Professional development workshops for coastal teachers, interpreters, and emergency management educators.
Introductions

- CEETEP
- Instructors
- Participants
- EarthScope
CEETEP

• Primary Aim: Improve disaster resilience through educator professional development

• Goals – Participants will:
  • **Learn Geoscience** and be able to communicate about earthquake and tsunami science and research
  • **Understand Risk** and be able to communicate about Cascadia geohazards
  • **Take Action** and be able to work with learners to improve preparedness
  • **Exchange Pedagogy** on how to teach about EarthScope, hazards/risk, and preparedness
“The same geological processes that threaten our lives with earthquakes and tsunamis also nourish our spirits by creating the spectacular headlands and beaches of the Pacific Northwest.” – Bob Lillie

Fort Stevens State Park

http://www.oregonstateparks.org/
CEETEP Precursors

Teachers on the Leading Edge (TOTLE)
Workshops for Earth Science Teachers
in Oregon and Washington
(2005 - 2011)

EarthScope Education and Outreach
Workshops for Interpretive
Professionals in Parks and Museums
(2008 - Present)
Rethinking the View

Science (EarthScope, Cascadia)

Not: “Dumbing It Down”
Scientists
Students
The Public

Instead: “Storying It Up” 😊

Greater resilience in Cascadia & America
Partner organizations & further dissemination
Meanings (Geoscience, Hazards, Preparedness)

CEETEP View

Formal Learning
Free-Choice Learning

Scientists
Science (EarthScope, Cascadia)

Students
The Public
Greater resilience in Cascadia & America

Partner organizations & further dissemination

**Meanings** (Geoscience, Hazards, Preparedness)

- Students
- The Public
- Scientists
- Educators
  - Emergency Management Educators
  - Educators
  - K-12 Teachers
  - Park Interpreters

Joint professional development in coastal communities
Galvanizing change in preparedness

- Research on behavioral change (Wood 2012; Mileti 2011)
  - Simple consistent messaging on what TO DO
  - From many trusted sources
  - For a long long time
  - Seeing others take preparedness steps

- FEMA (2010) suggests that science classrooms are under-utilized for hazard and preparedness connections


Mileti and colleagues (National Hazards Center, University of Colorado) http://www.colorado.edu/hazards/

CEETEP
Cascadia EarthScope
Earthquake and Tsunami Education Program

Workshops on Cascadia Science and Preparedness:

Gray’s Harbor & Olympic Peninsula 2014

Astoria, Oregon
October 11-14, 2013

Newport, Oregon
August 12-15, 2013

Coos Bay & South Oregon 2015
Astoria workshop space

- Columbia Hall 219 – Main room
- Columbia Hall 221 – Drinks, snacks, lunch and some breakout activities or team planning
- Water fountains & Restrooms – Far other end of hallway
CEETEP Binder

- Agenda
- Contact lists
- Resources
- Feedback
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td><strong>Coffee, tea, juice, snacks for those who arrive early</strong></td>
</tr>
<tr>
<td>9:00</td>
<td>Introductions: CEETEP, EarthScope, Participants, Instructors <strong>Please sit with your Action Team.</strong></td>
</tr>
<tr>
<td>10:15</td>
<td><strong>Break (Coffee, tea, juice, snacks)</strong></td>
</tr>
<tr>
<td>10:30</td>
<td>Beauty and the Beast: Plate Tectonics and Geological Hazards of the Pacific Northwest</td>
</tr>
<tr>
<td>12:00</td>
<td>Thoughts/questions/reflection</td>
</tr>
<tr>
<td>12:15</td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td>1:00</td>
<td>Basics of Earthquake and Tsunami Science and Hazards and Related Teaching Activities</td>
</tr>
<tr>
<td>3:15</td>
<td><strong>Break (Coffee, tea, juice, snacks)</strong></td>
</tr>
<tr>
<td>3:30</td>
<td>Preparedness for Distant Tsunami and Surviving an Earthquake</td>
</tr>
<tr>
<td>4:30</td>
<td>Forms: Reimbursements; Stipends; Photo Permissions; Logistics for Day 2 Field Trip</td>
</tr>
<tr>
<td>4:45</td>
<td>Reflection, Questions, Implications</td>
</tr>
<tr>
<td>5:30</td>
<td><strong>Adjourn</strong></td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
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<tr>
<td>9:00</td>
<td>Depart</td>
</tr>
<tr>
<td>9:15</td>
<td><strong>Stop 1:</strong> Tongue Point GPS station</td>
</tr>
<tr>
<td>10:45</td>
<td><strong>Stop 2:</strong> Long Beach interpretive site and evacuation challenges</td>
</tr>
<tr>
<td>12:00</td>
<td><strong>Lunch</strong> in Ilwaco (packed lunches)</td>
</tr>
<tr>
<td>12:45</td>
<td><strong>Stop 3:</strong> Ilwaco Evacuation Walk</td>
</tr>
<tr>
<td>2:30</td>
<td><strong>Stop 4:</strong> Niawiakum River Tsunami Geology</td>
</tr>
<tr>
<td>5:30</td>
<td>Adjourn</td>
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</tbody>
</table>
## Agenda Day 3 – Cascadia

**Sunday, October 13 (Day 3)**

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<td><strong>Lunch</strong></td>
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<tr>
<td>1:00</td>
<td>Preparedness and Surviving Local Tsunami Events</td>
</tr>
<tr>
<td>1:45</td>
<td>Native American Oral Histories</td>
</tr>
<tr>
<td>2:30</td>
<td>Exchange of Pedagogies: Interpreting the &quot;Beauty and the Beast&quot; Story along the Cascadia Coast</td>
</tr>
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<td>3:00</td>
<td><strong>Break (Coffee, tea, juice, snacks)</strong></td>
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<td>3:15</td>
<td>Reflection, Questions, Implications</td>
</tr>
<tr>
<td>4:00</td>
<td>Action Teams: Interpretive Program Development. Teams work on 10-minute interpretive program that they will present on Day 4.</td>
</tr>
<tr>
<td>5:30</td>
<td>Adjourn</td>
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<tr>
<td>Time</td>
<td>Session</td>
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<td>-------------------------------------------------------------------------</td>
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<td>9:00</td>
<td><strong>Digital Resources</strong></td>
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<td>9:45</td>
<td><strong>Preparedness for Post-event Personal and Community Survival</strong></td>
</tr>
<tr>
<td>10:30</td>
<td><strong>Break (Coffee, tea, juice, snacks)</strong></td>
</tr>
<tr>
<td>10:45</td>
<td><strong>Break Out Sessions</strong></td>
</tr>
<tr>
<td></td>
<td>Tsunami Vertical Evacuation Structures <strong>Teachers</strong></td>
</tr>
<tr>
<td></td>
<td>Hazard Inventory <strong>Interpreters &amp; EM Educators</strong></td>
</tr>
<tr>
<td>11:25</td>
<td><strong>Break Out Sessions</strong></td>
</tr>
<tr>
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<td>12:45</td>
<td><strong>Action Teams: Interpretive Program Presentation.</strong> Each group presents their 10-minute Interpretive Programs. Discussion after each about content and efficacy.</td>
</tr>
<tr>
<td>2:15</td>
<td><strong>Break (Coffee, tea, juice, snacks)</strong></td>
</tr>
<tr>
<td>2:30</td>
<td><strong>Action Teams: Collaboration and Share-a-Thon Plans.</strong> Collective discussion about the task, schedule, and logistics for each Action Team to develop their March 8, 2014 Share-a-Thon products</td>
</tr>
<tr>
<td>4:15</td>
<td><strong>Post-Workshop Assessment.</strong> Survey and focus groups.</td>
</tr>
<tr>
<td>5:30</td>
<td><strong>Adjourn</strong></td>
</tr>
</tbody>
</table>
CEETEP
Astoria, Oregon
October 11-14, 2013

CEETEP Principle Investigators and Instructors
1. Bob Butler, University of Portland, Portland
2. Nancee Hunter, OSU Hatfield Marine Science Center, Newport
3. Bob Lillie, Oregon State University, Corvallis
4. Beth Pratt-Sitaula, Central Washington University, Ellensburg, and UNAVCO, Boulder, CO

Master Teachers and Co-Instructors
6. Bonnie Magura, Portland Public Schools (retired), Portland
7. Roger Groom, Mt. Tabor Middle School, Portland
8. Pat Corcoran, OSU Extension, Astoria
9. Althea Rizzo, Oregon Emergency Management, Corvallis
CEETEP
Astoria, Oregon
October 11-14, 2013

CEETEP Partner Organizations
10. Bob de Groot, Southern California Earthquake Center, Los Angeles, CA

External Evaluators
11. Michael Coe, Cedar Lake Research, Portland

Animator/Videographer
12. Jenda Johnson, Portland

Student Assistants
13. Rachel Hausmann, Oregon State University, Corvallis
14. Leslie Moclock, University of California Davis & Portland, OR
20-second Intro
1. Who are you?
2. Your organization and/or educational setting?

Optional:
3. What you particularly hope to get from CEETEP?

K-12 Teacher
Alyssa Caudill  South Bend
Key McMurry  Raymond

Park/Museum Interpreter
Lee Knott  Long Beach
Julie Tennis  Naselle

Emergency Management Educator
Ed Archer  Ocean Park

South Bend Jr/Sr High School
South Bend School District

Sea Schools Co-operative
Fleance interpreter

Pacific County EM
Action Team 2 – Astoria

20-second Intro
1. Who are you?
2. Your organization and/or educational setting?

Optional:
3. What you particularly hope to get from CEETEP?

K-12 Teacher
Nick Baisley   Astoria     Astoria High School
Michael Baker  Astoria     Astoria High School

Park/Museum Interpreter
Betsey Ellerbroek  Astoria     Columbia River Maritime Museum
Cathy Peterson   Astoria     Lewis and Clark National Historical Park
Susan Rhoads     Astoria     Lewis and Clark National Historical Park

Emergency Management Educator
Lianne Thompson  Astoria     Comm. Emergency Resp. Team (CERT)
20-second Intro
1. Who are you?
2. Your organization and/or educational setting?

Optional:
3. What you particularly hope to get from CEETEP?

K-12 Teacher
Sena Berquist Gearhart
Becky Seybold Gearhart

Park/Museum Interpreter
John Koch Hammond

Emergency Management Educator
Adam Morse Seaside

Gearhart Elementary School
Fort Stevens State
Seaside High School CERT
20-second Intro
1. Who are you?
2. Your organization and/or educational setting?

Optional:
3. What you particularly hope to get from CEETEP?
20-second Intro
1. Who are you?
2. Your organization and/or educational setting?

Optional:
3. What you particularly hope to get from CEETEP?
Get to know your team

- Several minute intro – Each member of the team should share a little more details about their:
  - Teaching setting and audience
  - Existing strengths or experience with geoscience and preparedness
  - Goals for gaining knowledge and abilities in teaching tsunami and earthquake education
A National Science Foundation (NSF) effort to …..
- Explore the structure and evolution of North American continent
- Study processes that cause earthquakes and volcanic eruptions

EarthScope has three main “observatories”
EarthScope Observatories

USArray

Seismometers

Geodetic Instruments

Deep Drillhole

PBO

San Andreas Fault Observatory at Depth

Plate Boundary Observatory
Like a “Hubble Telescope” aimed into the Earth
1. USArray

- Includes 400 Transportable Seismometers
- Each station occupies a site for 1½ to 2 years
- 10 years to leap-frog across the country

[Map of USArray stations]

IRIS
(Incorporated Research Institutions for Seismology)
Washington, DC

http://anf.uesd.edu/stations/deployment_history.php
Status: June, 2013

1. USArray
Seismic waves moving across USArray

Wells, Nevada, 2008

Bob Woodward - IRIS
Chuck Ammon - Penn State
Seismic Waves Moving Across USArray China, 2008

Bob Woodward - IRIS
2. PBO
Plate Boundary Observatory

- GPS Instruments
- Strainmeters

GSP Station
California State University at San Bernardino

UNAVCO
Boulder, CO
2. PBO
Plate Boundary Observatory

EarthScope GPS Stations

- Backbone Network
- Subduction Cluster
- Volcanic Cluster
- Transform Cluster
- Extension Cluster
"This [direct measurement of continental drift] must be left to the geodesists. I have no doubt that in the not too distant future we will be successful in making a precise measurement of the drift of North America relative to Europe." -- Alfred Wegener, 1929
20-30 kilometers/million years
20-30 millimeters/year
~1 inch/year
GPS Measurements:
Motion of North America relative to Europe.
Wegener’s Dream come true! 😊
Newport, Oregon GPS Station

Yearly Movement, 2000 - 2013
(Referenced to Stable North America)

North Movement (inches)

East Movement (inches)

Newport, Oregon GPS Station

Robert J. Lillie
Pacific Northwest Status
July 1, 2013

http://www.earthscope.org/current_status/showstatus.php?
map=NW&Facility=All&Instrument=All&StartDate=2000-01-01&Display=Instruments
Cascadia Initiative

New seismometers being deployed offshore and onshore to complement existing onshore seismometers and GPS instruments

Four year project:
2011 - 2014

Onshore:
232 GPS stations
27 seismometers

Offshore:
60 ocean-floor seismometers
1. Create high profile **EarthScope identity**
2. Promote science literacy through **informal education**
3. Advance **formal education** in the classroom
4. Foster use of **data, discoveries, technology**
5. Establish sense of **community ownership**
1. Earth scientists use repeatable observations and testable ideas to understand and explain our planet.

2. Earth is 4.6 billion years old.

3. Earth is a complex system of interacting rock, water, air, and life.

4. Earth is continuously changing.

5. Earth is the water planet.

6. Life evolves on a dynamic Earth and continuously modifies Earth.

7. Humans depend on Earth for resources.

8. Natural hazards pose risks to humans.

9. Humans significantly alter the Earth.
Sense of Place ..... 
• Our hometowns and other special places are part of exciting new exploration and discovery. 
• Our communities are not standing still—they are moving!