

Workshop for Interpretive Professionals in the San Andreas Region:
Southern California Earthquake Center & EarthScope
San Bernardino County Museum, Redlands, California
April 19-22, 2009

EarthScope Interpretive Workshops: www.earthscope.org/enp/parks
This workshop: www.scec.org/workshops/san_andreas/index.html

What? Southern California's San Andreas Fault is a prime target area to investigate plate-tectonic processes that result in earthquakes and the dramatic topography that forms along an actively deforming plate boundary. Interpretive professionals in parks and museums in the region have the unique opportunity to engage the public on the relevance of scientific discoveries as they are being made. This 3-day workshop features presentations by scientists from the Southern California Earthquake Center (SCEC) and EarthScope to help convey the story of southern California's breathtaking landscape and geological hazards. Participants will learn how to use SCEC and EarthScope data and science results, and will develop and present actual interpretive programs and exhibits during the workshop. The goal is to help interpreters create opportunities for the public to form their own intellectual and emotional connections to the dynamic landscape along the San Andreas Fault and surrounding regions.

Sponsored by: EarthScope National Office (ESNO), Southern California Earthquake Center, and the San Bernardino County Museum (www.co.san-bernardino.ca.us/museum). EarthScope (www.earthscope.org) is funded by the National Science Foundation (NSF). SCEC (www.scec.org) is funded by NSF and the United States Geological Survey (USGS).

Who should attend? Interpretive professionals from the National Park Service, U. S. Forest Service, Bureau of Land Management, state parks, museums, and state geological surveys, and other individuals who engage the public on geological processes in southern California. Participants do not have to be geologists, but they should have some knowledge of the geology and tectonics of the region and experience incorporating geological information into interpretive programs or exhibits. There is also room for a few K-12 Earth science teachers who interact with interpretive specialists in parks or museums.

Funding: Participants' organizations provide travel costs to and from the workshop. ESNO and SCEC provide food, lodging, materials, and field trip travel while at the workshop. CDs, printed handouts, and other workshop materials will be provided by ESNO and SCEC at no cost to participants.

Lodging: Rooms have been reserved at Country Inn & Suites in Redlands (www.countryinns.com/redlandsca), within a mile of the workshop site at the San Bernardino County Museum. The EarthScope National Office will pay double occupancy rates for participants. Single rooms are available for participants who wish to pay ½ of the single room cost (the ESNO will pay the other half).

Commitment: Participants and instructors are required to attend the full three days of the workshop (from 6:00 PM Sunday, April 19 to 12:00 Noon Wednesday, April 22). Each participant and their supervisor must commit to providing follow-up training to their staff members on how SCEC and EarthScope data, scientific results, and societal implications can be incorporated into interpretive programs and exhibits at their site.

Instructors and Facilitators:

Bob Lillie (Professor of Geology at Oregon State University and EarthScope Education/Outreach Manager).

Robert de Groot (Education Programs Manager, Southern California Earthquake Center).

Kathleen Springer (Senior Curator, Division of Geological Sciences, San Bernardino County Museum).

Wendy Bohon (PhD student in tectonic geomorphology, Arizona State Univ.; former USGS outreach coordinator).

Jim Evans (Professor of Geology at Utah State University and researcher on EarthScope SAFOD drillhole data).

Charlotte Goddard (Education and Outreach Specialist for EarthScope National Office at Oregon State University).

Ken Hudnut (U.S. Geological Survey, Pasadena; expert on the San Andreas Fault, GPS, LiDAR, and geodetic data from the EarthScope Plate Boundary Observatory in southern California).

Lucy Jones (Chief Scientist, Multi Hazards Initiative, U.S. Geological Survey, Pasadena; earthquake hazards expert).

Sally McGill (Professor, Dept. Geological Sci., Cal. State Univ.-San Bernardino; expert on paleoseismology and GPS).

Patrick McQuillan (Education and Outreach Specialist, Incorporated Research Institutions for Seismology).

Shelley Olds (Science Education Specialist at UNAVCO, Inc. in Boulder, Colorado).

Jolene Redvale (Education Curator, San Bernardino County Museum).

Chris Walls (GPS Regional Engineer for UNAVCO, Inc. in southern California).

Agenda: SCEC/EarthScope San Andreas Interpretive Workshop
San Bernardino County Museum, 2024 Orange Tree Lane, Redlands, California

Sunday, April 19, 2009

Evening:

- 4:00 Instructors meet at **San Bernardino County Museum** to review workshop goals, agenda, and evaluation plan.
- 6:00 Participants and instructors meet at San Bernardino County Museum for dinner, poster setup, and orientation.**
- 7:00 “Overview of the workshop (including material on ‘Plate tectonics and building the landscape of the western United States’)” (Bob Lillie, Bob de Groot)
- 7:45 *Personal Introductions*
- 8:30 Adjourn**

Monday, April 20, 2009

Morning:

- 7:00 Meet at **Country Inn & Suites** for coffee, juice, bagels, fruit, muffins, etc.
- 8:00 San Bernardino County Museum.** Welcoming. (Kathleen Springer, Jolene Redvale)
- 8:05 “Overview of EarthScope: SAFOD, USArray, and the Plate Boundary Observatory” (Bob Lillie)
- 8:35 *Brainstorming – Tangible and Intangible ideas for connecting EarthScope to the public.*
- 8:55 “Earthquake Hazards in Southern California: Communicating probabilities and hazards” (Lucy Jones)
- 9:35 *Brainstorming – Educating the public on earthquake and other hazards along the San Andreas Fault.*
- 9:55 Break.**
- 10:10 “Overview of SCEC and other earthquake science and monitoring in southern California (Bob de Groot)
- 10:35 *Brainstorming – Tangible and Intangible ideas for connecting SCEC to the public.*
- 10:50 “Presenting EarthScope and SCEC to the public in parks and museums: Interpretive themes and strategies for the San Andreas Fault” (Bob Lillie)
- 11:15 *Brainstorming – Developing site-specific interpretive themes based on today’s presentations.*
- Participants divide into five teams (each team has 4 to 6 participants and one scientist).
- Discuss San Andreas topics and EarthScope materials to incorporate into programs and exhibits.
- Each team begins to develop an outline with content, data needs, and a theme statement for their program.
- 12:00 Lunch.** (San Bernardino County Museum)

Afternoon:

- 1:00 “The San Andreas Fault Observatory at Depth (SAFOD)” (Jim Evans)
- 1:30 *Brainstorming – Connecting results of SAFOD to the public.*
- 1:50 “Precise geodetic imaging of dynamic landscape change in southern California using the Plate Boundary Observatory (PBO)” (Ken Hudnut)
- 2:20 *Brainstorming – Connecting results of PBO to the public.*
- 2:40 Break**
- 3:00 *Participants present their posters, exhibits, and other materials on geology related to the San Andreas Fault.*
- 4:00 *Groups continue to develop interpretive programs.*

Evening:

- 5:00 - 8:00 Tour of “Hall of Geological Wonders” at San Bernardino County Museum.**
Includes informal dinner and model interpretive program by Kathleen Springer and Jolene Redvale.

(Continued next page)

Tuesday, April 21, 2009

Morning:

- 7:00 Meet at **Country Inn & Suites** for coffee, juice, bagels, fruit, muffins, etc.
- 8:00 **Field excursion by bus. Depart from Country Inn and Suites.** (*Led by Chris Walls, Sally McGill, and Kathleen Springer*)
- Visit EarthScope GPS instrument at Cal State-San Bernardino.
 - Observe geologic features and visit Lost Lake along the San Andreas Fault (Cajon Pass).
 - Discuss landscape features and processes that can be presented to the public.
 - Relate each group's interpretive theme to EarthScope, SCEC, and transform plate boundary processes.
- 12:00 Return to **San Bernardino County Museum.** Working lunch with your group to continue developing interpretive programs.

Afternoon:

- 1:00 **San Bernardino County Museum.** "Tectonic geomorphology and GeoEarthScope data from southern California" (Wendy Bohon).
- 1:30 **Brainstorming – Using GeoEarthScope and other data on tectonic geomorphology in interpretive programs.**
- 1:50 "Using EarthScope data and the Active Earth Display in interpretive programs and exhibits: www.earthscope.org, www.iris.edu, and www.unavco.org." (Shelly Olds, Patrick McQuillan, Charlotte Goddard).
- 2:20 **Brainstorming – Incorporating EarthScope and SCEC digital resources into interpretive programs and exhibits.**
- 2:40 **Break.**
- 3:00 **Groups continue to develop 15-minute interpretive programs based on themes involving EarthScope, SCEC, and the San Andreas Fault.**
- 5:00 **Adjourn.**

Evening:

- 6:30 **Dinner.** (Local Restaurant)

Wednesday, April 22, 2009

Morning:

- 7:00 Meet at **Country Inn & Suites** for coffee, juice, bagels, fruit, muffins, etc.
- 8:00 **San Bernardino County Museum.**
- 8:00 **Group presentations, each involving:**
- Theme statement, setting, audience – followed by 10-15 minute program presentation.
 - Brainstorming about Geology/SCEC/EarthScope content and interpretive methods employed.
- 11:45 **Workshop evaluation.**
- 12:00 **Lunch and adjourn.**
- Participants depart after lunch.
 - Organizers and instructors meet briefly to discuss workshop and follow-up activities.

Description:
SCEC/EarthScope San Andreas Interpretive Workshop

Purpose of Workshop

This is the third in a series of workshops organized by the EarthScope National Office (ESNO) to train interpreters¹ in parks and museums to incorporate EarthScope observations and science results into programs that engage the public in landscape-forming processes and natural hazards (www.earthscope.org/eno/parks). EarthScope employs advanced geophysical sensors and high-performance computing to measure signals generated by earthquakes and volcanic events. This National Science Foundation (NSF) program is deploying hundreds of seismometers and GPS devices, and drilling a borehole across the San Andreas Fault, to observe the inner-workings of the continent. Many of the instruments are permanently-based in the western United States. Other instruments are being gradually moved across the country from west to east over the next decade. The resulting EarthScope images provide a record of how the continent has evolved over millions of years, enabling scientists, students, and the public to appreciate how the North American continent deforms in ways that affect our lives.

The Southern California Earthquake Center (SCEC) is a community of over 600 scientists, students, and others at over 60 institutions worldwide, headquartered at the University of Southern California. It was founded in 1991 with a mission to gather data on earthquakes in Southern California and elsewhere, integrate information into a comprehensive and physics-based understanding of earthquake phenomena, and communicate understanding to society at large as useful knowledge for reducing earthquake risk. SCEC is funded by the National Science Foundation and the U.S. Geological Survey to develop a comprehensive understanding of earthquakes in Southern California and elsewhere, and to communicate useful knowledge for reducing earthquake risk. SCEC's science goal is to understand the physics of the Southern California fault system and develop a model of key aspects of earthquake behavior.

EarthScope and SCEC integrate many types of observations to study processes that deform the western edge of North America. This workshop will show how incorporating geophysical observations into interpretive programs and exhibits can enhance the “sense of place” represented by the dynamic landscape of southern California. Presentations and activities will focus on engaging the public on not only how and why science is important, but also that it is understandable and meaningful. The workshop will bring together individuals from the scientific and interpretive communities to learn about SCEC and EarthScope and develop interpretive programs on how geophysical instrumentation and deep drilling enhance our understanding of landscape formation and geological hazards in the earthquake-prone region of the San Andreas Fault.

EarthScope Primary Interpretive Themes

Workshops were held in 2003 and 2004 to develop a comprehensive interpretive plan involving EarthScope and the National Park Service (NPS; see www.ees.nmt.edu/RME/fall2004.html). The primary interpretive themes developed in the workshops are key ideas through which EarthScope’s nationally-significant values can be conveyed to the public. Two of the overall NPS/EarthScope themes are particularly applicable to interpretation in the San Andreas Fault region:

- ***The EarthScope experiment – the most comprehensive exploration to date of the structure, dynamics, and geologic history of the North American continent – exemplifies the insatiable human drive to learn.***
- ***EarthScope encourages a feeling of national interconnectedness – a continental sense of place – by openly inviting communities to actively participate in the experiment, and by fostering an understanding that their local environment and culture interact with other components within the larger, dynamic Earth system.***

During the San Andreas Workshop, participants will work with scientists to develop themes specific to parks and museums in the region. By the end of the workshop, groups will develop and present interpretive programs that provide opportunities for visitors to connect SCEC and EarthScope observations to the physical and cultural aspects of their site. Here’s an example of a specific theme that might link SCEC and EarthScope science to dynamic Earth processes in the region:

- ***The same earthquake activity that threatens our lives also nourishes our spirits by creating the dramatic landscape of southern California.***

¹ The term “informal educator” is commonly used in museums, while parks typically use “interpreter.” Other terms such as “resource educator” are used by various organizations. The term “interpreter” in this document is meant to encompass all the professionals who engage the public in informal education.

Workshop Goals

EarthScope (www.earthscope.org) consists of three observatories: USArray, a system of seismometers managed by the Incorporated Research Institutions for Seismology (IRIS, www.iris.edu); Plate Boundary Observatory (PBO), an array of GPS, strainmeter, and other geodetic instruments managed by UNAVCO, Inc. (www.unavco.org); and the San Andreas Fault Observatory at Depth (SAFOD), a deep drillhole managed by Stanford University (www.stanford.edu) in collaboration with the United States Geological Survey (www.usgs.gov). The Southern California Earthquake Center (www.scec.org) seeks to develop a comprehensive understanding of earthquakes in Southern California and elsewhere, and to communicate useful knowledge for reducing earthquake risk. The goals of the San Andreas Interpretive Workshop are consistent with those of EarthScope and SCEC.

- ***Build networks of scientists and interpreters.*** EarthScope and SCEC scientists will present overviews of their research and work with participants to develop interpretive programs on active tectonics and earthquake hazards of southern California.
- ***Produce interpretive programs and displays targeting specific audiences.*** Teams of participants will work with the scientists to develop interpretive materials on earthquakes and landscape development targeting visitors to parks and museums in the San Andreas Fault region.
- ***Collaborate with a variety of organizations to produce and disseminate data and products to interpretive professionals.*** The workshop will foster collaboration between interpreters and EarthScope, SCEC, IRIS, UNAVCO, USGS, and other organizations to expand education and outreach networks. Workshop products will be disseminated via print materials and the EarthScope and SCEC websites.
- ***Target diverse audiences to engage in interpretive programs and exhibits.*** Diverse backgrounds, learning styles and gender equity will be built explicitly into interpretive programs.

Interpretive Program Development

Participants and scientists will work in teams to assemble SCEC, EarthScope and other content for interpretive programs focused on transform plate boundary processes in southern California. Here are examples of three topics for interpretive programs that might be developed during the workshop.

1. **Plate Tectonics and its bearing on Earthquakes and Landscape Development.** Because of the SCEC and EarthScope goal to study the deforming edge of North America in an integrative way, interpretive programs should not “stand alone” as individual topics, but should feed into an integrative approach. This presentation might be the “big picture” program that provides the plate-tectonic context for other programs. Interpretive opportunities will also be developed by incorporating connections of the landscape and its formation processes to the region’s biology, ecology, culture, history, and economy.
2. **Earthquakes.** SCEC and EarthScope are advancing understanding of how and why earthquakes occur by measuring small-to-moderate sized earthquakes in the region, imaging the deep structure of the crust and mantle by studying how seismic waves from distant earthquakes travel to arrays of seismometers, and mapping the movement of Earth’s surface with strainmeters and GPS instruments. One group could develop a program emphasizing how advancement in knowledge about earthquake locations and processes impacts the safety, economy, history, and other aspects of society in southern California and beyond.
3. **The San Andreas Fault Observatory at Depth (SAFOD).** The EarthScope SAFOD project represents “Big Science” that can be as captivating as anything being done by NASA. Core samples from the drillhole might be considered as rare and precious as moon rocks. Coupled with geophysical instruments monitoring the physical state of the world’s most well-known active fault zone, these rocks represent tangible information that interpreters can use to create opportunities for audiences to form their own intellectual and emotional connections to the active Earth in southern California.

IRIS Active Earth Display

The Active Earth Display is an interpretive kiosk (www.iris.edu/about/ENO/aed.htm) developed by the Incorporated Research Institutions for Seismology. IRIS is the organization that deploys and maintains the seismic instrumentation for EarthScope. The kiosk includes a computer and touch-screen, and has basic modules on seismology (sample display at: www.iris.edu/activeearth/index.phtml?code=AGU2007). This material is designed to be complemented by modules focused on the region of the visitor center or museum hosting the kiosk. Funds are available to supply two or three sites participating in the workshop with their own Active Earth Display. The value of a kiosk, complete with computer, monitor, speakers, other electronic equipment, and housing with personalized logos, ranges from \$3500 to \$6000, depending on options chosen. After the workshop, participants will be invited to submit proposals outlining how they would use the kiosk to complement their overall interpretive program, and how they plan to maintain it. Sites will also be required to outline how they will help EarthScope, SCEC, IRIS, and UNAVCO develop content and interpretive strategies for a San Andreas module for the kiosk.

Biographical Information:
SCEC/EarthScope San Andreas Interpretive Workshop

Dr. Robert J. Lillie has been a Professor of Geology at Oregon State University since 1984, where he teaches courses in physical geology, oceanography, tectonics, geophysics, geological writing, and public interpretation. He is author of *“Parks and Plates: The Geology of Our National Parks, Monuments, and Seashores”* (W. W. Norton and Company, 2005) and is a Certified Interpretive Trainer (CIT) through the National Association for Interpretation (NAI). In 2007 he became the Manager of Education and Outreach for EarthScope. Dr. Lillie was born and raised in the Cajun Country of Louisiana. He has a B.S. in geology from the University of Louisiana – Lafayette, and an M.S. in geophysics from Oregon State University. He worked three years in oil exploration in the Rocky Mountains before earning a Ph.D. in geophysics from Cornell University, where he worked with deep-crustal seismic reflection data through the COCORP project. Dr. Lillie’s research is focused on the crustal structure and tectonic evolution of mountain ranges formed by the collision of continents, including the Himalayas in India and Pakistan and the Carpathians in Central Europe. He is also author of *“Whole Earth Geophysics: An Introductory Textbook for Geologists and Geophysicists”* (Prentice Hall, 1999), used in college courses in the U. S. and other countries. Since 1994 Dr. Lillie has collaborated with the National Park Service (NPS) on educating the public in geology. He has been a seasonal interpretive ranger at Crater Lake and Yellowstone national parks and John Day Fossil Beds National Monument, and he and his graduate students have written and illustrated geology training manuals for several NPS sites. Dr. Lillie has presented seasonal training on geology at many parks, as well as workshops at annual NAI meetings. At the 2005 Geological Society of America meeting, Dr. Lillie was presented an award from the NSP Geological Resources Division for “outstanding contributions in engaging the National Parks staff and visitors in geoscience.”

Dr. Robert M. de Groot is the Education Programs Manager for the Southern California Earthquake Center, an NSF and USGS Center headquartered at the University of Southern California in Los Angeles. His responsibilities include managing SCEC’s three internship programs and K–12 formal and informal education programs. Under his leadership he established Earthquake Education and Public Information Centers (EPIcenters), a network of informal learning institutions devoted to enhancing earthquake education programs and exhibits. Dr. de Groot has nine years of classroom experience as a chemistry educator at the secondary and university levels and has worked as an informal educator at the California Science Center in Los Angeles and Lowell Observatory in Flagstaff, Arizona. As a researcher, his work has taken him into the lab and the field to study stratospheric ice clouds, river ecology, the active faults of California, and enzyme biochemistry. Dr. de Groot holds an M.A. with an emphasis in chemistry and Earth science education from Northern Arizona University and a Ph.D. in science education from the University of Southern California. His doctoral research investigated the use of analogy in science communication. As a science education researcher, Dr. de Groot is currently investigating the role of models and model building in science. This interest stems from a desire to understand and characterize how models function within the process of “doing” science. In addition, he is interested in understanding how models used by specialists are applied in media and educational settings. He is an active member of the American Chemical Society (ACS), serving in 2009 as president of his local chapter. On the national level Dr. de Groot serves on the ACS Committee on Community Activities and the ACS Committee on Public Relations and Communications.

Kathleen Springer has been at the San Bernardino County Museum (SBCM) since 1989, where she is now the Senior Curator of Geological Sciences. She has lead geologic and paleontologic investigations throughout southern California, Arizona and Nevada and has been instrumental in developing fossil resource management guidelines for county, state and federal agencies. Kathleen earned B.S. and M.S. degrees in Geological Sciences from the University of California, Riverside with an emphasis in paleontology. She specializes in the application of stratigraphic controls and geologic interpretations to paleontologic investigations, and stresses the importance of detailed data recovery and full curation of recovered specimens in such studies. Her efforts have led to the recovery and preservation of thousands of significant fossils and their associated data that currently reside in the SBCM. With grant funding from the Bureau of Land Management (BLM), Kathleen is currently mapping and documenting late Pleistocene vertebrate localities in the extensive spring deposits of the Upper Las Vegas Wash as well as implementing the State of Nevada’s first Site Stewardship program for the BLM in this area. She also is conducting research in Joshua Tree National Park in the eastern Pinto Basin and the Eagle Mountains. Kathleen has done extensive work in north central Nevada and is currently continuing studies on Silurian-Devonian boundary graptolite faunas as well as geologic mapping in the Simpson Park Range. Kathleen has been recognized by the Association of Environmental Professionals for environmental education and by the California Mineralogical Society. Since 2004, Kathleen and her curatorial colleagues in Geological Sciences have been focused at the Museum on creating all of the exhibits for the upcoming Hall of Geological Wonders. The central theme in the Hall is to actively connect the visitor with the fact that mighty geological processes reveal the paleontologic history of the region. We also strive to illustrate in an engaging way that science is a process, where we can ex-

plain our hypotheses put forth in every exhibit by demonstrating the multiple lines of evidence – thereby allowing visitors to evaluate for themselves.

Wendy Bohon graduated from James Madison University in 1998 with a B.A. in Theatre and Geology. She then spent 7 years working as the Outreach and Education Coordinator for the U. S. Geological Survey (USGS) Earthquake Hazards Program in Southern California where she gave earthquake education talks to schools, local community groups and news organizations, as well as assisted in many teacher workshops. While working for the USGS, Wendy saw first hand how critical geologic and seismic hazards communication and education is to people who live in earthquake prone regions. After completing an MS in Geology/Geomorphology at The Ohio State University in 2006, she came to Arizona State University where she is currently pursuing a Ph.D. in Tectonic Geomorphology. She has worked on many earthquake-related projects including the B4 LiDAR project in Southern California, climate and tectonic studies in Northwestern Argentina, GPS deployment projects in Bolivia and thrust fault studies in the Andean Precordillera of Argentina. Wendy's research interests include geomorphology, paleoseismology, landscape evolution and geologic hazards communication.

Dr. James P. Evans is a Professor in the Department of Geology at Utah State University. His research interests lie in figuring out how structures form by using mapping, laboratory measurements, geochemistry, computer graphics, and structural analysis. In addition, he and his students integrate their work with hydrogeology, applied mathematics, and mechanics to develop a sound understanding of the processes of rock deformation and fluid flow, and how to predict the properties and structure of deformed rocks over time. Dr. Evans' research focuses on: 1) fault zone studies, and fault zone hydrology; 2) development of geologically and mechanically based stochastic models of fault development; and 3) structural analyses of deformed rocks. He and his students are involved in research incorporating the San Andreas Fault Observatory at Depth (SAFOD) of the NSF EarthScope Program. Dr. Evans teaches a variety of courses, including Introductory Earth Science, Structural Geology, Field Methods, Mechanics of Earth Processes, and Geologic Field Camp - a 4 week intensive capstone class for geologists. He received B. S. degrees in Geology and Engineering in 1981 from the University of Michigan, followed by M. S. (1983) and PhD degrees in Geology from Texas A&M University. Dr. Evans has been on the faculty at Utah State since 1987. In his spare time he is the editor of the Journal of Structural Geology, which publishes the results of research on structural geology and rock deformation.

Dr. Charlotte Goddard is an Education and Outreach specialist with the EarthScope National Office at Oregon State University in Corvallis. She received her B.A. in geology from Skidmore College, her M.S. in geology from the University of Idaho, and her Ph.D. in oceanography from Oregon State University. Her research interests lie in marine geology and geochemistry, backarc basin formation, and the scientific misconceptions and spatial visualization skills of students and the public. She volunteers with Guide Dogs for the Blind and is often accompanied by a super-cute puppy in a green coat.

Dr. Kenneth W. Hudnut studies earthquakes as a geophysicist for the U. S. Geological Survey in Pasadena, California. He serves as Geodetic Coordinator on the U.S. Earthquake Program Council and leads the Southern San Andreas Fault Evaluation (SoSAFE) Project for the Southern California Earthquake Center. In recognition for contributions made to the global navigation and positioning industry, notably his leadership of the new GPS L1C signal design, he was selected by GPS World as one of "50+ Leaders to Watch" in 2007. For the USGS Multi-Hazards Demonstration Project, he led the earthquake source design and computer simulations of the ShakeOut scenario, a simulated magnitude 7.8 earthquake on the San Andreas Fault. Since receiving his Ph.D. from Columbia University in 1989, and his A.B. from Dartmouth College in 1983, he has published over 80 scientific papers. He is a Visiting Associate in Geophysics on the faculty of the California Institute of Technology.

Dr. Lucy Jones is a seismologist with the U. S. Geological Survey in Pasadena, California and a Visiting Research Associate at the Seismological Laboratory of the California Institute of Technology. She is Chief Scientist of the USGS Multi-Hazards Demonstration Project for Southern California, integrating hazards science with economic analysis and emergency response to increase community resiliency to natural disasters. Dr. Jones is also a Commissioner of the California Seismic Safety Commission, which advises the governor and legislature on seismic safety, and she serves on the California Earthquake Prediction Evaluation Council. Her research involves the physics of earthquakes, foreshocks and earthquake hazard assessment, and the seismotectonics of southern California. Her awards include the Alquist Award from the California Earthquake Safety Foundation, the Shoemaker Award for Lifetime Achievements in Science Communication from the USGS, and the 2007 Award of Merit from the Los Angeles County Emergency Preparedness Commission. Dr. Jones has a BA in Chinese Language and Literature from Brown University and a PhD in geophysics from the Massachusetts Institute of Technology. (Modified from: http://en.wikipedia.org/wiki/Lucy_Jones).

Dr. Sally F. McGill is a professor of geology at California State University, San Bernardino. She is an active member of the Southern California Earthquake Center and the Southern San Andreas Fault Evaluation (SoSAFE) project. Dr. McGill studies active faults in southern California, including the San Andreas, San Jacinto, and Garlock faults as well as the faults that ruptured in the 1992 Landers and 1999 Hector Mine earthquakes. Her primary expertise is in neotectonics and paleoseismology, using field-based techniques to study active faults, including geologic mapping, excavations across the faults, and collection of GPS data to measure elastic strain accumulation in the vicinity of active faults. Dr. McGill has also developed and led hands-on activities and field trips related to plate tectonics and earthquakes for groups of K-12 students.

Patrick McQuillan is the Education and Outreach Specialist for the Incorporated Research Institutions for Seismology (IRIS). His responsibilities include managing informal education programs including museum exhibits such as the Active Earth Display, developing visualizations and K-12 lesson plans, presenting professional development and outreach programs, and managing the IRIS Distinguished Lectureship Speaker Series. Patrick has BS and MA degrees in Physics and Museum Education from the College of William and Mary. He has over twenty years experience managing and developing informal science education programs in museums and planetariums. Several of the planetarium programs he wrote and produced are used in museums around the world. As Education Manager for the Challenger Center for Space Science Education, he managed the production of the educational curriculum for the Next Generation Challenger Learning Center. The curriculum included over 80 hands-on, inquiry based science activities utilizing actual scientific equipment and real data. The video created for the curriculum included over one hour of animations at four-times-High-Definition resolution of solar system locations that are still the highest resolution animations using actual science data that exist for solar system objects. He is currently working on Active Earth Display content modules for the Cascadia Subduction Zone, Basin and Range Province, EarthScope, and PoleNet. In his spare time he is a NASA Solar System Ambassador and is creating content for the IYA 365 Days of Astronomy Podcasts project.

Shelley Olds is a member of the Education and Outreach team at UNAVCO. She develops free educational materials for high school and college science courses, provides professional development opportunities for college faculty and K-12 teachers, and manages the web content for UNAVCO. Shelley has over ten years experience leading science education and professional development projects. She holds an MA in Instructional Systems Development and a BS in Geology and Geophysics. She was the education lead on the DLESE Teaching Box project to facilitate collaborations between educators, scientists, designers, and technologists to develop classroom-ready instructional units that model scientific inquiry. Shelley has worked in the NASA Earth Science Directorate's Education office to coordinate education programs and support the Destination Earth website redesign. She also has many years of experience as a field geologist in environmental consulting to investigate Superfund and RCRA sites, develop remediation designs and implement remedial action plans.

Jolene Redvale is the Curator of Education for the San Bernardino County Museum (SBCM). She began her work in informal education as an intern, writing text for the Museum's exhibit section. There she recognized the need to communicate to visitors in a meaningful, interpretive fashion. Jolene earned a BA in Natural History Museum Studies and Exhibits Techniques, a self-designed major. She worked as a Park Interpreter with the Riverside County Parks and Open Space District. Along the way she taught Gifted and Talented Education (GATE) classes and started a consulting business creating interpretive programs. Jolene became the Curator of Education at SBCM and earned an MA focused on Environmental Education from California State University, San Bernardino (CSUSB) in 1997. Shortly thereafter she began teaching in the Environmental Education and Museum Studies programs at CSUSB. Jolene has presented professional development workshops for teachers in natural and cultural history subjects, both through the Museum and as an independent consultant, focusing museum-related topics to curricula and state standards. Jolene is a Certified Interpretive Guide through the National Association for Interpretation. She trains volunteers annually in interpretive skills and helps staff develop and conduct interpretive programs on a wide variety of topics.

Chris Walls is the Southwest Regional Engineer for the Plate Boundary Observatory, the geodetic component of EarthScope, operated by UNAVCO and funded by the National Science Foundation. His responsibilities include oversight of network engineers and 450 GPS stations in California, Arizona, and Nevada. Over the past 16 years Chris has participated in the deployment of geodetic instrumentation from Mexico to Alaska for studies related to earthquake and volcanic research. Chris holds a B.S. in Geology from Central Washington University and an M.S. in Geology from San Diego State University. His undergraduate work focused on structural geology and active faulting in Washington State and California. During his masters research Chris focused primarily on neotectonics and GPS studies in the Los Angeles region. Chris is fascinated with earthquake processes and appreciates a range of tectonic scales, from mountain-building events down to the subtleties of tectonic geomorphology. He believes Education and Outreach is a fundamental component in advancing the science.

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SCEC/EarthScope San Andreas Interpretive Workshop

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