08089: Geologic Field trip to Southern California for Earth System Science Teachers and Students at 6 High Schools for the Deaf

Michele Cooke, University of Massachusetts

Introduction

Earth system students and teachers from around the US came to southern California May 4-10 for a field trip led by Cooke, a deaf geoscientist from the University of Massachusetts, Amherst. All the participating students on the trip conducted experiments on fault systems at their home schools using a deformational sandbox model developed by Cooke. The expedition gave the students a once-in-a-lifetime opportunity to apply knowledge gained from their classroom studies to actual sites in the field.

The theme for the California trip was "Geological Hazards and Society". The group visited many sites of earthquake and landslide hazards in Southern California. The aim of the trip was to show the participants how geologic hazards are assessed and how society can adjust to accommodate active geologic processes. Each day the students and other participants posted an entry in the field trip blog http://clercblog.gallaudet.edu/ca08/

The Californian expedition was the third and final expedition led by Dr. Cooke. This trip and previous trips were funded by her NSF CAREER grant. The first two trips explored faults in Utah and Massachusetts. The Bromery Fund of the University of Massachusetts Geosciences Department and the SCEC generously contributed funding for the Faults in the Field Expedition.

The Southern California Earthquake Center provided a bus for the California trip, which greatly facilitated communication throughout the trip. The bus allowed us to continue our discussions while traveling between stops.

Goals and Outcomes

Cooke has invested in outreach to high school students as a way to encourage deaf and hard of hearing students to consider science careers. These activities give opportunity for deaf students who use American Sign Language to apply the same 3-D visual skills they use for communication to visualize geological formations in 3-D. The skills a geologist needs are good observation skills, the ability to think spatially, and, in 3-D, and the ability to imagine dynamic pictures in the mind. Cooke has found in

observations of deaf students who use ASL that there is a “natural fit between the visual skills geologists use and the skills of deaf learners.”

A formal assessment of the impact of the deformational sandbox activities and the field trips on teaching at the schools is led by education researchers at UMass.

Participants

14 high school students, 7 high school earth system science teachers, 10 geoscientists , 6 interpreters (3 working at a time), 1 education researcher, 1 reporter from Gallaudet and1 alum of the two previous trips, who is also an EMT.

Participating high schools for the Deaf:

- North Carolina School for the Deaf
- Model Secondary School for the Deaf, Washington, D.C.
- Indiana School for the Deaf
- Iowa school for the Deaf
- Kansas school for the Deaf
- University high School, Irvine
- California School for the Deaf, Riverside

Participating geologists

- Dr. Michele Cooke, UMass
- PhD candidate Scott Marshall, UMass (now Asst Prof. at Appalachian State)
- MS candidate Laura Dair, UMass (now at ExxonMobil)
- Dr. Doug Morton, USGS
- Dr. Katherine Kendrick, USGS and UC Riverside
- Dr. James Dolan, USC
- Dr. Rob Degroot, SCEC

- MS candidate Laura Dair, UMass (now at ExxonMobil)
- MS candidate Erin Dominov, UMass (deaf)
- BS student Suzanna Sullivan, UMass

The Trip

The students, teachers, and geologists visited Forest Falls debris flows, a sag pond along the San Andreas in Cajon Pass (Lost Lake), the San Jacinto fault, Thousand Palms oasis, Portuguese Bend landslide, the Hollywood fault, La Brea tar pits, the San Onofre fault, Bluebird canyon landslide and strata at Laguna beach. They saw firsthand where houses, buildings, and even a nuclear power plant were located either on or near faults and landslides, and discussed the degree of risk to these structures.

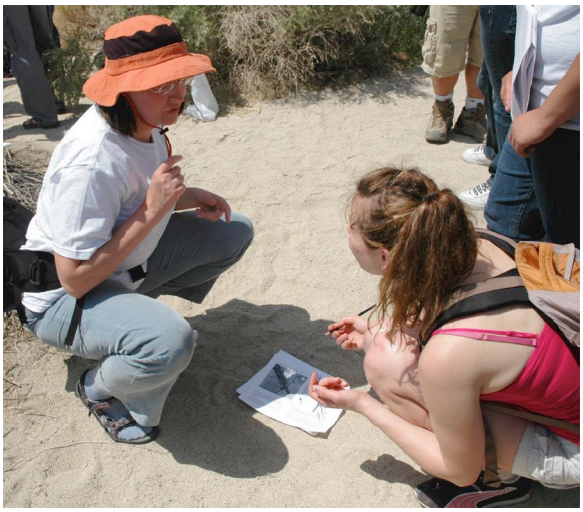
At each site the students applied the same documenting techniques that professional geologists use when making site observations. They sketched in their notebooks, analyzed topographical maps, made interpretations of the structures, took photographs, and discussed details and patterns of rock formations with fellow participants in a similar way to how professional geologists confer with colleagues to clarify ideas.

OBSERVING

Students observe damage to the tree in Forest Falls from a debris flow. The rocks embedded in the tree give evidence to the force and character of the debris flow. (photo courtesy of Dr. Jana Lollis, teacher at North Carolina School for the deaf.)

SKETCHING

Students sketch a cross-section across the levee of the San Jacinto River near the town of San Jacinto. Through sketching, the students realized that the river bed is higher than the elevation town. (photo courtesy of Dr. Jana Lollis)



INTERPRETING

At 1,000 Palms, Cooke helps students to interpret fault locations and slip sense from a topographic map of a nearby sag pond. (photo courtesy of Teresa Huckleberry, teacher Indiana School for the Deaf)

ANALYZING

At Lost Lake, students analyze the slip rate along the San Andreas from offset of dated alluvial terraces. The exercise uses Ray Weldon's dataset and was simplified from an exercise that Dr. Kendrick uses for her upper-level course. (photo courtesy of Teresa Huckleberry)

DISCUSSING

Each day of the trip incorporated many formal and informal small group discussions. Here a group discusses their obsevations of spatial distribution of building developments on a California Special Study Zone map. (photo courtesy of UHS student)

At the end of the week, the students summarized the data they collected during their trip related to their topic assignment, “Living with Landslides,” “The San Andreas is Not the Only Fault in Town,” or “How Much Shaking Can You Expect?” With the assistance of the geologists, they developed PowerPoint presentations, which they presented to an assembly at the University High School in Irvine, California. Following the student presentations, Dr. Bob DeGroot, from the Southern California Earthquake Center (SCEC), shared information on earthquake preparedness and distributed information on The Great Southern California ShakeOut (http://www.shakeout.org/).

PRESENTING

Throughout the week students discussed their interpretations within small groups and presented to the larger group. At the end of the week, the students summarized what they learned within 3 presentations topics, “Living with Landslides,” “The San Andreas is Not the Only Fault in Town,” or “How Much Shaking Can You Expect?”

The students and other participants kept a daily log throughout the trip to share news with their schools, friends, and families. A new feature of the blog for this expedition was the addition of a daily GEO Quiz. To view the blog, visit http://clercblog.gallaudet.edu/ca08.