 pending any action to address this by Congress. I encourage all of you to look for funding opportunities within the larger, cross-directorate and Foundation-wide initiatives including the [Science, Engineering, and Education for Sustainability \(SEES\) portfolio](#). Another opportunity for EAR’s community is through the various programs that NSF offers to facilitate innovation and industry collaboration. Geophysics Program Officer Raffaella Montelli is our Directorate-wide point of contact and passionate advocate for NSF’s Innovation Call. Please see the attached [GEO Innovation Newsletter](#) for an introduction to opportunities you may not have previously considered.

A new version of the NSF [Proposal & Award Policies & Procedures Guide \(PAPPG\), \(NSF 13-1\)](#), has been issued. The PAPPG is comprised of documents relating to the Foundation’s proposal and award process and is effective for proposals submitted or due on or after January 14, 2013. One of the most significant changes to the PAPPG is revision to the merit review criteria and the Foundation is conducting extensive outreach to the internal and external NSF communities including: a revised [NSF Merit Review website](#) with updated information about the revisions; and, a [resource website for the proposer community](#) containing presentations, fact sheets and other important links. We encourage you to explore these sites. Those of you who review proposals for us by mail or within panels will be asked to address the following five review elements in **both** the Intellectual Merit and the Broader Impacts of a project:

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

These new criteria require us – both at NSF and in the community – to think critically about what kinds of resources our PIs need in order that proposals can be written and reviewed in line with the five elements and that when the work is completed, EAR investigators have contributed meaningfully, regardless of the scope of the work, to a body of knowledge on effective implementation and assessment of a wide range of Broader Impact activities. In 2009, our summer intern analyzed 366 awards made in FY2008, documenting over 1700 proposed Broader Impacts activities. From this compilation, we learned that almost all EAR investigators engage in education and broadening participation activities to meet the intent of the Broader Impacts criterion. We also found that only rarely did PIs take advantage of existing NSF resources – for example, AGEP ([Alliances for Graduate Education and the Professoriate](#)) and RET ([Research Experiences for Teachers](#)). EAR Program Officers seek to engage our community in the development of earth science-oriented resource materials to help you in writing and reviewing proposals, and in implementing and assessing effective education and broadening participating activities.

We will use *EAR to the Ground* to illustrate successful projects and best practices, choosing a variety of examples that range from activities that can reasonable be accomplished by a single PI to the larger initiatives required in some solicitations. In this edition of our newsletter, we begin with the article by Lina Patino, our Program Officer for Education and Human Resources.

Wendy Harrison
Director, Division of Earth Sciences

Broader Impacts – Examples from the Ground

In collaboration with EAR program directors, we have compiled a great list of examples of broader impacts that we will 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, K12 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.

Engaging High School Educators in Field Work

Introduction: The following broader impact activity is part of a Partnerships for International Research and Education (PIRE) award, which is supported by the Office of International Science and Engineering, Division of Earth Sciences, and the Division of Research on Learning in Formal and Informal Settings. The primary goal of PIRE is to support high quality projects in which advances in research and education could not occur without international collaboration. Thus, this broader impact activity has some components that not all EAR awards share (e.g. international collaborative research experience). However, we consider that this broader impact activity has best practices applicable for other K-12 educational broader impacts regardless of the location of the research project, meeting with teachers before and after the research experience.

Award Number: 0966884

PIRE: Ancient biodiversity and global change in the New World Tropics:

A once-in-a-century opportunity along the Panama Canal

PI: Bruce J. MacFadden, University of Florida

Research: The mission of the Panama Canal Project (PCP) PIRE is to advance knowledge of the extinct faunas and floras of the ancient Neotropics based on the new fossil discoveries along the Panama Canal expansion.

Broader Impact Activity: Six high school educators joined PCP PIRE researchers in the field for two weeks and developed inquiry-based curriculum using the knowledge and experience gained in the field.



Teachers collecting from the middle Miocene Cucaracha Formation along the Panama Canal (credit: Bruce McFadden)

Implementation: This activity was designed with the assistance of a graduate student in the Department of Education specializing in Teacher Professional Development and who argued for multiple engagement opportunities with the teachers.

- A team of representatives from PCP PIRE *met with the teachers prior to the trip to Panama*. The team included one PI, one STEM faculty instructor, one undergraduate student, and one evaluator for the PIRE. At the meeting, the *teachers were introduced to the PCP PIRE research*, examined previously collected samples, and *were given guidelines* for the field work they would do in Panama.
- In the field, the teachers joined the team collecting samples and performing tasks like other members of the research team. The teachers *collected their own fossils* to bring back to the classroom. In addition, the teachers had the opportunity to *test some lesson plans while in the field working with a 4th grade class from a school in Panama*.
- Upon returning to the USA, the teachers included materials related to their research experience in their curriculum. In addition, there were *monthly conference calls with the teachers, the STEM instructor and the undergraduate student*. Six months after returning, *the PIRE team went back to meet in person with the teachers* for follow up and post-trip assessment.

Impact: Teachers experienced field research in the tropics, increased their understanding of geology, paleontology, and tropical biodiversity and they had the opportunity of professional development within an international context. The teachers developed high school science curricula for biology, environmental science, and chemistry classes addressing issues like ancient biodiversity, climate change, and evolution. These curricula have been used in 12 classes, engaging 500 high school students. The teachers gave presentations at the Geological Society of America Annual meeting.

“My experience in Panama made a profound and lasting impression on my understanding of scientific process and provided me with the tools and inspiration to effectively build this into my teaching practice.” Daniel C. Johnston, Educator at the Santa Cruz City Schools

References:

MacFadden, B.J., 2012, Broader Impact activities of the Panama Canal Project: adding value and expanding the reach of stem research and education in the U.S. and Latin America. GSA Meeting Abstracts with Programs. Vol. 44, no. 7, p.268.

McLaughlin, C. et al., 2012, Research Experience for teachers (RET): Using paleontology fieldwork in the Panama Canal to support professional learning. GSA Meeting Abstracts with Programs. Vol. 44, no. 7, p.269.

Johnston, D.C. and MacFadden B.J., 2012, International stem teacher project: a uniquely valuable professional development opportunity for science educators in Panama. GSA Meeting Abstracts with Programs. Vol. 44, no. 7, p.269.

Falls, S.F. et al., 2012, International professional learning experience for high school science teachers: incorporating scientific knowledge and methodology from the Panama Canal project into the classroom. GSA Meeting Abstracts with Programs. Vol. 44, no. 7, p.269.

NSF Director Subra Suresh Named Carnegie Mellon University President

National Science Foundation Director Subra Suresh announced February 5 that he will step down from his current role at NSF at the end of March to accept an appointment as Carnegie Mellon University's ninth president, effective July 1.

In a statement released the same day, President Barack Obama wrote, "We have been very fortunate to have Subra Suresh guiding the National Science Foundation for the last two years. Subra has shown himself to be a consummate scientist and engineer--beholden to evidence and committed to upholding the highest scientific standards. He has also done his part to make sure the American people benefit from advances in technology, and opened up more opportunities for women, minorities, and other underrepresented groups. I am grateful for his service."

EAR Welcomes New Program Officer Dr. Zheng-Kang Shen



Dr. Zheng-Kang Shen is a research geophysicist with the Department of Earth and Space Sciences, UCLA. He received a BS in Geophysics from Peking University in China, and a PhD in Geophysics and Space Physics from UCLA. He has been working with the geophysics community for more than 20 years, focusing on space geodesy techniques such as GPS and InSAR and their applications to crustal deformation monitoring, tectonic deformation and modeling, fault zone physics and earthquake processes, geophysical inversion problems, and earthquake probability and hazard assessments. He served as a guest associate editor for the Bulletin of Seismological Society of America (BSSA).

EAR Says Farewell to Dr. Tobias Fischer

EAR said farewell to Tobias Fischer in January. Tobias served as a Program Director (IPA) in the Instrumentation & Facilities Program beginning in September 2011. Tobias returns to the University of New Mexico where he is a Professor of Volcanology in the Department of Earth and Planetary Sciences. EAR would like to thank Tobias for his service to the community and for his dedication while at NSF.



Water Sustainability and Climate



The revised Water Sustainability and Climate (WSC) solicitation ([13-535](#)) has recently been issued. The goal of this program is to enhance the understanding and predict the interactions between the water system and land use changes, the built environment, ecosystem function and services and climate change/variability through place-based research and integrative models. Studies using models and/or observations at specific sites that allow for spatial and temporal

extrapolation to other regions, as well as integration across the different processes are encouraged. There are three award categories: (1) small team synthesis, modeling, integration and assessment, (2) place-based modeling studies with new observations, and (3) synthesis, modeling and integration that will use only existing data to integrate and synthesize across watershed and groundwater sites. Please note that the description for these categories have been modified from the previous solicitation.

Deadline: September 10, 2013.

EarthCube Domain Workshop Update

EarthCube Domain Workshops are continuing to be held. To date, there have been 10 workshops that have been held across the geosciences and 5+ are scheduled for the next 6 months. Workshop reports can be found on the EarthCube.ning.com site.

Upcoming workshops include:

- [Education and Workforce](#) (Date: March 4-5, 2013); Location: Scripps Institution of Oceanography, La Jolla, CA; Contact: Cheryl Peach, cpeach AT ucsd.edu
- [Petrology and Geochemistry](#) (Date: March 6-7, 2013); Location: National Museum of Natural History, Washington, DC; Contact: Kerstin Lehnert, lehnert AT ideo.columbia.edu
- [Sedimentary Geology](#) (Date: March 25-26, 2013); Location: University of Utah, Salt Lake City; Contact: Marjorie Chan, marjorie.chan AT utah.edu
- **Community Modeling** (Date: April 22-24, 2013); Organizer: Louise Kellogg (University of California, Davis)
- **Increasing the Access to and Relevance of Marine Seismic Data** (Marine Geophysics) (Date: TBD - most likely Fall 2013); Location: UT Austin, Austin TX; Organizers: Jamie Austin (UT Austin), T. Shipley (UTIG), N. Bangs (UTIG), J. Snedden (UTIG), D. Arctur (Bureau of Economic Geology, Jackson School of Geosciences, UT/Austin), S. Carbotte (Lamont-Doherty Earth Observatory, Columbia University), J. Childs (U.S. Geological Survey), and A. McGrail (ION Geophysical)

Past Workshops:

- **Geochemistry**: June 28, 2012
- **MYRES V: The Sedimentary Record of Landscape Dynamics**: August 8, 2012
- **Envisioning Success - A Workshop for Next Generation EarthCube Scholars and Scientists**: October 17-18, 2012
- **Structural Geology and Tectonics**: October 20-21, 2012
- **EarthScope**: October 29-30, 2012
- **Experimental Stratigraphy**: December 11-12
- **Shaping the Development of EarthCube to Enable Advances in Data Prediction and Ensemble Assimilation**: December 17-18
- **Engaging the Critical Zone Community to Bridge Long Tail Science with Big Data**: January 21-23, 2013
- **Envisioning a Digital Crust for Simulating Continental Scale Subsurface Fluid Flow in Earth System Models**: January 29-31, 2013
- **Cyberinfrastructure for Paleogeoscience**: February 4-6, 2013

Instrumentation and Facilities Highlight: The Arizona LaserChron Center

The [Instrumentation & Facilities Program](#) of the Division of Earth Sciences (EAR/IF) supports eighteen (18) 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.

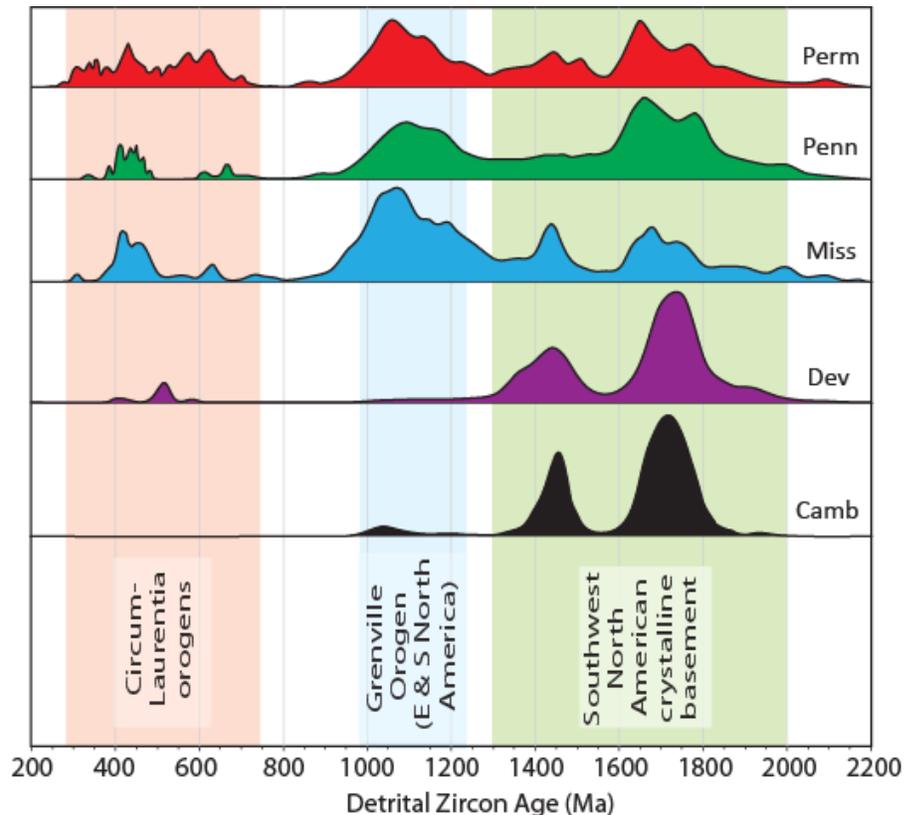
EAR to the Ground is continuing to highlight some of these facilities, to make the community aware of the incredible capabilities sponsored by EAR/IF. You can download the newly-updated guide to multi-user facilities [here](#).

In this issue, we bring you a highlight from the [Arizona LaserChron Center \(ALC\)](#). The ALC is an EAR/IF multi-user facility that provides instrumentation and expertise for generating U-Th-Pb

geochronologic data and complementary geochemical information by Laser Ablation-ICP-Mass Spectrometry. The center's primary goals are to:

- Maintain a facility that generates U-Th-Pb ages and Hf isotope ratios of the best precision and accuracy possible by LA-ICPMS.
- Provide opportunities for NSF-supported researchers and students to use our instruments and expertise to address geologic problems, and also to learn the theory and methodology of U-Th-Pb geochronology and related geochemistry.
- Drive the development of new applications of LA-ICPMS.

One of the primary areas of research at the ALC involves the determination of U-Th-Pb ages and complementary geochemical information from detrital minerals. An example of this type of research (see accompanying figure) is a recent study of detrital zircon grains from Paleozoic sandstones of the Grand Canyon (Gehrels et al., 2011, *Detrital zircon U-Pb geochronology of Paleozoic strata in the Grand Canyon: Lithosphere*, v. 3 (3), p. 183-200). Rather than the traditional view that these sandstones were derived from relatively nearby crystalline basement, the data demonstrate that most sandstones contain abundant detritus derived from Circum-Laurentian orogenic systems, such as the Grenville, Appalachian, Caledonian, and/or Franklinian orogens. Detrital zircon studies are similarly revolutionizing current understanding of paleogeography and provenance in many different regions of the world, and also providing new insights into processes of orogenesis, sediment generation/dispersal, and crustal growth/recycling.



Age-distribution diagram of detrital zircon ages from Paleozoic sandstones of the Grand Canyon, Arizona, USA. Each curve consists of U-Pb ages determined from zircon grains extracted from multiple samples of Cambrian, Devonian, Mississippian, Pennsylvanian, and Lower Permian sandstone. A total of 2677 U-Pb ages are shown. Vertical shaded regions indicate the ages of rocks exposed in interpreted source regions.

Detrital mineral research has a very exciting future given the number of different minerals that can provide U-Th-Pb geochronologic and complementary geochemical information (e.g., zircon, monazite, titanite, apatite, rutile, garnet) coupled with the wide range of information that can be extracted from these minerals (e.g., crystallization age, cooling age, crystallization temperature, history of fluid interactions, petrogenetic conditions). To take advantage of these new applications, the ALC has recently acquired a single-collector mass spectrometer that can be operated in tandem with the existing multi-collector mass spectrometer to study several different systems efficiently and from the same volume of material (e.g., U-Th-Pb age, Hf isotope composition, and REE/trace element abundances). We have also acquired a new SEM equipped with EDS, EBSD, and color/UV CL capabilities in order to generate high-resolution images and compositional/crystallographic information from minerals to be

analyzed.

In an effort to maximize community access to this type of information, the ALC has teamed up with researchers from the EarthChem, EARTHTIME, and Cirdles Initiatives to build a global database of ages and complementary geochemical information (<http://www.geochron.org/detritalsearch.php>). A significant portion of the published detrital mineral information has been loaded into the database, and the remaining legacy data is being uploaded and cyberinfrastructure is being developed to facilitate incorporation of new data.

In addition to detrital mineral research, the ALC supports studies of the petrogenesis of granitic batholiths, origin of loess deposits for paleoclimate reconstructions, ages of ore deposits around the world, chronology of early hominids, metamorphic and exhumation history of orogenic belts, sub-glacial geology of Greenland and Antarctica by analyzing ice-rafted sediment, and deformational chronology by analyzing pre-, syn-, and post-tectonic igneous rocks. The archeological community has also begun to conduct geochronologic analyses of temper sands and mano stones to reconstruct ancient trade routes.

Outreach efforts include:

- Teaching annual short courses on geochronologic techniques and applications at National GSA and AGU Meetings.
- Subsidizing travel and lodging expenses to facilitate student research.
- Creating and distributing educational materials on geochronologic theory and methods (see ALC web page).
- Providing tools for data analysis and plotting of geochronologic and geochemical data (see ALC web page).
- Compiling information about the various minerals standards available for analysis by LA-ICPMS (see ALC web page).

Please contact Mark Pecha (mpecha@email.arizona.edu), manager of the ALC, for information about analytical methods, schedules, costs, support letters, etc.

Upcoming NSF Proposal Announcement 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:

EarthCube

(NSF 13-529) Full Proposal Deadline: March 26, 2013

Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE)

(NSF 13-518) Letter of Intent: March 29, 2013. Track 2 Full Proposals: May 13, 2013. Track 1 Full Proposals: May 29, 2013. Director's INSPIRE Awards Full Proposals: May 29, 2013

Hydrologic Sciences

(NSF 13-531) Full Proposal Deadline: June 3, 2013

Geophysics

(NSF 12-598) Full Proposal Target Date: June 5, 2013

Petrology & Geochemistry

(NSF 09-543) Full Proposal Window: June 6, 2013 - July 6, 2013

Tectonics

(NSF 09-542) Full Proposal Window: June 6, 2013 - July 6, 2013

Geoinformatics

(NSF 11-581) Full Proposal Deadline: July 1, 2013

Geomorphology and Land Use Dynamics

(NSF 09-537) Full Proposal Deadline: July 16, 2013

Geobiology and Low-Temperature Geochemistry

(NSF 09-552) Full Proposal Deadline: July 16, 2013

EarthScope

(NSF 12-550) Full Proposal Deadline: July 16, 2013

Sedimentary Geology and Paleobiology (Track 1 only)

(NSF 12-608) Full Proposal Deadline: July 18, 2013

Instrumentation and Facilities: Full Proposals Accepted Anytime

The revised version of the [NSF Proposal & Award Policies & Procedures Guide \(PAPPG\), NSF 13-1](#) is effective for proposals submitted, or due, on or after January 14, 2013.

Also, beginning March 15, 2013, Fastlane will begin compliance checking required proposal components. Fastlane will not accept the proposal if any of the following components is not present:

- Cover Sheet – including certifications
- Project Summary
- Project Description
- References Cited
- Biographical Sketch(es)
- Budget and Budget Justification
- Current and Pending Support
- Facilities, Equipment & Other Resources
- Supplementary Documentation
 - Data Management Plan
 - Postdoctoral Mentoring Plan (where applicable)



[@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](#)

[NSF](#)

[EarthScope](#)

[GeoPRISMS](#)



National Science Foundation
4201 Wilson Blvd.
Arlington, VA
22230

phone: 703.292.8550
web: <http://www.nsf.gov>

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 sge@nsf.gov.

To subscribe to EAR to the Ground, send an email to listserv@listserv.nsf.gov

The text of the email must be in this format:

subscribe [listname] [subscriber's name]

For example:

subscribe EARTH Alfred Wegener

GEO'S INNOVATION CALL NEWSLETTER

GEO is calling for its PIs to participate in the NSF's Innovation Call. We are looking for research ripe for commercialization, for PIs interested in having students co-advised with Industry, for PIs interested in working with their counterparts in Industry, for faculty members interested in creating new education curricula with innovation activities, and for much more. Some of these activities have been in place since the late 70s, but where are you? We know that GEO-related PIs have a lot to contribute, so please call us!

On this page, you find a list of various NSF-wide programs that support the Innovation Call. On the following pages are examples of GEO-related engagement in some of these programs.

NSF's Innovation Call

"Innovation – the process by which individuals and organizations generate new ideas and put them into practice – is the foundation of American economic growth and national competitiveness." The White House

Build an academic industry platform to perform fundamental research of common interest

I/UCRC – Industry University Cooperative Research Centers Program
Up to 16 years of NSF funding (1 yr planning + 5 yrs Phase I + 5 yrs Phase II + 5 yrs Phase III) to manage the center. Multi-institutional centers are preferred. Industry partners pay a membership fee to participate in the center. International partners are welcome, though restrictions on funding apply.
<http://www.nsf.gov/eng/iip/iucrc/>

Educate and train

IGERT – Integrative Graduate Education and Research Traineeship Program
Establish new models for graduate education and training that include integrated interdisciplinary research and innovation activities supported by an additional up to \$200,000 Competitive Innovation Incentive Fund.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12759

GOALI – Grant Opportunities for Academic Liaison with Industry
Project funds or fellowships/traineeships available to support an eclectic mix of industry-university linkages.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504699&org=NSF&sel_org=XCUT&from=fund

ATE – Advanced Technological Education Program
With an emphasis on two-year colleges, program focuses on the education of technicians for the high-technology fields.
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5464

Accelerate the Translation of Research Discoveries into Commercial Products

Motivate the translation and transfer of your research discovery:
AIR – Accelerating Innovation Research
http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504790

Discover your customers:
i-Corps Teams – Innovation Corps Teams Program
\$50,000 to help you find your market and define your best business plan.
http://www.nsf.gov/news/special_reports/i-corps/sites.jsp

Translate your research product in a commercial reality:
BIC – Building Innovation Capacity
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504708
STTR – Small Business Technology Transfer/ASET – Accelerating Sustainability using Enabling Technologies
<http://www.nsf.gov/pubs/2013/nsf13501/nsf13501.htm>
SBIR – Small Business Innovation Research
<http://www.nsf.gov/eng/iip/sbir/index.jsp>

Discovery Academia — — — — — **Development** — — — — — **Commercialization Industry**

Latest News

The first GEO/EAR Industry/University Cooperative Research Center is in the works.

GEO/EAR is proud to announce the planning of the “Center for Geothermal Energy Resources (CGER)”, a NSF Industry-University Cooperative Research Center (I/UCRC) co-funded with the Engineering Directorate. The center comprises two academic institutions (U.C. Davis and U. Nevada at Reno) and several industry partners:

<http://174.143.170.127/iucrc/publicFactSheetServlet?centerId=80>

Our PI Wendy Calvin, CGER Center Deputy Director, attended the 2013 NSF I/UCRC Annual Meeting held in Arlington, from Jan 9 to Jan 11, 2013, together with many members of several of the currently active and in planning NSF I/UCRC centers.

GEO I-Corps Teams put their entrepreneurial skills in action.

Two GEO-teams are currently participating in the i-Corps Teams Curriculum to assess the prospects for commercializing their research products derived from their respective NSF awards:

Online Groundwater Trading Team

*PI **Nicholas Brozovic**, an Associate Professor in Agricultural and Consumer Economics at the University of Illinois, his student and Entrepreneurial Lead **Richel Young**, a dual MS student in Applied Economics and Civil and Environmental Engineering at the University of Illinois, and their i-Corps mentor **Charles Linville**, an entrepreneur with extensive direct experience in a variety of agricultural-related businesses, are bringing to the market their “Online clearing house for trading resource use rights with environmental and spatial constraints”*

http://www.nsf.gov/awardsearch/showAward?AWD_ID=1313526&HistoricalAwards=false
(EAR)

Stakeholder Alignment Team

*PI **Joel Cutcher-Gershenfeld**, a professor and former dean of the School of Labor and Employment Relations at the University of Illinois, Urbana-Champaign; his student and Entrepreneurial Lead **Mark Nolan**, a Ph.D. student in the Graduate School of Library and Information Science; and their mentors **Patrick Canavan** and **Michael Haberman** are testing the ground for their “Stakeholder Alignment for Public-Private Partnerships”*

http://www.nsf.gov/awardsearch/showAward?AWD_ID=1313562&HistoricalAwards=false
(OCI/EAR)

Below are the first impressions of the **Online Groundwater Trading Team** members, right after the three-day kickoff workshop of the I-Corps curriculum held in Arlington, VA from January 22 to January 24, 2013.

Richael Young, the **Entrepreneurial Lead** says: “This program is painful, but painfully helpful. The I-Corps faculty are brutally honest, pushy -- even interrogative. As someone who hates public speaking, this has been really tough for me. And still I know that their comments are fair and require me to be informed, to have evidence, to have my next steps ready, and to connect all of these together. I'm being prepared for the career ahead of me, and picking up some confidence along the way.

The hands-on approach of I-Corps requires us to discover the problem statement first. At a university, this is given, and something I've taken for granted. So far, my education has been geared toward developing problem-solving skills, but I was never taught how to figure out the problem. I-Corps is about talking to people, discovering their problems, and solving their problems -- in that order. I'll use this methodology for the rest of my life.”

Nick Brozovic, the **Principal Investigator** (PI), says: “I found the teaching team's focus on a hypothesis-based approach to analyze problems from a customer's perspective to be very helpful. Just a few days into the program, the ideas I've learned have made me change the work I'm doing on one of my other current research projects. I'm certain that how I go about my research in the future will be affected enormously by the I-Corps program.

The I-Corps program also represents a unique professional development opportunity for the graduate students involved. Student entrepreneurial leads are placed in a position of great responsibility at the start of the program and their responsibilities and NSF's expectations increase from there. For the right students, the experience is clearly transformative.”

Charlie Linville, the **i-Corps Mentor**, says “Where was this program when I was starting my businesses? The emphasis on the customer development process is quite valuable. The needs of others that are most pressing are not always the ones that a firm goes in ready to address. I think that the emphasis on pace of talking with customers is spot-on, and the cohort format is particularly effective.”

Past GEO I-Corps Team awards:

I-Corps: The Charge Tracker (AGS/ATM)

http://www.nsf.gov/awardsearch/showAward?AWD_ID=1242358&HistoricalAwards=false

I-Corps: A low cost GPS snow sensor (EAR)

http://www.nsf.gov/awardsearch/showAward?AWD_ID=1249009&HistoricalAwards=false

I-Corps: InSpace - Revolutionizing geoinformatics through commercial satellite hosted payloads (AGS/ATM)

http://www.nsf.gov/awardsearch/showAward?AWD_ID=1262258&HistoricalAwards=false

I-Corps: Open-path, compact nitrous oxide sensor using quantum cascade laser spectroscopy (AGS)

http://www.nsf.gov/awardsearch/showAward?AWD_ID=1263579&HistoricalAwards=false

For information please contact:

Raffaella Montelli, Program Officer

rmontell@nsf.gov