## Cascadia EarthScope Earthquake and Tsunami Education Program (CEETEP)

Professional Development Workshop for Coastal Teachers, Interpreters, and Emergency Management Educators

Aberdeen Museum of History Aberdeen, Washington August 11-14, 2014

> **Bob Butler** University of Portland

Nancee Hunter & Bob Lillie Oregon State University

Beth Pratt-Sitaula Central Washington University



http://ceetep.oregonstate.edu

Cascadia EarthScope Earthquake and Tsunami Education Program (CEETEP)

# **Introductions**

- CEETEP
- Instructors
- Participants
- EarthScope





## **CEETEP:** Aim and Goals

**<u>Primary Aim</u>:** To improve disaster resilience through educator professional development.

## **Goals:**

- **1. Learn Geoscience** and be able to communicate about earthquake and tsunami science and research
- 2. Understand Risk and be able to communicate about Cascadia geohazards
- **3. Take Action** and be able to work with students and communities to improve preparedness
- **4. Exchange Pedagogy** on how to teach about geoscience, hazards/risk, and preparedness



## A beautiful spot on the Oregon Coast ... Why are places like Beverly Beach so important to our discussions?

## March 27, 1964

- Four children killed by tsunami spawned by Great Alaska Earthquake.







**Beverly Beach State Park, Oregon** 



**Beauty and the Beast** 



"The same geological forces that threaten our lives with earthquakes and tsunamis also nourish our spirits by creating the spectacular headlands and beaches of the Pacific Northwest."



Olympic National Park, Washington

Copalis River, Washington

### **Cascadia EarthScope Earthquake and Tsunami Education Program (CETEEP)**

**Precursors:** 

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





https://wordpress.up.edu/totle

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





http://ceetep.oregonstate.edu

### СЕЕТЕР

## **Cascadia EarthScope Earthquake and Tsunami Education Program**



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

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



**Science** (EarthScope, Cascadia)

## Cascadia Earthquake and Tsunami EarthScope Education Program (CETEEP)

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



# **Earthquake/Tsunami Science and Preparedness**

## Federal Emergency Management Agency (FEMA)<sup>1</sup>

• Suggests that science classrooms are under-utilized for hazard and preparedness connections

## **Research on Behavioral Change**<sup>2,3</sup>

- Simple consistent messaging on what TO DO
- From many trusted sources
- For a long long time
- Seeing others take preparedness steps
- 1. FEMA, Bringing Youth Preparedness Education to the Forefront: A Literature Review and Recommendations, Federal Emergency Management Administration. 21 pp., 2010. Available from: <u>http://www.citizencorps.gov/resources/research/prepresearch.shtm</u>
- 2. Wood, M. M., D. S. Mileti, M. Kano, M. M. Kelley, R. Regan, & L. B. Bourque, Communicating Actionable Risk for Terrorism and Other Hazards, Risk Analysis, v. 32, 601–615, 2012.
- 3. Mileti and colleagues (National Hazards Center, University of Colorado) http://www.colorado.edu/hazards/



# **Aberdeen Workshop Space**

- <u>Main Room</u>: Exhibit Room
  - Most of the presentations.
- <u>Secondary Room</u>: Meeting Room #1 (Lower Level)
  - Drinks, snacks, lunch. Some breakout activities and team planning.
- <u>Water Fountains & Restrooms</u> ???











# **CEETEP Binder**

- Lots of Stuff!
- Agenda
- Contact Lists
- Participants
- Feedback

#### Cascadia EarthScope Earthquake & **Tsunami Education Program** (CEETEP)

#### Workshops for K-12 Teachers, Park/Museum **Interpreters, and Emergency Management Educators**

Aberdeen, Washington, August 11-14, 2014 Forks, Washington, October 10-13, 2014

- **Instructors:** Bob Butler, University of Portland Nancee Huner, OSU Hatfield Marine Science Center Bob Lillie, Oregon State University Beth Pratt-Sitaula, Central Washington University
- **Co-Instructors:** Brian Atwater, U. S. Geological Survey Bob de Groot, Southern California Earthquake Center Roger Groom, Mt. Tabor Middle School Bonnie Magura, Portland Public Schools (Retired) Brvnné Walker, Washington Emergency Management Division



CEETEP

SC/EC





\* Portland

## **Monday – Intro to Cascadia Science and Preparedness**

#### Monday, August 11 (Day 1)

Cascadia plate tectonics, earthquakes and tsunamis; Seismic and GPS monitoring: Earthquake and distant tsunami preparedness

#### 8:30 Coffee, tea, juice, snacks for those who arrive early

9:00 Introductions: CEETEP, EarthScope, Participants, Instructors (Bob Lillie). Please sit with your Action Team. Tables will be marked.

#### 10:15 Break (Coffee, tea, juice, snacks)

10:30 Beauty and the Beast: Plate Tectonics and Geological Hazards of the Pacific Northwest (Bob Lillie)

12:00 Thoughts/questions/reflection (Bob Lillie, Nancee Hunter, Beth Pratt-Sitaula, Bob Butler)

#### 12:15 Lunch (Served in Entry Area)

1:00 Basics of Earthquake and Tsunami Science and Hazards and Related Teaching Activities (Bob Butler, Bonnie Magura, Roger Groom)

#### 3:15 Break (Coffee, tea, juice, snacks)

3:30 Surviving a Cascadia Subduction Zone Earthquake (Brynné Walker, Bob DeGroot)

4:30 Forms: Reimbursements; Stipends; Photo Permissions; Logistics for Day 2 Field Trip (Nancee Hunter, Beth Pratt-Sitaula)

4:45 Reflection, Questions, Implications (Bob Butler, Bonnie Magura, Roger Groom, Brynné Walker, Bob de Groot)

5:30 Adjourn

## **Tuesday** – Field Trip

Tuesday, August 12		Field Trip	Activities
(Day Z) Field Trip: C	ascadia earthquake and tsun	ami geology: FarthScope GPS	installation: Farthquake and
tsunami em	ergency planning		
7:30	Coffee, tea, juice, snacks for those who arrive early		
8:00	Depart Aberdeen Museum of History for Field Trip (designated car pools will be arranged Day 1)		
8:30	<b>Stop 1</b> : Elk River Estuary (Brian Atwater, Bob Butler)	Tsunami Geology	Core for tsunami sand and discuss the varied evidence used to determine Cascadia's Great Quake and tsunami history.
11:00	Drive to Ocosta Elementary School	-	
11:15	<b>Stop 2:</b> Ocosta Elementary School (Brynné Walker, Paula Akerlund, and Cale Ash)	Tsunami Vertical-Evacuation Structure	Visit construction site for vertical-evacuation structure.
12:00	Drive to Grayland Fire Hall, Intersection of Hwy 105 & Grayland Beach Access Rd.	-	
12:15	Lunch, Grayland Fire Hall	_	
1:00	<b>Stop 3</b> : Grayland Beach (Bob Lillie; Brynné Walker).	Beauty and the Beast; Extreme Evacuation Challenges	Brainstorm about interpretive opportunities and overcoming challenging tsunami evacuation sites.
1:45	Grayland Beach Evacuation Walk (Brynné Walker)	Tsunami Evacuation Route	Walk from Grayland Beach to Turkey Road Assembly Area. Includes time to think about and discuss hazards, infrastructure, solutions.
2:30	Drive to Stafford Prison off Hwy 105 between Aberdeen and Westport		
3:00	<b>Stop 4</b> : GPS Station P398. (Beth Pratt-Sitaula)	GPS Station	Visit component of EarthScope Plate Boundary Observatory (PBO) and discuss how movements of Earth's surface tell us about earthquake hazard.
4:15	Drive back to Aberdeen Museum of History		
4:30	Adjourn		

## **Wednesday** – **Detailed Cascadia Science and Preparedness**

#### Wednesday, August 13 (Day 3)

Cascadia earthquake and tsunami science and activities; Local tsunami preparedness; Native American oral histories; Pedagogical exchange among educators; Action Team planning

#### 8:30 Coffee, tea, juice, snacks for those who arrive early

9:00 Cascadia Earthquakes and Tsunami and Related Teaching Activities (Bob Butler, Bonnie Magura, Roger Groom) Please sit with your Action Team. Tables will be marked

#### 10:30 Break (Coffee, tea, juice, snacks)

10:45 Cascadia Earthquakes and Tsunami and Related Teaching Activities (Bob Butler, Bonnie Magura, Roger Groom)

12:00 Thoughts/questions/reflection (Bob Butler, Bonnie Magura, Roger Groom)

12:15 Lunch (Served in Entry Area).

1:00 Science Storytelling through Interpretation: CEETEP team presents example of "Group Interpretive Program" from 2013 Workshop.

1:15 Tsunami: Are You Ready? (Brynné Walker)

2:00 Native American Oral Histories (Beth Pratt Sitaula)

2:45 Exchange of Pedagogies: Working Together in Coastal Communities to Engage Students, Visitors and Residents on Earthquake and Tsunami Science and Preparedness (Bob Lillie)

#### 3:15 Break (Coffee, tea, juice, snacks)

3:30 Birds-of-a-Feather Breakouts: How do I relate earthquake/tsunami science and preparedness to my learners at my venue? (Interpreters: Bob Lillie & Bob de Groot; EM Educators: Beth Pratt-Sitaula & Brynne Walker; Teachers: Bob Butler & Nancee Hunter)

4:15 Action Teams: Teams work on Community Educational Project on earthquake and tsunami science and preparedness. They will present their project plan during Day 4 of this workshop, and the results of implementation at the March 7, 2015 Share-A-Thon in Quinault, WA.

#### 5:30 Adjourn

## **<u>Thursday</u> – Community Education and Preparedness Planning**

Thursday, August 14 (Day 4)				
Community earthquake and tsunami preparedness; Action Team presentations and post- workshop action plans				
8:30 Coffee, tea, juice, snacks for those who arrive early				
9:00	Digital Resources (Beth Pra	tt-Sitaula, Bob DeGroot)		
9:45	9:45Preparedness for Post-Event Personal and Community Survival (Brynné Walker)			
10:30	10:30Break (Coffee, tea, juice, snacks)			
10:45	Break Out Sessions	Room 221 (small room) Tsunami Vertical Evacuation Structures (Roger Groom) <u>Teachers</u>	Room 219 (big room) Hazard Inventory (Bonnie Magura, Brynné Walker) Interpreters & EM Educators	
11:35	Break Out Sessions	Room 221 Tsunami Vertical Evacuation Structures (Roger Groom) Interpreters & EM Educators	Room 219 Hazard Inventory (Bonnie Magura, Brynné Walker) Teachers	
12:15	Lunch (Served in Entry A	Area)		
1:00	1:00 Action Teams: Final preparations for presentations and discussion about the task, schedule, and logistics for each Action Team to develop their March 7, 2015 Share- a-Thon products.			
1:45	1:45 Action Teams: Groups 1, 2, and 3 present their ideas for development of Community Educational Programs on earthquake/tsunami science and preparedness. 20 minutes total per group (2 minutes prelude; 10 minutes presentation; 8 minutes discussion). Groups are encouraged to model how they will present specific concepts in different educational settings.			
2:45	2:45Break (Coffee, tea, juice, snacks)			
3:00	3:00 Action Teams (continued): Groups 4 and 5 presentations.			
3:40	3:40 Action Teams debrief and further develop their Project Plan, including tasks, schedule, and logistics for completing and implementing their project and reporting results at March 7, 2015 Share-a-Thon.			
4:15	4:15 Post-Workshop Assessment (Michael Coe, Beth Pratt-Sitaula). Focus groups will be held by educator type (teachers, interpreters, EM educators). When you are not ir a focus group, you will be taking the post-workshop survey.			
5:30	Adjourn			

### <u>CEETEP Workshop</u> OSU Hatfield Marine Science Center Newport, Oregon August 12-15, 2013

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

#### **Master Teachers and Co-Instructors**

- 5. Brian Atwater, U. S. Geological Survey, Seattle, WA
- 6. Bonnie Magura, Portland Public Schools (retired), Portland, OR
- 7. Roger Groom, Mt. Tabor Middle School, Portland, OR
- 8. Brynné Walker, Washington Emergency Management Division, Camp Murray, WA



<u>CEETEP Workshop</u> OSU Hatfield Marine Science Center Newport, Oregon August 12-15, 2013

<u>CEETEP Partner Organizations</u>
9. Ken Austin, UNAVCO, Boulder, CO
10. Bob de Groot, Southern California Earthquake Center, Los Angeles, CA

**External Evaluator** 11. Michael Coe, Cedar Lake Research, Portland

<u>Animator/Videographer</u> 12. Jenda Johnson, Portland

**<u>Student Assistant</u>** 13. Lisa Akers, Oregon State University, Corvallis





# <u>Action Team 1:</u> Grays Harbor County

**20-Second Intro:** 

1. Who are you?

2. Your organization and/or educational setting?

### **Optional:**

**3.** What do you hope to get from CEETEP training?

**K-12 Teachers** Kelly Bonnelle Taholah Pacific Beach Curtis Leitch Lynette Reime Pacific Beach Shani Wood Pacific Beach Rhonda Adams Pacific Beach **Park/Museum Interpreter** Felicia Maffia Seattle **Emergency Management Educator** Lois Guthrie Aberdeen **Technical Advisor** Beth Pratt-Sitaula Denver, CO

Taholah School Pacific Beach Elementary School Pacific Beach Elementary School Pacific Beach Elementary School Pacific Beach Elementary School

Pacific Science Center

Grays Harbor Co. Emer. Management

CWU and UNAVCO



# Action Team 2: Ocean Shores

**20-Second Intro:** 

1. Who are you?

2. Your organization and/or educational setting?

### **Optional:**

<u>K-12 Teachers</u>		
Kelly Eddy	Ocean Shores	Ocean Shores Elementary School
Rhonda Ham	Ocean Shores	Ocean Shores Elementary School
Mercedes Lamphier	Ocean Shores	Ocean Shores Elementary School
Penny Reither	Ocean Shores	North Beach Jr/Sr High School
Park/Museum Interpreter		
Bob Barack	Ocean Shores	<b>Coastal Interpretive Center</b>
<b>Emergency Management</b>	Educator	
David Wayman	Ocean Shores	North Beach Sch. Dist. Safety Coor.
<b>Technical Advisor</b>		
Bob Butler	Portland, OR	University of Portland



## Action Team 3: Aberdeen

**20-Second Intro:** 

1. Who are you?

2. Your organization and/or educational setting?

### **Optional:**

K-12 Teachers		
Diane Burns	Aberdeen	St Mary School
Randy Cole	Aberdeen	Aberdeen School District
Barbara Good	Aberdeen	Miller Junior High School
Sally Holt	Aberdeen	Miller Junior High School
Park/Museum Interpreters		
Dann Sears	Aberdeen	Aberdeen Museum of History
Emergency Management Educator		
Jamie Judkins	Tokeland	Shoalwater Bay Indian Tribe
<b>Technical Advisor</b>		
Roger Groom	Portland, OR	Mt. Tabor Middle School



# Action Team 4: Hoquiam

**20-Second Intro:** 

1. Who are you?

2. Your organization and/or educational setting?

### **Optional:**

K-12 Teachers			
Mary Groves	Hoquiam	Hoquiam Middle School	
Jody Harris	Hoquiam	Hoquiam Middle School	
Kerry Marl	Hoquiam	Hoquiam Middle School	
Stan Severson	Hoquiam	Hoquiam High School	
Leslie Stump	Hoquiam	Hoquiam School District	
Park/Museum Interpreter	•		
Maureen Carlisle	Seattle	Burke Museum	
Emergency Management Educator			
<b>Technical Advisor</b>			
Bonnie Magura	Portland, OR	Portland School District (Retired)	



# **Action Team 5:**

# Westport

**20-Second Intro:** 

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

### **Optional:**

K-12 leachers		
Melanie Garrett	Westport	Ocosta Jr/Sr High School
Jon Harwood	Westport	Ocosta Jr/Sr High School
Marina Smith	Naselle	Naselle-Grays River Valley School
<b>Park/Museum Interpreter</b>		
Stephen Armes	Westport	
Aleksandr Robbins	Seattle	Pacific Science Center
<b>Emergency Management H</b>	Educator	
Scott McDougall	South Bend	Pacific Co. Emergency Management
<b>Technical Advisor</b>		
Bob deGroot	Los Angeles, CA	Southern Calif. Earthquake Center

**Get to Know Your Team** Spend a Few Minutes Together ©

- Each member of the team should share a little more details about their:
- 1. Educational setting and audience.
- 2. Strengths or experience with geoscience and preparedness.
- 3. Goals for gaining knowledge and abilities in earthquake and tsunami education.



# **EarthScope**

**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**

## Like a <u>"Hubble Telescope"</u> <u>aimed into the Earth</u> "EarthScope Overview" <u>Movie (0:00 - 4:30)</u>









## EarthScope Station Status July, 2014



http://www.earthscope.org/science/maps/current-status-map

#### CEETEP-EarthScope Acronym Cheat Sheet

UNAVCO

(NSF's Geodetic Facility)

runs PBO



IRIS

(NSF's Seismic Facility)

runs USArray

• Central WA Univ.



## 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=Inst

"EarthScope in Cascadia" Movie (0:24 – 5:07)



- 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**



Niawiakum River, Washington

Ilwaco, Washington



Earth Science Literacy Principles <u>http://www.earthscienceliteracy.org</u>

## **Big Ideas:**





**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.



The dots on this card show motion of the Aberdeen GPS station over the past nine years. Because the station is anchored into hard rock beneath the soil, the dots represent the year-to-year movement of the Aberdeen region toward the northeast.

Orient this graph toward the north, tape it to the floor, and think about the questions below.

1. How far has the Aberdeen region moved since the year 2004? At what rate (inches per year) is the region moving? At that rate, how far has the region moved since the year 1700?

2. Why is the region moving toward the northeast?

3. The last big earthquake in the Pacific Northwest occurred in the year 1700. What will happen to the Aberdeen region when the next big earthquake occurs?

Cut Here

Station P398 from the EarthScope Plate Boundary Observatory (http://pbo.unavco.org). GPS time series data provided by UNAVCO (http://www.unavco.org). Data as of June 14, 2014.

Card developed by the Cascadia EarthScope Earthquake and Tsunami Education Program (http://ceetep.oregonstate.edu). CEETEP is sponsored by a grant from the EarthScope Program of the National Science Foundation (http://www.earthscope.org) to Oregon State University, the University of Portland, and Central Washington University.

# **EarthScope**

## 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!

Drillhole across San Andreas Fault
875 GPS Instruments
175 Borehole Strainmeters
5 Long-Baseline Laser Strainmeters
400 Seismometers at 2,000 sites
100 Permanent Seismometers