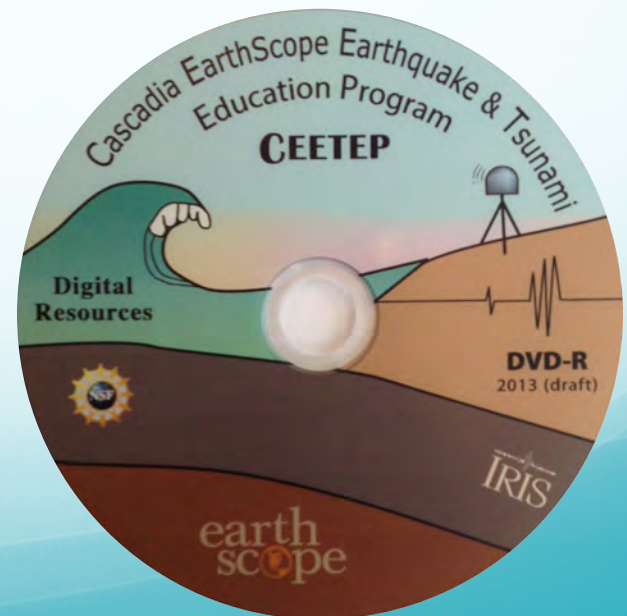
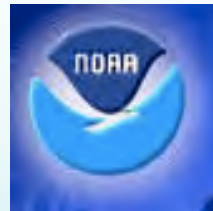
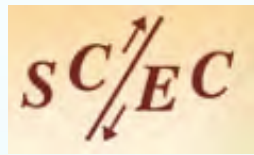


# Digital Resources Related to CEETEP Topics

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

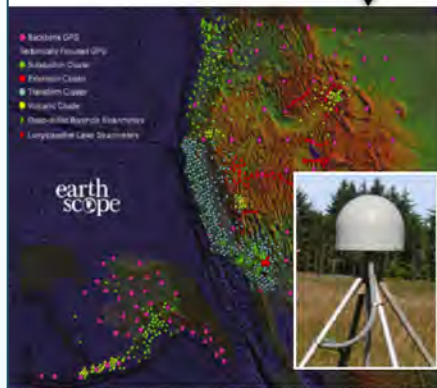
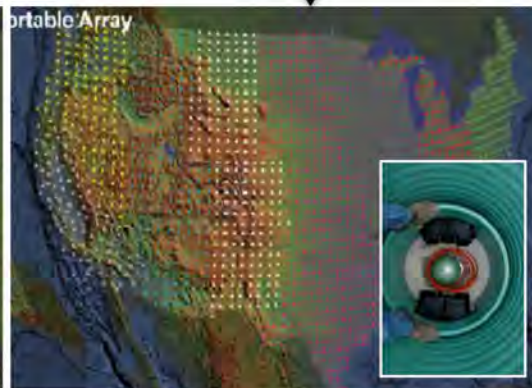


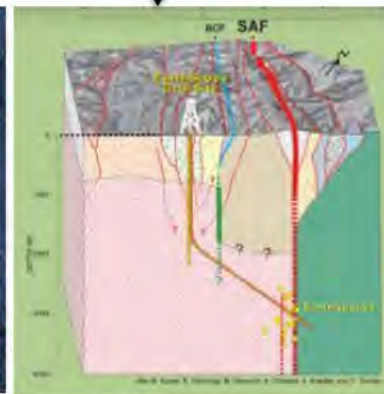
Plate Boundary Observatory (PBO) – >1100 GPS stations and strainmeters to measure crustal movements

**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



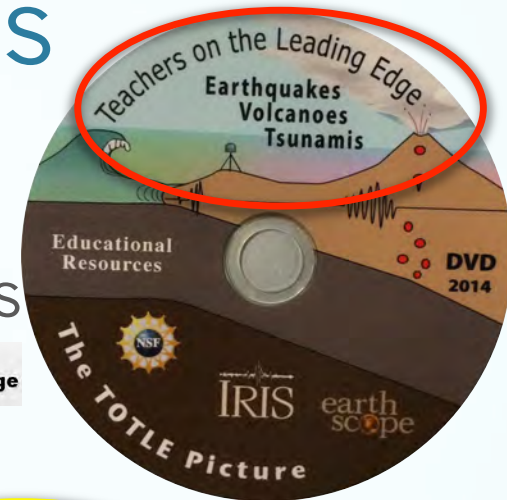
Cascadia EarthScope Earthquake and Tsunami Education Program has 3 collaborating universities

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

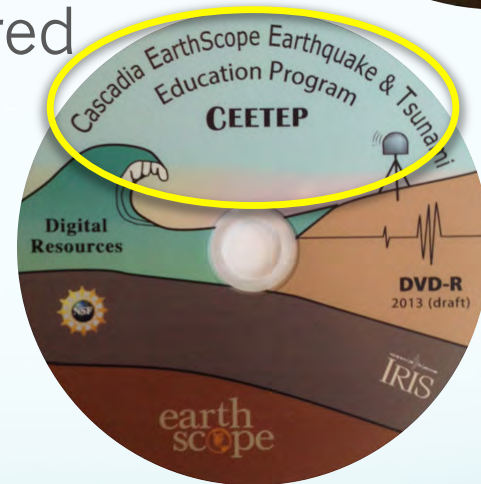
# CEETEP Resources

- 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 – Aberdeen, WA**  
**14 August 2014**  
**[degroot@usc.edu](mailto: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)

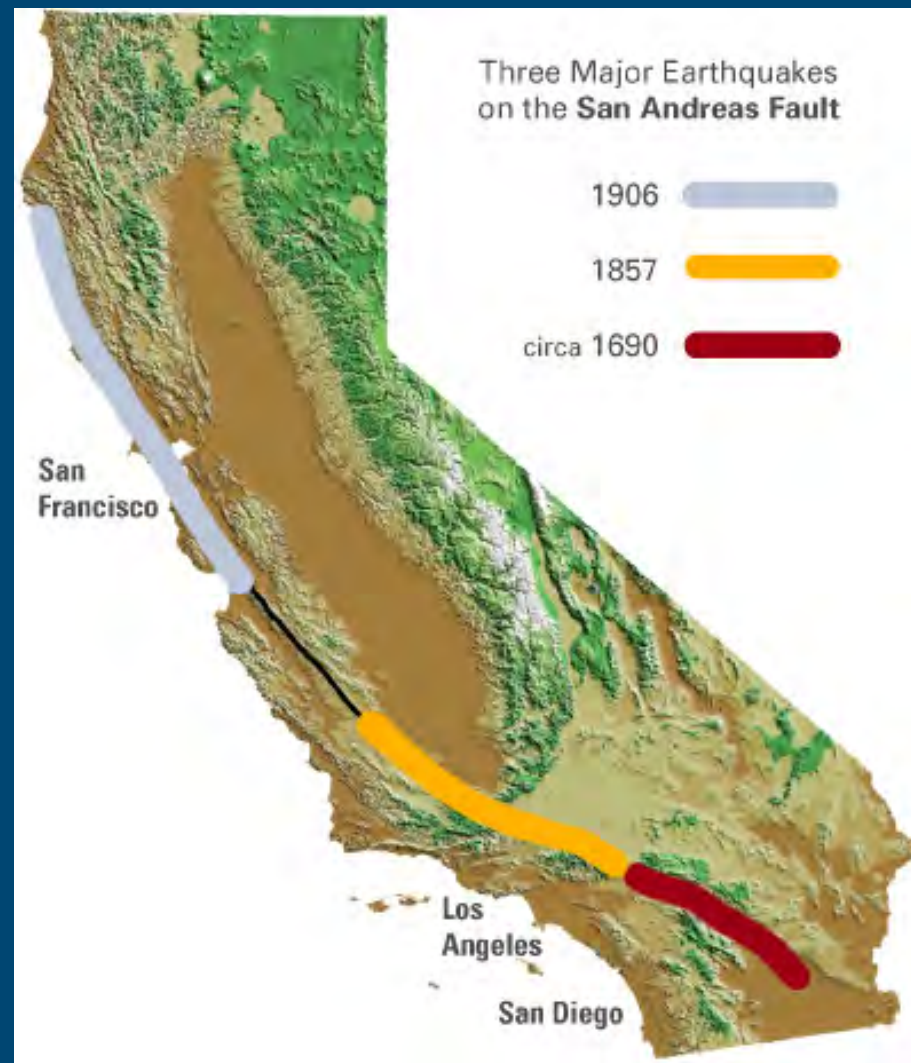
Mission: To gather new information about earthquakes in Southern California, combine knowledge into a comprehensive understanding of earthquake phenomena, and communicate this understanding to increase earthquake awareness, reduce economic losses, and save lives.

[www.scec.org](http://www.scec.org)



# Welcome to Earthquake Country!

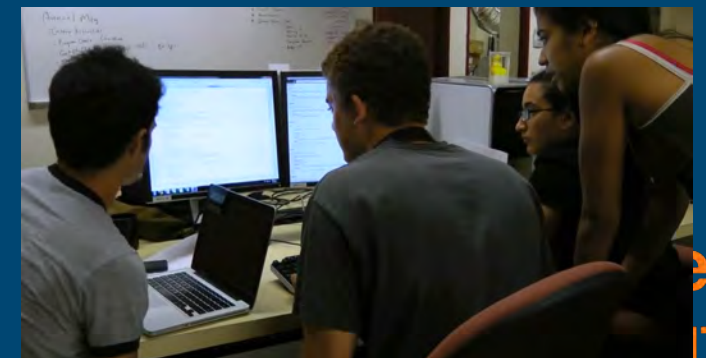
## California: A Natural Laboratory



# 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.

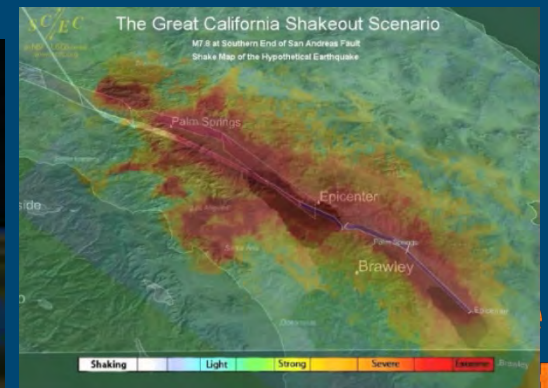
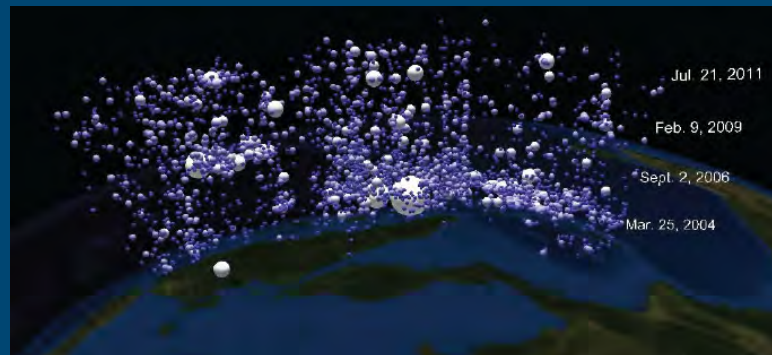
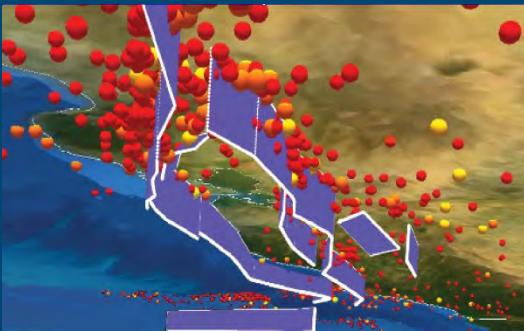
- Began in 2002
  - striving for diversity
  - Over 242 interns to date
- Interdisciplinary, Team-Based Program
  - primarily computer science and computer engineering
  - nearly 3 dozen majors represented
  - many freshmen and sophomores
  - organized around a “Grand Challenge”
- Succeeds in attracting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



[www.scec.org/useit](http://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](mailto:degroot@usc.edu) for ordering information (\$15)





October 16, 2014 @ 10:16 am  
Register today at [ShakeOut.org](http://ShakeOut.org)

As of today:

Grays Harbor County - 2,906

Pacific County - 2,723

Wahkiakum County - 350

King County - 174,198

**2013 Drill - 870,000 in WA**

All 2013 drills 23.1 M registered



#### CHECK THE STATS

**Over 410,000**  
participants and counting!  
(Over 13.8 million worldwide)

Click the map for  
details about each area



**2013 Participants: Over 870,000**  
*Click Map for Area Total:*



**DROP!**



**COVER!**



**HOLD ON!**

# ShakeOut.org/resources

Get Ready to Shake Out.

10.20.11  
Register Now at  
[www.shakeout.org](http://www.shakeout.org)

The Great California  
Shake Out™



**The Great California ShakeOut**  
Annual Disaster Earthquake Drill

**Individuals and Families**  
Get Ready to ShakeOut

Register today at [ShakeOut.org](http://ShakeOut.org)

At 10:20 a.m. on October 20, 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 10:20 a.m. on 10/20/11.

Major earthquakes may happen anywhere 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 a "Drop, Cover, and Hold On" drill important? As with anything, it's not quickly you start practice often. You may only have seconds to protect yourself in an earthquake before strong shaking knocks you down, or something falls on you.

Nearly 8.5 million Southern Californians participated in the 2008 ShakeOut. Now statewide, the Great California ShakeOut will be held on the third Thursday of October each year.

Businesses 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
- Be connected to the largest free ShakeOut drill ever
- Receive ShakeOut news and other earthquake information
- Not an example that encourages others to get involved

**The Great California ShakeOut**  
Annual Disaster Earthquake Drill

**Businesses**  
Get Ready to ShakeOut

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- Not an example that encourages others to get involved

**The Great California ShakeOut**  
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's not quickly you start practice often. You may only have seconds to protect yourself in an earthquake before strong shaking knocks you down, or something falls on you.
- Other preparedness information is on the back of this flyer and is online at [www.shakeout.org](http://www.shakeout.org).
- Everyone can participate! Individuals, families, businesses, schools, government agencies, community groups, and other organizations are all invited to register.
- Register now at [www.ShakeOut.org](http://www.ShakeOut.org)

**California is earthquake country!**

- California experienced earthquakes as large as the 1906 Northridge or 1989 Loma Prieta quakes for larger than most states, on average.
- All areas of California have experienced earthquakes in the past and will do so again in the future. There are hundreds of faults throughout the state that can have large earthquakes.
- There is a 30% chance of a magnitude 7.5 or greater earthquake somewhere in California in the next 30 years (<http://seis.cslu.org/>).
- While some major and central 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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The ShakeOut is a fun, non-profit activity that helps you and your family become more prepared for earthquakes. It's a chance to practice how to protect ourselves, and for everyone to become prepared. The goal is to prevent disasters from becoming catastrophes.

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**Official Participant**

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

**DROP! COVER! HOLD ON!**

**October 20, 10:20 a.m.**

Register at [www.ShakeOut.org](http://www.ShakeOut.org)

**"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](http://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](http://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), what 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 customer 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/vendors/> 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](http://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 20<sup>th</sup> (or an alternative time, if necessary)**
  - Hold post-drill discussions to hear what people learned and plan next steps.

Earthquake Country Alliance



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

The Great California  
Shake Out™

[www.shakeout.org](http://www.shakeout.org)

# 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](http://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

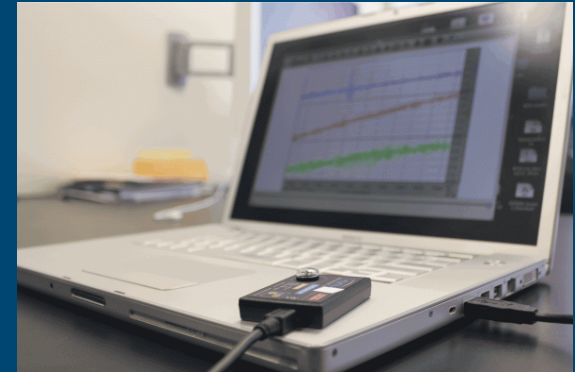
- Developed by SCEC SURE interns and Science Center staff
- [www.californiasciencecenter.org](http://www.californiasciencecenter.org)
- 15-minute program performed on the Creative World *Tech Review* Stage at the California Science Center in Los Angeles
- Debuted in Spring 2012 as a *Science Spectacular!™* 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>



Shake  
Out

# 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>

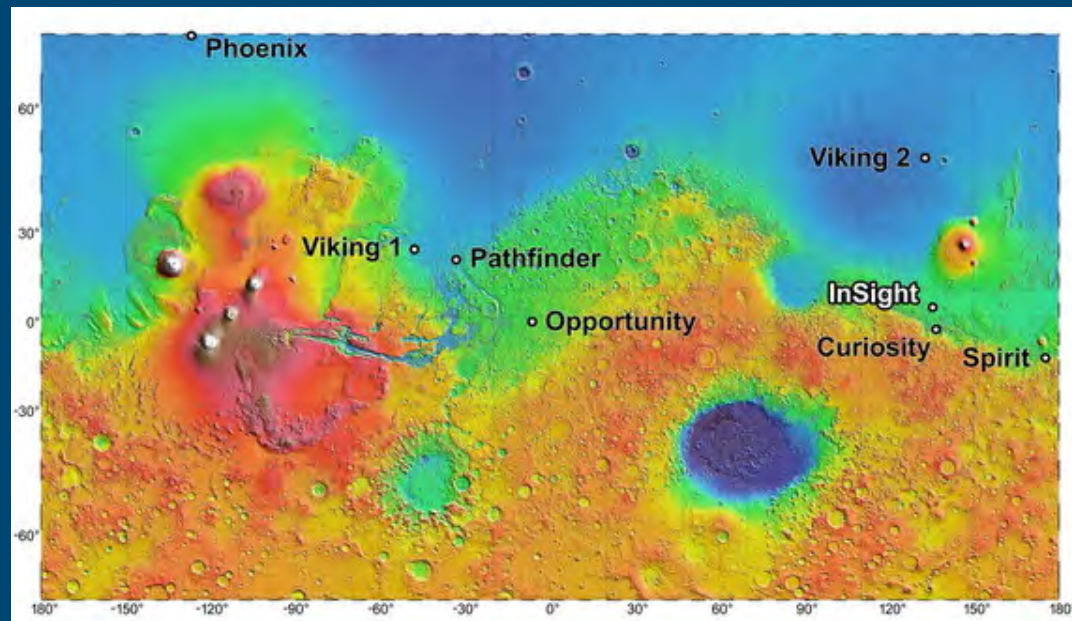


Shake  
Out

# 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*

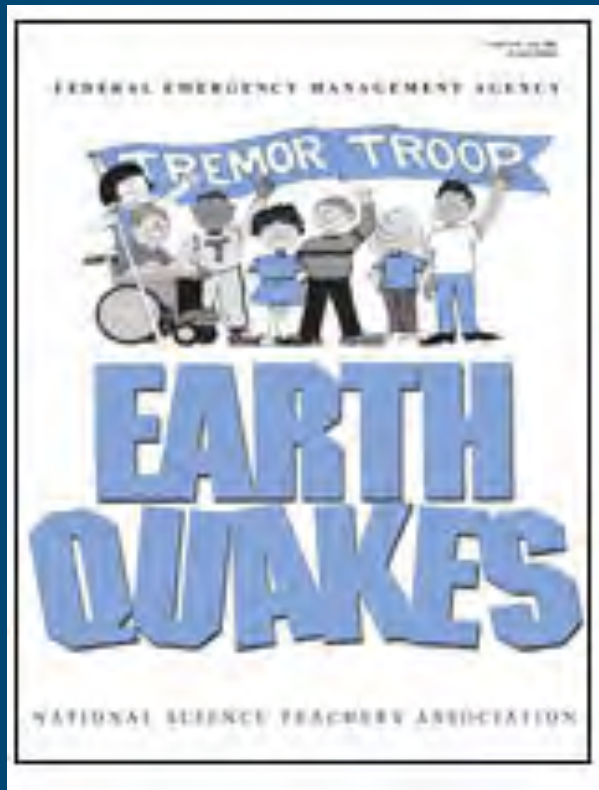
### Educator Fellows will:

- 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)



Shake  
Out

# 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](mailto:degroot@usc.edu)**



Earthquake Country **Alliance**  
*We're all in this together.*