

Preview of Award 1216301 - Final Project Report

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Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
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Project Title:	Earth Science Education and Outreach Provider Summit
PD/PI Name:	Steven C Semken, Principal Investigator J Ramon Arrowsmith, Co-Principal Investigator
Recipient Organization:	Arizona State University
Project/Grant Period:	01/15/2012 - 12/31/2013
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Submitting Official (if other than PD\PI):	N/A
Submission Date:	N/A
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	N/A

Accomplishments

* What are the major goals of the project?

Our goal is to develop contacts and improve coordination among organizations that have a relationship to EarthScope education, public outreach, or science to promote effective development, dissemination, sharing, and usage of the resources of the EarthScope project and of the participating organizations.

* What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?

Major Activities: ESNO received funding from NSF (EAR 1216301) to organize and host a two-day **Earth Science Education and Outreach (E&O) Provider Summit** at Tempe on 20-21 February 2012. Eleven organizations:

- *American Geosciences Institute* [AGI];
- *Consortium of Universities for the Advancement of Hydrologic Science, Inc.* [CUAHSI];
- *Critical Zone Observatories* [CZO];
- *Drilling, Observation, and Sampling of the Earth's Continental Crust* [DOSECC];
- *Geodynamic Processes at Rifting and Subducting Margins* [GeoPRISMS];
- *Incorporated Research Institutions for Seismology* [IRIS];
- *National Center for Earth-surface Dynamics* [NCED] with *Geoscience Alliance* [GA];

- *Network for Earthquake Engineering Simulation* [NEES];
- *Southern California Earthquake Center* [SCEC];
- *UNAVCO, Inc.*; and
- *United States Geological Survey* [USGS]

sent representatives to convene with EarthScope and NSF. ESNO also subcontracted with the *Science Education Resource Center* [SERC] at Carleton College, which served as co-facilitator, external evaluator, and archivist for the Provider Summit. SERC established a Provider Summit website (serc.carleton.edu/earthscope-eno/index.html) and also submitted a Final Report, which is included in the Final Report Addendum.

The Provider Summit included a comprehensive review and group discussion of the E&O programs and resources of the participating organizations, networking opportunities, and a day-long session in which self-organized working groups identified and prepared draft white papers on the following topics relevant to Earth science E&O: (1) Effectively measuring program impact; (2) Using an Earth-system approach to organize ideas, resources, content, and pedagogy in informal learning environments; (3) Developing inter-organizational web resources focused on specific issues such as hydrofracking; and (4) Effectively using social media for E&O. SERC also presented its own pre-Summit review of the online E&O resources of the participating organizations.

Specific Objectives: Specific objectives were to organize and hold the Provider Summit, to facilitate collaborations among the participating institutions and with EarthScope both during and after the Provider Summit, and to maintain communications between EarthScope and the participating organizations.

Significant Results: Project outcomes and deliverables include Provider Summit websites on SERC (serc.carleton.edu/earthscope-eno/index.html) and the EarthScope website (www.earthscope.org/events/workshops/); enhanced participation by some participating organizations (AGI, GeoPRISMS, Geoscience Alliance, and SCEC) in EarthScope E&O activities, and facilitated collaboration among some of the participating organizations even outside of EarthScope-specific activities, which are detailed below.

We have compiled all relevant records and products from the Provider Summit itself as a 339-page **Addendum** PDF that can be viewed or downloaded (warning: it is 32 MB in size) from this website:

<http://semken.asu.edu/esno/providersummit.pdf>

The contents of this Addendum PDF are:

- Introduction and Table of Contents (pages 1-2)
- Final Agenda for Provider Summit (pages 3-5)
- Roster of Provider Summit Participants (pages 6-7)
- Final Report on the Provider Summit from SERC (pages 8-10)
- PowerPoint Presentations by ESNO and Eleven Participating Organizations (AGI, CUAHSI, CZO, DOSECC, GeoPRISMS, IRIS, NCED/Geoscience Alliance, NEES, SCEC, UNAVCO, and USGS; pages 11-305)
- Screen Captures from SERC Provider Summit Web Page (pages 306-336)
- Post-Summit Evaluations (pages 337-339)

Key outcomes or Other achievements: Key outcomes included enhanced participation by some participating organizations (AGI, GeoPRISMS, Geoscience Alliance, and SCEC) in EarthScope E&O activities, and facilitated collaboration among some of the participating organizations even outside of EarthScope-specific activities:

American Geosciences Institute and EarthScope

Following the Provider Summit, EarthScope E&O personnel have given invited presentations on the EarthScope Program and EarthScope science to Earth and Space Sciences teachers participating in several AGI-sponsored Teacher Leadership Academies (professional development workshops): at Houston, TX in summer 2011; at Tempe, AZ in summer 2011 and 2012; and at Pasadena, CA in summer 2013. EarthScope will also participate in a workshop planned for Salisbury, MD in summer 2014. Further, Provider Summit funding was used to bring Dr. Ian MacGregor, an AGI representative who also attended the Provider Summit, to participate in the 2013 EarthScope National Meeting in Raleigh, NC.

GeoPRISMS and EarthScope

The participation by GeoPRISMS in the Provider Summit led directly to regular invited participation by a GeoPRISMS researcher, Dr. Peter van Keken, as a facilitator in the ongoing series of EarthScope Interpretive Workshops, including the Northeastern workshop in fall 2013 and the upcoming Alaska/Yukon workshop in spring 2014.

Geoscience Alliance (NCED) and EarthScope

Provider Summit funding was used to bring Dr. Diana Dalbotten, director of the Geoscience Alliance, to participate in the 2013 EarthScope National Meeting in Raleigh, NC. Dr. Dalbotten is a regular collaborator with EarthScope on E&O, including a planned series of Native American Science Educator Workshops, in the same vein as the Interpretive Workshops but aimed at formal educators in Native American communities, beginning in 2015.

Southern California Earthquake Center and EarthScope

The participation by SCEC in the Provider Summit led directly to regular invited participation by a GeoPRISMS researcher, Dr. Robert deGroot, as a facilitator in the ongoing series of EarthScope Interpretive Workshops, including the Southeastern workshop in spring 2013, the Northeastern workshop in fall 2013, and the upcoming Alaska/Yukon workshop in spring 2014.

Past and current EarthScope National Offices

Dr. Bob Lillie, the E&O Director for the previous ESNO at Oregon State University, participated in the Provider Summit and shared his experience and expertise with all participants. Further, Provider Summit funding was used to bring Dr. Lillie to participate in the 2013 EarthScope National Meeting in Raleigh, NC. Thus, the Provider Summit enhanced continuity of knowledge transfer between the two sequential ESNO programs.

Geoscience Alliance and CUAHSI

Dr. Diana Dalbotten of the Geoscience Alliance and Dr. Rick Hooper, director of CUAHSI, were both participants at the Provider Summit, and met there to discuss common interests regarding water-resources and other hydrological issues relevant to Native American nations. As a result, Dr. Dalbotten and the GA are now actively collaborating with CUAHSI.

*** What opportunities for training and professional development has the project provided?**

The Provider Summit provided opportunities for Earth science E&O professionals to share expertise and experiences, first in

an informal workshop, and subsequently by telecommunication and by informal gatherings at EarthScope exhibits at national Earth science conferences such as AGU and GSA.

* How have the results been disseminated to communities of interest?

ESNO has disseminated the details and outcomes of the Provider Summit project through its multiple outlets, which include the EarthScope website (and the Provider Summit pages on the SERC website), EarthScope social media (including a blog and Facebook page), the publication "InSights," and professional presentations at national conferences in 2012 and 2013 (the abstracts for which are appended to this Report).

Products

Books

Book Chapters

Conference Papers and Presentations

Semken, S., Arrowsmith, R., Garnero, E., Fouch, M. J., Taylor, W. L., Bohon, W., Pacheco, H., Robinson, S., Schwab, P., & Dick, C. (2012). EarthScope National Office education and outreach program: 2012 update on activities and broader impacts [Abstract]. Geological Society of America Abstracts with Programs, 44(7), 179. (2012). *EarthScope National Office education and outreach program: 2012 update on activities and broader impacts [Abstract]*. Geological Society of America Annual Meeting. Charlotte. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Semken, S. C., Robinson, S., Bohon, W., Schwab, P., Arrowsmith, R., Garnero, E. J., Fouch, M. J., Pettis, L., Baumbach, D., & Dick, C. (2013). EarthScope National Office education and outreach programs: 2013 update on activities and outcomes [Abstract]. Eos, Transactions, American Geophysical Union, ED31A-0741. (2013). *EarthScope National Office education and outreach programs: 2013 update on activities and outcomes [Abstract]*. American Geophysical Union 2013 Fall Meeting. San Francisco. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Semken, S. C., Arrowsmith, R., Fouch, M. J., Garnero, E. J., Taylor, W. L., Bohon, W., Pacheco, H. A., Schwab, P., Baumbach, D., Pettis, L., Colunga, J., Robinson, S., & Dick, C. (2012). Education and outreach at the EarthScope National Office: 2012 update on activities and broader impacts [Abstract]. Eos, Transactions, American Geophysical Union, ED41B-0675. (2012). *Education and outreach at the EarthScope National Office: 2012 update on activities and broader impacts [Abstract]*. American Geophysical Union 2012 Fall Meeting. San Francisco. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Inventions

Journals

Licenses

Other Products

Other Publications

Patents

Technologies or Techniques

Thesis/Dissertations

Websites

EarthScope Earth Science Education and Outreach Provider Summit
<http://serc.carleton.edu/earthscope-eno/index.html>

The website hosted by SERC was initially used as workspace for participants during the Provider Summit. It now provides a permanent link to the websites of all participating organizations, a summary of the project and its goals, and an archive of the materials produced by the Provider Summit working groups.

Provider Summit on the EarthScope Workshops Page

<http://www.earthscope.org/events/earthscope-education-and-outreach-provider-summit>

This page on the main EarthScope website provides information on the Provider Summit and a link to the SERC Provider Summit webpages.

Supporting Files

Filename	Description	Uploaded By	Uploaded On
ESNO_PS_Abstracts.pdf	Published abstracts.	Steven Semken	04/08/2014

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Semken, Steven	PD/PI	2
Arrowsmith, J Ramón	Co PD/PI	1
Dick, Cynthia	Other Professional	1
Taylor, Wendy	Other Professional	1

Full details of individuals who have worked on the project:

Steven C Semken

Email: semken@asu.edu

Most Senior Project Role: PD/PI

Nearest Person Month Worked: 2

Contribution to the Project: Principal investigator; led planning and organization of and presided over the Provider Summit; was primary contact with SERC; led post-Summit communications and reporting.

Funding Support: NSF EAR-1101100

International Collaboration: No

International Travel: No

J Ramón Arrowsmith

Email: ramon.arrowsmith@asu.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 1

Contribution to the Project: Co-principal investigator; collaborated in planning and organization of the Provider Summit; was co-president; collaborated with PI on post-Summit communications and reporting.

Funding Support: NSF EAR-1101100

International Collaboration: No

International Travel: No

Cynthia Dick

Email: cindy.dick@asu.edu

Most Senior Project Role: Other Professional

Nearest Person Month Worked: 1

Contribution to the Project: ESNO Project Manager: Provided logistical support including participant travel and lodging arrangements; meeting arrangements; and grant management.

Funding Support: NSF EAR-1101100

International Collaboration: No

International Travel: No

Wendy Taylor

Email: wendy.taylor@asu.edu

Most Senior Project Role: Other Professional

Nearest Person Month Worked: 1

Contribution to the Project: ESNO Education and Outreach Manager: assisted PI in planning and organization of summit; worked with Project Manager on logistical details; co-presided over Provider Summit.

Funding Support: NSF EAR-1101100

International Collaboration: No

International Travel: No

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
American Geosciences Institute	Other Nonprofits	Alexandria, VA
CUAHSI	Other Nonprofits	Washington, DC
UNAVCO	Other Nonprofits	Boulder, CO
Critical Zone Observatories	Other Nonprofits	State College, PA
DOSECC	Other Nonprofits	Salt Lake City, UT
GeoPRISMS	Other Nonprofits	Houston, TX
Incorporated Research Institutions for Seismology	Other Nonprofits	Washington, DC
National Center for Earth-surface Dynamics	Other Nonprofits	Minneapolis, MN

Network for Earthquake Engineering Simulation

Other Nonprofits

West Lafayette, IN

Southern California Earthquake Center

Other Nonprofits

Los Angeles, CA

U.S. Geological Survey

Other Organizations (foreign or domestic)

Reston, VA

Full details of organizations that have been involved as partners:

American Geosciences Institute

Organization Type: Other Nonprofits

Organization Location: Alexandria, VA

Partner's Contribution to the Project:

In-Kind Support

Collaborative Research

More Detail on Partner and Contribution:

CUAHSI

Organization Type: Other Nonprofits

Organization Location: Washington, DC

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Critical Zone Observatories

Organization Type: Other Nonprofits

Organization Location: State College, PA

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

DOSECC

Organization Type: Other Nonprofits

Organization Location: Salt Lake City, UT

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

GeoPRISMS

Organization Type: Other Nonprofits

Organization Location: Houston, TX

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Incorporated Research Institutions for Seismology

Organization Type: Other Nonprofits

Organization Location: Washington, DC

Partner's Contribution to the Project:

In-Kind Support

Collaborative Research

More Detail on Partner and Contribution:

National Center for Earth-surface Dynamics

Organization Type: Other Nonprofits

Organization Location: Minneapolis, MN

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Network for Earthquake Engineering Simulation

Organization Type: Other Nonprofits

Organization Location: West Lafayette, IN

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

Southern California Earthquake Center

Organization Type: Other Nonprofits

Organization Location: Los Angeles, CA

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

U.S. Geological Survey

Organization Type: Other Organizations (foreign or domestic)

Organization Location: Reston, VA

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution:

UNAVCO

Organization Type: Other Nonprofits

Organization Location: Boulder, CO

Partner's Contribution to the Project:

In-Kind Support

Collaborative Research

More Detail on Partner and Contribution:

Have other collaborators or contacts been involved? No

Impacts

What is the impact on the development of the principal discipline(s) of the project?

The Provider Summit brought the key education and outreach personnel of eleven leading Earth science organizations together—some for the very first time. The Provider Summit facilitated communication and interaction and has already enhanced the E&O program of EarthScope through direct participation by some of these providers. We anticipate that these collaborations will continue and enhance Earth science education and public outreach through the specific missions of the participating organizations.

What is the impact on other disciplines?

Although the participating organizations were invited to the Provider Summit on the merits of their work in Earth science education and public outreach, all of them have interdisciplinary interests (e.g., CUAHSI, DOSECC, and NEES: engineering; IRIS and UNAVCO: physics; and so on). These organizations contribute to formal education and public literacy in these disciplines as well, so Provider Summit outcomes are more broadly shared.

What is the impact on the development of human resources?

Nothing to report.

What is the impact on physical resources that form infrastructure?

Nothing to report.

What is the impact on institutional resources that form infrastructure?

Nothing to report.

What is the impact on information resources that form infrastructure?

Participating organizations have contributed their links (and hence access to their resources and products) to the broader community through the SERC and EarthScope websites.

What is the impact on technology transfer?

Nothing to report.

What is the impact on society beyond science and technology?

Nothing to report.

Changes/Problems

Changes in approach and reason for change

Nothing to report.

Actual or Anticipated problems or delays and actions or plans to resolve them

Nothing to report.

Changes that have a significant impact on expenditures

Because not all funds designated for participant costs were expended during the Provider Summit itself, the PI requested and received permission from NSF to use these funds to bring representatives of the participating organizations to the EarthScope National Meeting in Raleigh, NC, in spring 2013. The funds were used to cover travel, lodging, and subsistence. Representatives of AGI, Geoscience Alliance, and the prior ESNO thus had an unforeseen opportunity to attend and participate actively in the National Meeting.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.