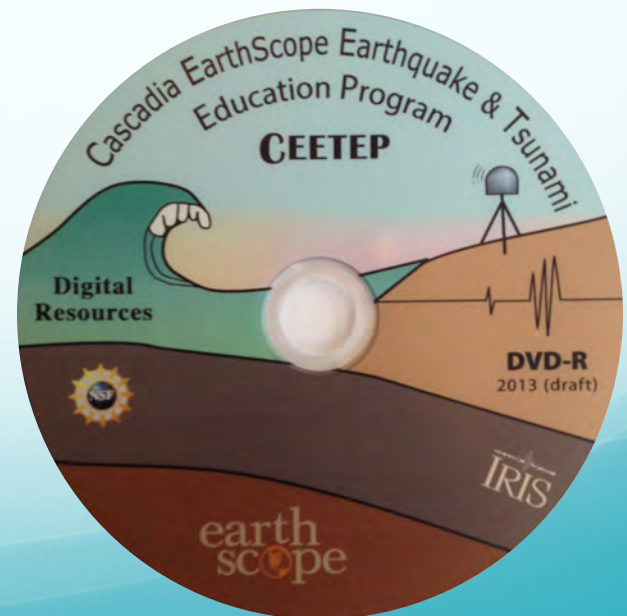
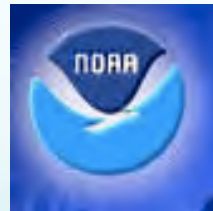
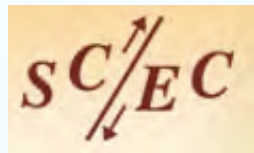


Digital Resources Related to CEETEP Topics

Beth Pratt-Sitaula
CEETEP Workshop

Teachers on the Leading Edge





EarthScope is a ~15 year long geophysics initiative to study the crust of North America – what it is made of, how it was assembled, and the geohazards it has. Funded by National Science Foundation



EarthScope also funds science and education projects like CEETEP

EarthScope Facility has 3 Parts

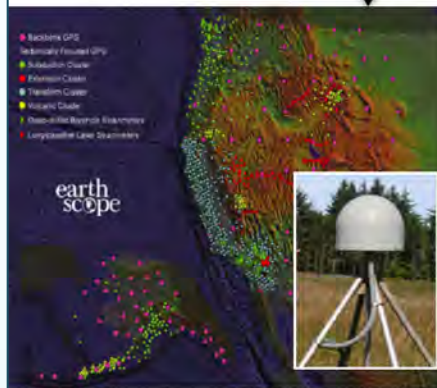
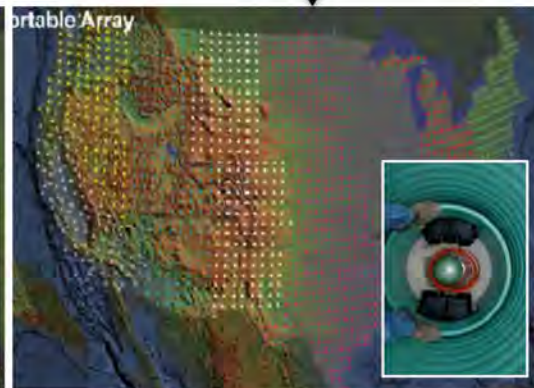


Plate Boundary Observatory (PBO) – >1100 GPS stations and strainmeters to measure crustal movements

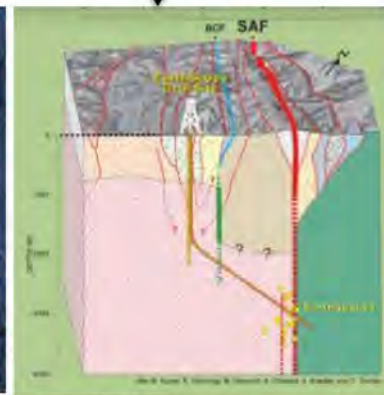
UNAVCO
(NSF's Geodetic Facility)
runs PBO



USArray – 400 Transportable Array seismic stations that have been stepping across lower-48 and now Alaska for last 10 years.

IRIS

(NSF's Seismic Facility)
runs USArray



San Andreas Fault Observatory at Depth (SAFOD) – drilling to San Andreas fault at 3-4 km



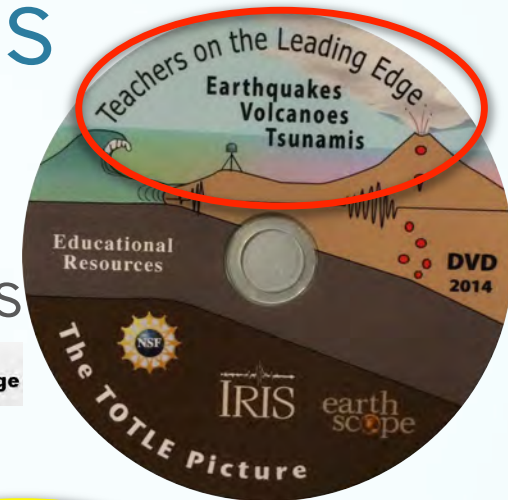
Cascadia EarthScope Earthquake and Tsunami Education Program has 3 collaborating universities

- Oregon State Univ.
- Univ. of Portland
- Central WA Univ.

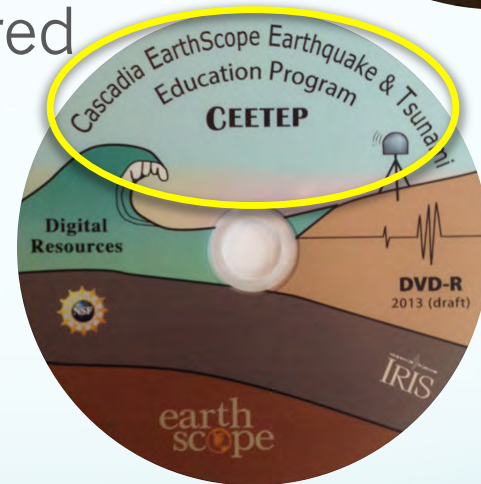
CEETEP Resources

- TOTLE-Earthquake, Tsunami, Volcanoes
-- Topic-ordered

Teachers on the Leading Edge



- CEETEP DVD – Workshop-ordered



- CEETEP Website
 - Topic-ordered
 - AND
 - Workshop-ordered



TOTLE DVD – Topic-driven

- 📄 0. About This DVD.pdf
- 📄 1. CEETEP_Activities_eBinder.pdf
- ▶ 📁 1. Earth & Plate Tectonics
- ▶ 📁 2. Earthquakes & Tsunamis
- ▶ 📁 3. Cascadia Earthquakes & Tsunamis
- ▶ 📁 4. Cascadia Volcanoes & Volcanic Hazards
- ▶ 📁 5. Maps & Posters
- ▶ 📁 6. TOTLE VFE and Field Trips

- 📄 0. About This DVD.pdf
- 📄 1. CEETEP_Activities_eBinder.pdf
- ▶ 📁 1. Earth & Plate Tectonics
- ▼ 📁 2. Earthquakes & Tsunamis
 - ▶ 📄 1A. Earthquakes.ppt
 - ▶ 📄 1B. Tsunami.ppt
 - ▶ 📁 2. ANIMATIONS_Earthquake & Tsunami
 - ▶ 📁 3. VIDEOS_Earthquake & Tsunami
 - ▶ 📁 4. ACTIVITIES_Earthquake & Tsunami
 - ▶ 📁 5. OTHER
- ▶ 📁 3. Cascadia Earthquakes & Tsunamis
- ▶ 📁 4. Cascadia Volcanoes & Volcanic Hazards
- ▶ 📁 5. Maps & Posters
- ▶ 📁 6. TOTLE VFE and Field Trips

CEETEP DVD – Workshop-ordered

- ▶ 1. CEETEP Workshop Organization
- ▶ 2. CEETEP Workshop Presentations
- ▶ 3. CEETEP Lesson Plans
- ▶ 4. CEETEP Posters & Maps
- ▶ 5. CEETEP Field Trips
- ▶ 6. GPS Station Records
- ▶ 7. Earthquake&TsunamiEducationResources
- ▶ 8. EarthScope
- ▶ 9. EarthquakeScenarios
- ▶ 10. OR EmergencyPreparedness
- ▶ 11. OR Tsunami Evacuation Maps
- ▶ 12. WA EmergencyPreparedness
- ▶ 13. WA County Preparedness Guides
- ▶ 14. WA Earthquake & Tsunami School Resource Guide
- ▶ 15. WA Tsunami Evacuation Maps
- ▶ 16. WA Tsunami Fact Sheets
- ▶ 17. WA Tsunami Vertical Evacuation Reports



What's Shaking at SCEC?

Robert de Groot

**Manager – Office of Experiential Learning & Career Advancement
Southern California Earthquake Center (SCEC)**

CEETEP – Forks, WA

13 October 2014

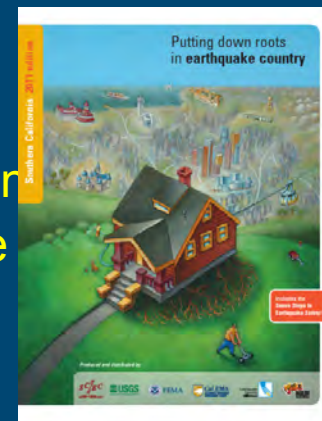
degroot@usc.edu

What is the Southern California Earthquake Center (SCEC)?

- A Multidisciplinary Research and Education Community
- Supported by the National Science Foundation and the U.S. Geological Survey
- Coordinates the efforts of over 60 institutions (e.g. Oregon State University, University of Oregon, Caltech, MIT, Harvard, UC Davis, USC, University of Alaska-Fairbanks, UC Berkeley)

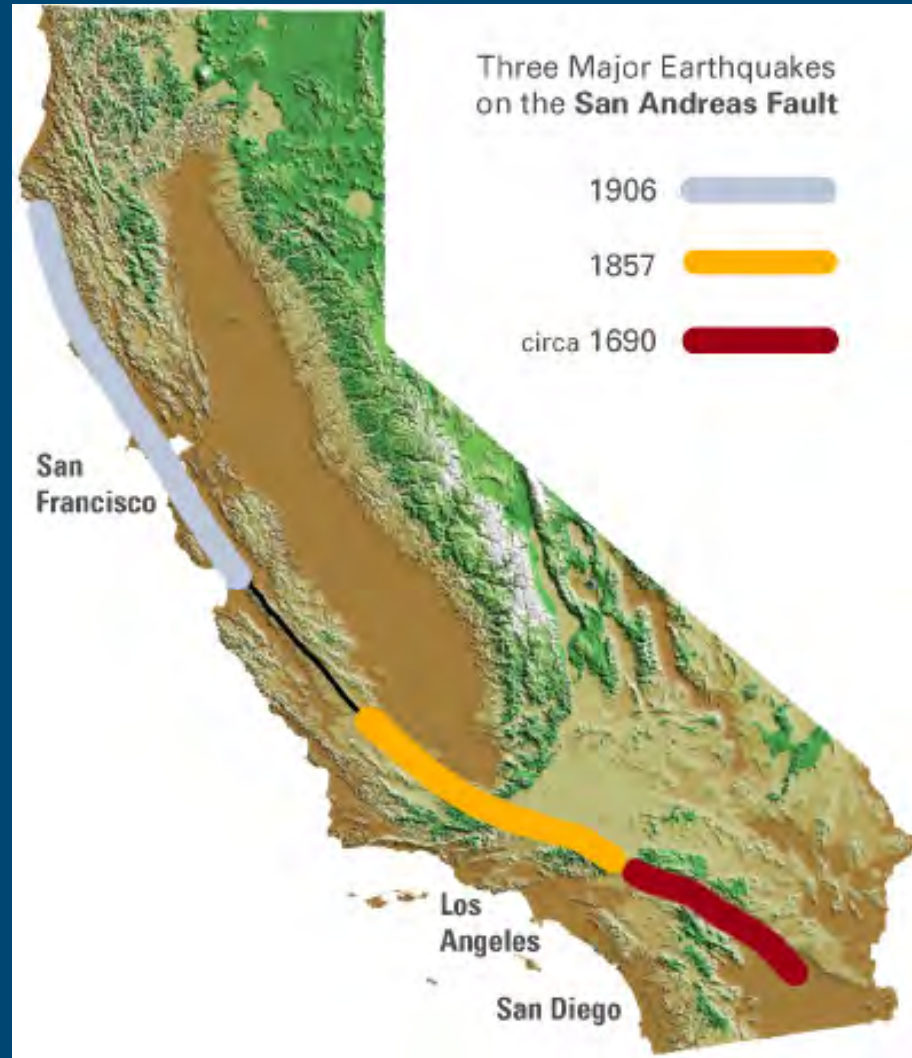
Mission: To gather new information about earthquakes in Southern California, combine knowledge into a comprehensive understanding of earthquake phenomena, and communicate this understanding to increase earthquake awareness, reduce economic losses, and save lives.

www.scec.org



Welcome to Earthquake Country!

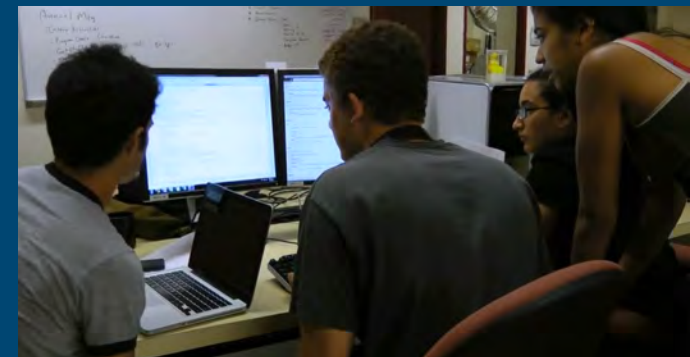
California: A Natural Laboratory



SCEC/USEIT: Undergraduate Studies in Earthquake Information Technology

Students develop technical tools for scientists, educators, and policy makers about faults, earthquakes, seismic hazard mitigation, and earthquake risk reduction.

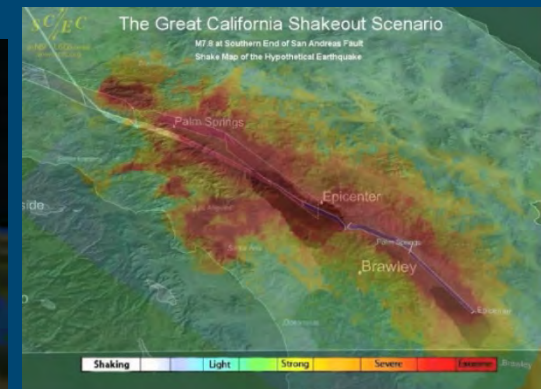
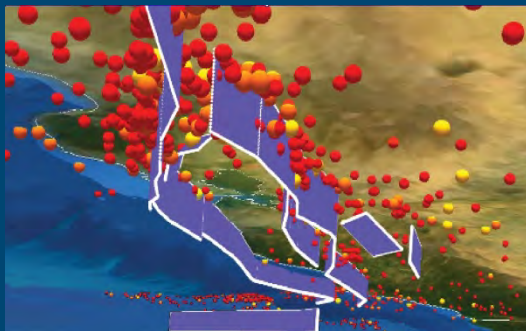
- Began in 2002
 - striving for diversity
 - Over 242 interns to date
- Interdisciplinary, Team-Based Program
 - primarily computer science and computer engineering
 - nearly 3 dozen majors represented
 - many freshmen and sophomores
 - organized around a “Grand Challenge”
- Succeeds in attracting new students
 - from other majors
 - from industry career plans



www.scec.org/useit

SCEC Virtual Display of Objects (SCEC-VDO)

- An open source software tool developed by SCEC USEIT interns to visualize geo-referenced datasets for analysis, presentations, and publications.
- Includes useful datasets such as fault systems, earthquake events, three-dimensional surface imaging, and space-time displays.
- Continually improved to fulfill the requests of the user community.
- Many examples at: <http://scec.usc.edu/internships/useit/scec-vdo>



SCEC Plate Tectonics Puzzle Map

- Large, two-sided version of the USGS *This Dynamic Planet* poster map along with an accompanying lesson plan with a map legend, instructions, most commonly lost plates template, and suggested discussion questions.
- Back is printed with plate outlines to guide cutting
- Provides educators with a tool to teach students about Earth science topics through interaction and visualization.
- Map includes volcanoes, mountains, earthquakes, and meteorite impacts as well as vector arrows that show direction and speed of plate movement.
- Email degroot@usc.edu for ordering information (\$15)





October 16, 2014 @ 10:16 am
Register today at ShakeOut.org

As of today:

Clallam County - 7,186

Jefferson County – 2,299

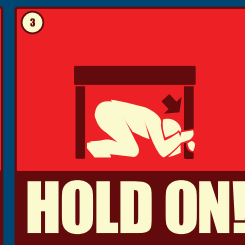
Grays Harbor County – 9,254

Pacific County – 2,678

King County – 311,376

2013 Drill - 870,000 in WA

All 2013 drills 23.1 M registered



ShakeOut.org/resources

Get Ready to Shake Out.

10.20.11
Register Now at
www.shakeout.org

The Great California
Shake Out



Shake Out The Great California ShakeOut
Annual Disaster Earthquake Drill

Individuals and Families
Get Ready to ShakeOut

Register today at ShakeOut.org

At 10:15 a.m. on October 16, 2011, millions of Californians will "Drop, Cover, and Hold On" to The Great California ShakeOut, the largest earthquake drill ever. Everyone is encouraged to participate in the drill whenever you are at 10:15 a.m. on 10/16/11.

Major earthquakes may happen anytime you work, live, or travel in California. The ShakeOut is an exercise to practice how to protect ourselves, and for everyone to become prepared. The goal is to prevent disasters from becoming catastrophes.

Why is "Drop, Cover, and Hold On" drill important? As with anything, it is not quickly you must practice often. You may only have seconds to protect yourself in an earthquake before strong shaking sends you down, or something falls on you.

Nearly 5.5 million business Californians participate in the 2011 ShakeOut. Now California's Great California ShakeOut will be held on the third Thursday of October each year.

Everyone can participate: Individuals, families, businesses, schools, colleges, government agencies and organizations are all invited to register.

As a registered ShakeOut participant you will:

- Learn what you can do to get prepared
- Receive ShakeOut materials for your earthquake drill event
- Be at the table

Everyone can participate: Individuals, families, businesses, schools, colleges, government agencies and organizations are all invited to register.

Shake Out The Great California ShakeOut
Annual Disaster Earthquake Drill

Businesses
Get Ready to ShakeOut

Register today at ShakeOut.org

At 10:15 a.m. on October 16, 2011, millions of Californians will "Drop, Cover, and Hold On" to The Great California ShakeOut, the largest earthquake drill ever. All businesses are encouraged to participate in the drill for plan & move earthquake exercise.

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- Be at the table

Everyone can participate: Individuals, families, businesses, schools, colleges, government agencies and organizations are all invited to register.

The Great Shake Out
Are You Ready to ShakeOut?

We're all in this together...

- On the third Thursday of October each year, you can join the millions of Californians who will "Drop, Cover, and Hold On" to The Great California ShakeOut, the largest earthquake drill ever.
- As described below, major earthquakes may happen where you work, live, or travel in California. The ShakeOut is our chance to practice how to protect ourselves, and for everyone to become prepared. The goal is to prevent disasters from becoming catastrophes.
- Why is a "Drop, Cover, and Hold On" drill important? As with anything, it is not quickly you must practice often. You may only have seconds to protect yourself in an earthquake before strong shaking sends you down, or something falls on you.
- Other preparatory information is on the back of this flyer and is online at www.shakeout.org.
- Everyone can participate! Individuals, families, businesses, schools, government agencies, community groups, and other organizations are all invited to register.
- Register now! www.ShakeOut.org

California is earthquake country!

- California experienced earthquakes no larger than the 1868 Fortridge or 1891 Loma Prieta quakes for largest recent quake, on average.
- All areas of California have experienced earthquakes in the past and will go on again in the future. There are hundreds of faults throughout the state that have been active recently.
- There is a 30% chance of a magnitude 7.5 or greater earthquake somewhere in California in the next 30 years (www.usgs.gov).
- While some major and minor faults have a higher chance of earthquakes than others, the risk anywhere in California is high when compared to most areas of the country.
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CALIFORNIA'S ANNUAL EARTHQUAKE DRILL
Shake Out
www.ShakeOut.org

Shake Out. October 20, 2011
Don't Freak Out.

The Great California
Shake Out

www.shakeout.org

Official Participant

Join Us
for the Largest Earthquake Drill in U.S. History.

October 20, 10:20 a.m.

Register at www.ShakeOut.org

Shake Out "Countdown to ShakeOut" for Businesses

Use the following countdown to ensure everyone in your business takes part in The Great California ShakeOut Drill on October 20, 2011, to prepare for the next big earthquake. All businesses are invited to participate at work, and at home!

- Register your business as an official participant in the 2011 ShakeOut Drill at www.ShakeOut.org**
 - Register the number of people participating business-wide
 - Encourage employees to also participate if at home and register as an individual or as a family, invite friends and neighbors to register as individuals or organizations
- Meet with department heads to review plan and obtain their buy-in, if necessary, and determine what level of drill your business will conduct and who will participate.** Consider drilling at a higher level to engage staff to be more effective during a disaster. (Drill manuals are available at www.ShakeOut.org/resources/index.html#manuals)
 - Level 1 - Simple: Drop, Cover and Hold On
 - Level 2 - Basic: Life Safety Drill
 - Level 3 - Intermediate: Decision-Making Drill
 - Level 4 - Advanced: Business Operations Simulation Drill
- Create a drill/exercise plan that includes overview of what your drill will consist of (even if just Drop, Cover and Hold On), who you expect to happen during the drill, and a feedback session after the drill to identify strengths and weaknesses.**
 - Inform employees/staff participants of date and time of drill, your expectations for their participation, and the benefits of the drill
- Encourage suppliers, vendors, contractors, partnering businesses, and others in your business network to participate - as a means of protecting your business - and share ShakeOut resources with them.** (Consider other tasks that can protect your business, such as having Service Level Agreements in place to ensure that the services or products you rely on will be available after disaster.)
- Create employee awareness campaign:**
 - Hang ShakeOut banners and signs throughout your business to encourage and remind employees, vendors, and customers to participate
 - Initiate an email campaign to employees, staff, and customers with information and tips on how to prepare at home and work. (See <http://www.shakeout.org/resources/> for examples)
 - Encourage employees to post a ShakeOut-related safety message on outgoing email messages, such as "Participate in the 2011 Great California ShakeOut on 10/20 at 10:20am!"
- Review and use ShakeOut resources for drills at www.ShakeOut.org/resources/index.html**
 - Drill manuals, Drill broadcast, banners, signs, triangle of life rebuttal, PowerPoint presentations, 7 Steps to an Earthquake Resilient Business booklet, ShakeOut Shop, etc.
- Hold your drill at 10:20 a.m. on October 20th (or an alternative time, if necessary)**
 - Hold post-drill discussions to hear what people learned and plan next steps

ShakeOut Country Alliance

Shake Out Shop

Shake Out t-shirt, mug, and other merchandise.

Tsunami Messaging



ShakeOut plus Tsunami Evacuation-WalkOut Drill

Add a tsunami evacuation drill to your ShakeOut Drill

First, find out if you live, work or play in a tsunami hazard area:

- Use the links listed below to find out where tsunami hazard zones occur.

CGS website: <http://www.tsunami.ca.gov>

CalEMA MyHazards <http://myhazards.calema.ca.gov/>

- Information from either of these websites can help you identify the tsunami hazard area in your community and help you prepare. If you are located just outside of a tsunami hazard area, you might consider working with your community to see what kind of assistance you might be able to provide for potential evacuees.



Add a Tsunami Evacuation Drill to your planned ShakeOut Drill

- For ShakeOut, it is important to register in advance for the event, and on the day of ShakeOut participate in the **Drop-Cover-Hold On** drill. Prior to ShakeOut, use the links above to determine if you are in a tsunami hazard area. If you are, you can add an organized tsunami evacuation drill that will follow the Drop-Cover-Hold On.
- To prepare for the drill, **identify** if there is an evacuation plan in place for your site. Contact your building manager, school district, and/or city or county offices of emergency services to find out the recommended procedures. Additionally, the maps at www.tsunami.ca.gov and <http://myhazards.calema.ca.gov/> can lead you to links to local, regional, state, and national information sources.
- If there is no tsunami evacuation plan in place for your building, **learn** what the recommended tsunami evacuation routes are in your city, county and region. Some cities and counties have this information available online.
- Identify an area outside the tsunami hazard zone where you can safely relocate (school, church, parking lot).
- Walk your evacuation route prior to the drill. Make sure there are no potential hazards that may prevent you from using this evacuation route safely.



Materials developed by Redwood Coast, Tsunami Work Group (Humboldt State University - CA)

**Shake
Out**

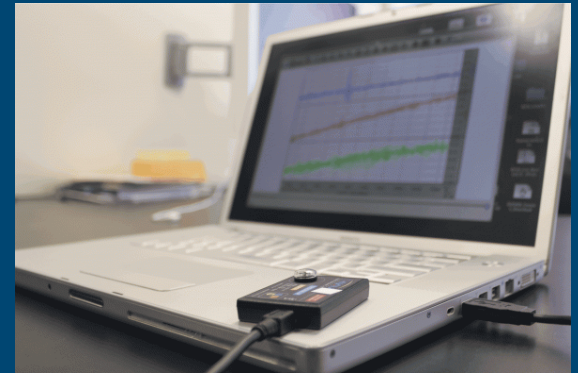
California Science Center Live Earthquake Program

- Developed by SCEC SURE interns and Science Center staff
- www.californiasciencecenter.org
- 15-minute program performed on the Creative World *Tech Review* Stage at the California Science Center in Los Angeles
- Debuted in Spring 2012 as a *Science Spectacular!™* Program and will be offered weekly to school groups, families, and other visitors
- Covers earthquake science and preparedness basics
- Program will be shared with and performed by other members of the EPIcenter Network (and other free choice learning institutions).
- Will be shared on the web in spring 2014.
- Link to Video & resources: <http://www.earthquakecountry.org/EPIcenter/eqshow.html>



Quake Catcher Network (QCN)

- Largest, low-cost strong motion seismic network utilizes sensors in and attached to Internet-connected computers.
- Collaborative initiative of Stanford Univ. & USGS
- Provides educational software that uses the sensors to teach about earthquakes and their hazards
- QCN and the EPIcenter Network are initiating a campaign to bring sensors and educational programming to free-choice learning environments. Partners include SCEC, NEES, IRIS, USGS, CA Geological Survey, UNAVCO, and EarthScope



<http://qcn.stanford.edu>

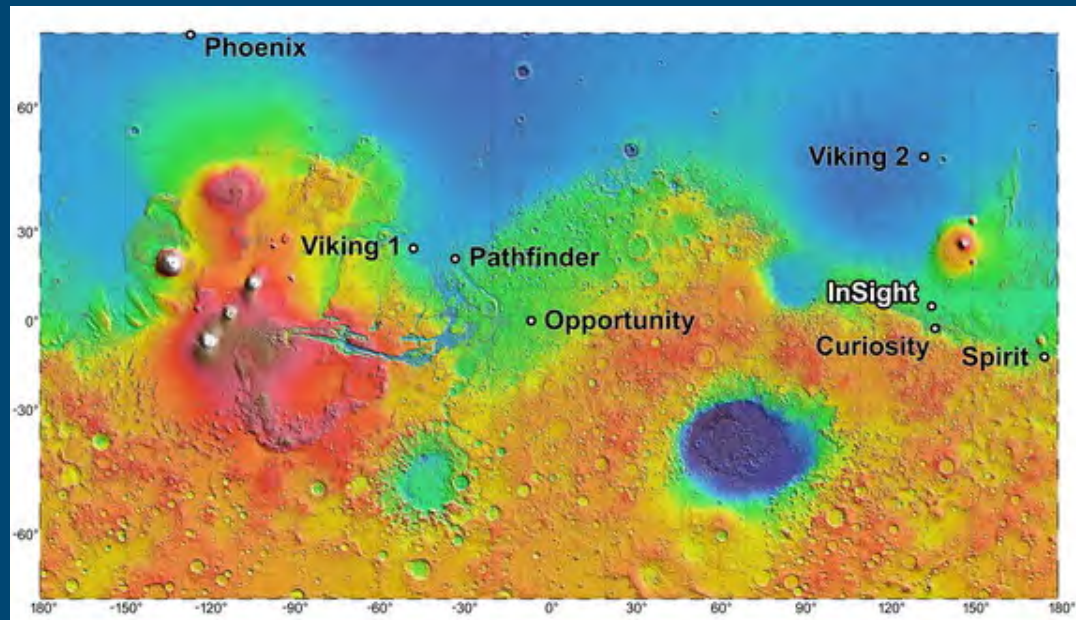


Shake
Out

NASA InSight



Interior Exploration using
Seismic Investigations,
Geodesy and Heat
Transport



NASA/JPL

Shake
Out

InSight Formal Education Program

2014 *Vital Signs of the Planet*

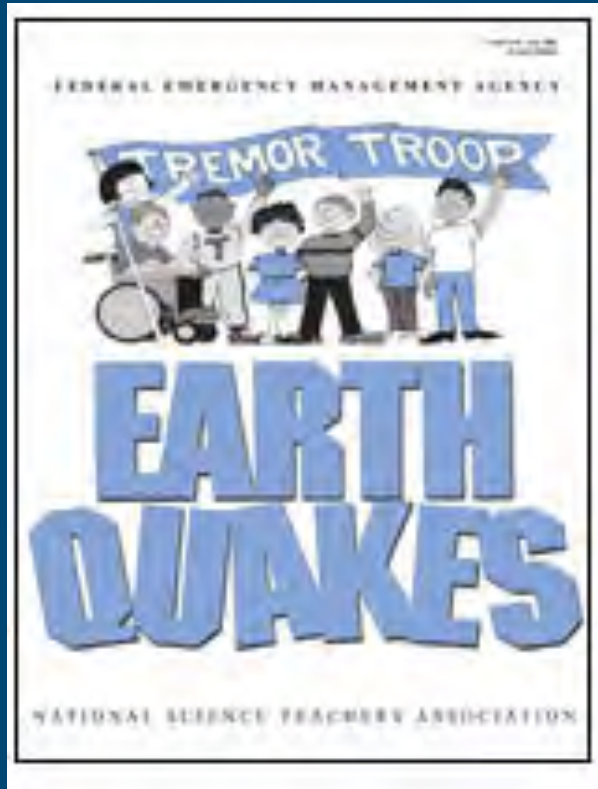
Educator Fellows will:

- Be immersed into the science of Caltech, JPL, QCN, SCEC
- Conduct 5 days of survey-mode GPS research
- 9 lesson kits to be hosted at SBCM Hub (lending kit format)
- Test teach the lessons
- Install a QCN seismometer at their school
- Host a workshop at SCEC Annual Meeting
- Participate in 2014 Great ShakeOut

<http://insight.jpl.nasa.gov/home.cfm>



Tremor Troop (K – 6)



<http://www.fema.gov/ar/media-library/assets/documents/2915>

“Native California is Earthquake Country!” Project

- Partnership with Sherman Indian High School (Riverside, CA)
- Turtle Tale Video: Earthquake story of Gabrielino-Tongva Tribe (filmed by SCEC)
- <http://www.earthquakecountry.org/EPIcenter/turtleale.html>
- Two posters: one with tribal languages of students at the school (national), one for distribution throughout California (only California languages)



Temporary and/or Event-Based Displays

Recruited two new EPIcenters and Quake Catcher Network Sensor Installations at: HSU Natural History Museum, Arcata and HSU Founders Hall (Geological Sciences).

Visited Humboldt County Fair to see award-winning earthquake and tsunami room.



ShakeOut Scenario for Southern California

M7.8 Scenario Earthquake
Time = 000.0 s



Source: USGS - <http://earthquake.usgs.gov/regional/nca/simulations/shakeout>

Shake
Out



Thank You!

Robert de Groot
Manager – Office of Experiential Learning & Career Advancement
Southern California Earthquake Center (SCEC)
degroot@usc.edu



Earthquake Country Alliance
We're all in this together.