



ASSOCIATION OF ENVIRONMENTAL AND ENGINEERING GEOLOGISTS
San Francisco Section

Announcing the April 2010 San Francisco Section Meeting

Student Night

Morgan Mendoza, San Jose State University
Skye Corbett, San Francisco State University
Valerie Zimmer, UC Berkeley

MEETING DETAILS

Restaurant:

Sinbad's
Pier 2 Embarcadero Street
San Francisco, CA

Date and Time:

Tuesday, April 13th, 2010
6:00 pm—Social Hour and Sign-in
7:00 pm—Dinner
8:00 pm—Presentation

Cost: \$40 AEG members, \$50 non-members, \$20 Students

Meal Choice: Chicken, Beef, Fish, and Vegetarian – you do not need to send in your meal choice.

Reservations*: To RSVP, fax or e-mail Sachiko Tanikawa (fax # 866-400-4068, email: treasurer@aegsf.org) by **12 PM, Friday, April 9th** with the following information:

(1) Name (2) Phone number/e-mail

Driving Directions: From the Bay Bridge, take the Fremont Street Exit and the Folsom Street Ramp. Go left (east) on Folsom Street, then left (north) onto the Embarcadero (Herb Caen Way). The driveway for Sinbad's is on the right, south of the historic Ferry Building. Please watch out for the pedestrians and cyclists when turning into the driveway. Thank you.

BART Directions: Exit the Embarcadero Station; walk up Market Street toward the Ferry Building (less than ½ a mile toward the Bay and to the east). Cross Embarcadero and Sinbad's is located next to the Alameda ferry pier on the south side the historic Ferry Building.

Parking: \$4 valet parking is available or metered parking is available on and around the Embarcadero.

*To assist us with reservations and to help the restaurant with the set-up, please RSVP in advance. Walk-ins are welcome. No shows and late cancellations will be charged.

See next page for abstracts and speaker biographies.

April 2010 Student Night

Morgan Mendoza, MODELING HILLSLOPE EVOLUTION: A DISCRETE ELEMENT APPROACH - Department of Geology, San Jose State University

ABSTRACT

Much effort has been put into modeling the evolution of hillslope profiles through time. Such models are commonly deterministic and model hillslope transport as a continuous and diffusive process governed by a linear relationship between hillslope angle and transport distance. This relationship produces hillslope profiles that increase in steepness from crest to base. However, hillslopes observed in the field commonly become nearly planar downslope of a convex crest. A non-linear relationship has been developed that produces hillslope profiles that are closer to what is observed in nature; however, it suffers from the same end result as the linear models. Recently, there has been interest in using a non-deterministic approach where transport distances follow probability distributions that depend on hillslope angle. In order to qualitatively and quantitatively characterize such a probabilistic relationship, the transport distances of particles released into a dry ravel flume with a non-uniform surface were measured as a function of flume angle. It can be shown that the motion of the particles down the flume is well characterized by a body sliding down a ramp with coefficient of kinetic friction μ . Thus, a μ value can be calculated from each measured transport distance, and together form a distribution of μ values. A distribution of surface roughness of the flume relative to the size of the particles being transported was measured and then related to the distribution of μ values. Using the inputs of hillslope angle and surface roughness as related to μ values, the results of the flume experiments were replicated with a discrete element model in which the motion of particles was modeled individually. The implication of this exercise is that this method has the potential to be used with inputs measured from the field to model the evolution of entire hillslopes.

Speaker Biography

I received an A.S. in Liberal Studies in July of 2006 from Gavilan College in Gilroy. I then transferred to San Jose State University and received a B.S. in Geology with a minor in Mathematics in August 2008. After graduating, I entered the graduate program at San Jose State University and am currently working towards a M.S. in Geology, to be completed August 2010. In the Fall of 2010 I will begin working towards a graduate degree from the Department of Applied Mathematics and Statistics at the University of California Santa Cruz. This is a dynamic department that is involved in many interdisciplinary projects. My hope is to work jointly with the Earth and Planetary Science Department on projects that will draw on my knowledge of geological processes.

Skye Corbett, USING SURFACE CURVATURE TO MAP GEOMORPHIC PROCESS REGIMES IN A BEDROCK LANDSCAPE, HENRY MOUNTAINS, UTAH, San Francisco State University

Abstract

Linkages between form and process are much better understood in soil-mantled landscapes than in bedrock landscapes, despite the wide occurrence of bedrock landscapes in arid and mountainous terrain. Soil-mantled hillslope topography can be characterized by hillslope gradient and its spatial derivative, which is commonly referred to as curvature and defined as the Laplacian of elevation. Curvature can also be quantified using techniques that are invariant to the orientation of the surface. These approaches are useful in many geoscience applications, including structural analysis of folded surfaces within deforming crustal blocks. Here we explore the use of normal curvature of bedrock topography as a metric to identify and map distinct geomorphic process regimes in a landscape devoid of soil cover. Our study site is Simpson Creek, a 2.5 km² watershed on the east flank of Mt. Hillers in the Henry Mountains, Utah, which drains to the Colorado River in Glen Canyon. The land surface is entirely exposed Navajo Sandstone bedrock, with isolated patches of wind-blown sand deposits. The channel network is discontinuous, with alternating reaches of steep, deeply-incised, frequently-potholed slots, and lower-gradient, sand-bedded channels. Hillslope topography is characterized by dome-shaped and sub-linear ridges, and is influenced by prominent structural joints. We are able to use normal curvature to map what can be interpreted as knickpoints, sand-bedrock bed transitions, and even individual large potholes. The tips of the channel network also have a distinct surface-curvature signature, and are associated with prominent polygonal bedrock fracturing at the sub-meter scale. In the hillslope portion of the landscape (positive mean curvature), the distribution of landscape elements has several modes, including a characteristic dome curvature that may be associated with sheet jointing and weathering-influenced exfoliation erosion, and an antiformal saddle curvature where solution pits occur, particularly on higher ridges most distant from the main-stem slot canyon channels. One key goal of this work is to quantify the effect of variable erosion rate on the distribution of process regime as expressed by these characteristic modes of bedrock surface curvature.

Speaker Biography

Skye Corbett is currently a Masters student at SFSU working with Leonard Sklar. My project for the past 2.5 years has been working at quantifying a bedrock landscape and attempting to link process and form with the aid of high resolution ALCM data. Both my undergraduate and graduate work has dealt with understanding the processes at work on a bedrock landscape, in particular on Navajo Sandstone.

Valerie Zimmer, SEISMIC AND ACOUSTIC RECORDS OF THE MARCH 2009 AHWIYAH POINT ROCK FALL, YOSEMITE VALLEY, CALIFORNIA, - UC Berkeley

Abstract

During the winter of 2008-2009, a seismic network was installed in Yosemite Valley for the purpose of rock fall monitoring. The network consisted of several 8 Hz geophones, accelerometers, and infrasound acoustic sensors recorded at sampling rates of 500 and 1000 samples-per-second. On March 28, 2009, at 5:26am, a very large rock fall occurred at Ahwiyah Point, near Half Dome. This rock fall originated near the summit of Ahwiyah Point

and fell approximately 600 m, sliding down the steeply (70 degree) dipping cliff face and striking ledges along the way. Rock debris knocked down hundreds of trees and buried 300 meters of the southern portion of the Mirror Lake trail. Detachment and impact seismic signals were recorded by the local seismic network at a distance of 4.4 to 6.8 kilometers, as well as by regional seismic stations up to 400 kilometers away, registering as a local magnitude 2.4 earthquake. The volume of the rock fall is estimated to be ~43,000 cubic meters, the largest to occur in Yosemite Valley in 22 years, a fact reflected in the magnitude of recorded shaking. The detachment portion of the signal represents several weak impacts of the falling rock mass which can be correlated across different stations. The impact portion of the signal contains distinct P and Rayleigh wave phases. The first infrasound signal arrives later than expected to correlate with the first detachment seismic signal. The main acoustic signal correlates well with the main impact. In addition, there is a lower (0.5 Hz) signal that arrives later than the main impact and may be correlated with a small airblast that knocked over trees outside of the debris field. Data collected from this rock fall event provides an important opportunity to evaluate the ability of seismic and acoustic sensors to detect rock falls, learn about the dynamics of rock falls, and explore the mechanisms by which seismic waves are generated during rock fall events and travel locally in mountainous terrain.

Speaker Biography:

Valerie Zimmer is a geo-engineering student at UC Berkeley working with Nick Sitar. Originally from Vermont, she first worked as a geophysical logging engineer for Schlumberger in Wyoming, then returned to Vermont where she worked as a contractor for government projects in New Mexico and Nevada that involved drilling for data, geophysical surveys, and general site characterization. She enjoys outdoor activities such as rock and snow climbing in her spare time.

Valerie's current research focuses on monitoring rock falls in Yosemite National Park with seismic and acoustic data, but also includes geophysical imaging of faults in the Berkeley Hills and various engineering and sustainability research.

Thank you for the RSVP! See you on Tuesday, April 13th!