Association of Environmental and Engineering Geologists
Southern California Section, Inland Empire Chapter

Inland Empire Chapter News

"Connecting Professionals, Practice and the Public"

Oct 1, 2007 Vol. 3, No. 10

Riding the waves of San Andreas: Geologic and Engineering aspects of the 17 October 1989 Loma Prieta earthquake, Santa Cruz, California

Wednesday 17-October-2007

5:00 - 6:15	Geologist Orientation	Patio Lounge/Banquet Room
6:30 - 7:15	Dinner /Meeting	Banquet Room
7:30 - 8:30	Presentation	Banquet Room

Pat 'N Oscars Family Restaurant, Temecula
(Meeting Cost $25.00, includes room fee/tax/tip)
(Fund-raising donation suggested is $5..00, or more)
(***RSVP/Directions below***)

Meeting Details (see inside)
RSVP Due COB 11-Oct-07
e-mail or call no. above:
rick.gundry@verizon.net

Chapter Officers

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This Month's Speaker :

Dr. Jeffrey Marshall, Associate Professor of Geomorphology, Geological Sciences Department, Cal Poly Pomona University, Pomona, California

"*We may expect light earthquake shocks for a day or two, and then thirty or forty years of monotony. Don't be afraid or get excited. Earthquakes are common the world over. They frighten many but physically injure few. As long as you live you will not die. ...The wise people take earthquakes as they take strawberries, as a part of life's eventful experience.*"

- *Santa Cruz Evening Sentinel*, April 19, **1906**.

Abstract (see following page)

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The AEG Inland Empire Chapter *Newsletter* a monthly publication of Inland Empire Chapter of the Southern California Section, Association of Environmental and Engineering Geologists. For more information visit websites shown in Newshead page 1

Submittals: Deadline 28th of the month. Employment notices, job position vacancy announcements no cost. (See notice inside this *Newsletter*)

Address changes: Send e-Mail to Rick Gundry.

Advertisements: *Newsletter* circulation about 170 in greater inland areas of so. California, and elsewhere. Advertisements welcome also, no cost to post; however, some form donation, recognized list of donors.

Abstract

At 5:04 p.m. PDT on October 17, 1989, a 40 km long segment of the San Andreas fault ruptured beneath the Santa Cruz Mountains in central California. The resulting Mw 6.9 Loma Prieta earthquake left 63 people dead, 3,757 injured, and over $6 billion in damage across 10 counties. In the heavily populated San Francisco and Monterey Bay areas a variety of earthquake related phenomena, including severe shaking, liquefaction, ground cracking, and slope failure, produced extensive damage to buildings, highways, bridges and utilities. Over 18,000 homes and 2,600 businesses were affected, and about 12,000 people were left homeless. This was the largest earthquake to strike central California since the great 1906 catastrophe. It was also the first major earthquake broadcast on live national television, striking the Bay Area during the warm-up for a World Series game between the San Francisco Giants and Oakland A's.

In the San Francisco Bay Area, the San Andreas fault is part of a system of several major faults that define a diffuse right-lateral transform boundary between the Pacific and North American plates. The NW-trending Santa Cruz Mountains coincide with a left-stepping restraining bend along the San Andreas fault south of the San Francisco peninsula. The Loma Prieta earthquake originated at an unusual depth of 18 km, and the aftershocks delineate a rupture surface dipping 70 degrees SW. The slip was oblique, with displacements of 1.7 m horizontal, and 1.3 m vertical. The SW side of the fault (Pacific plate) moved NW and up relative to the NE side (North American plate). Repetition of this oblique fault motion over the past few million years has formed the rugged topography of the Santa Cruz Mountains.

Initially, geologists were surprised by the lack of recognizable surface rupture along the fault trace. Aftershock patterns demonstrate that fault rupture terminated ~5 km below the surface, and directly beneath the shallow 1906 rupture zone. Violent shaking along the summit of the Santa Cruz Mountains (MM ≥IX, accelerations >1*g*) generated pervasive ground cracking along a 5 km wide zone. The cracks were the result of several different processes, including incipient landsliding and fill failure, ridge crest spreading, and flexural bedding-plane slip. In low-lying coastal areas, severe ground shaking (MM ≥VIII), resulted in liquefaction, lateral-spreading, bluff failure, and widespread structural damage along populated flood planes, wetlands, and beaches. The most severe damage affected older structures including unreinforced masonry buildings and wood-frame houses with unbolted mudsills and weak cripple-walls. Multiple deaths occurred in Santa Cruz and Watsonville from the outward collapse of brick storefronts and sidewalls on historic downtown buildings. The geologic effects, structural damage, and casualties wrought by the Loma Preita earthquake provide a valuable lesson on California seismic hazards.

"Loma Prieta is an outstanding example of a mountain moving. It has a wedge-shaped bottom, like the prow of a ship, pointing north. Pressure against it from the Pacific Ocean forces it toward the northeast and also raises it up in the air. It is not, however, moving at a rate that should disturb real estate values."

- Dr. Bailey Willis, geologist, Stanford University, 1930.

Speaker Biography:

Jeff Marshall is an Associate Professor in the Geological Sciences Department at Cal Poly Pomona. He is a geomorphologist with research expertise in neotectonics, coastal processes, and fluvial geomorphology. Dr. Marshall grew up in San Diego, and attended UCSD and UC Santa Barbara, where he completed a BA in Geological Sciences in 1984. After extensive travel in Europe and North Africa, he joined the Peace Corps and served in a small mountain village in Costa Rica. He returned to California to attend graduate school at UC Santa Cruz, where he earned an MS degree investigating Costa Rican coastal tectonics and large subduction earthquakes. During the early 1990's, Dr. Marshall worked for several San Francisco Bay Area consulting firms monitoring landslides generated by the 1989 Loma Prieta earthquake, and assessing ground water contamination in Silicon Valley. He then returned to graduate school at Penn State University and received a Ph.D. in Geosciences in 2000. His dissertation examined plate-boundary faulting and landscape evolution across the western Panama microplate in Costa Rica. While completing his Ph.D., Dr. Marshall worked as a visiting professor at Franklin & Marshall College in Lancaster, Pennsylvania.

In 2001, Dr. Marshall joined the faculty at Cal Poly Pomona where he teaches courses in geomorphology, neotectonics, natural disasters, engineering geology, and geosciences education. He also engages in research with both undergraduate and graduate students. His current projects focus on faulted alluvial fans along the San Gabriel Mountain foothills, and on fore arc faulting and coastal uplift along Costa Rica's Nicoya Peninsula. Dr. Marshall has published multiple papers on Central American geomorphology and tectonics, and is currently involved in NSF MARGINS research in the region. He also serves on the national Council on Undergraduate Research (CUR), and has worked with the Keck Geology Consortium as a project co-director and student research advisor in Florida, Pennsylvania, Australia, and Costa Rica.

Dr. Marshall is an avid photographer and maintains an extensive collection of geosciences teaching and research photos. In this talk, he will share his photos and firsthand experience as a geologist at the epicenter of the 1989 Loma Prieta earthquake. This talk will explore the earthquake's unique tectonics, and its geologic and engineering impacts on the epicentral region.

Thanks

Thanks to those attending the Annual Meeting.

Meeting Location

The meeting site is located in the City of Temecula East of I-15 on Rancho California Road.

PAT & OSCARS Family Restaurant
29375 Rancho California Road
Temecula, CA 92593
(951) 695-2422

Venue for Meal

* **Openers**
  - **Assorted non-alcoholic beverages, iced or hot tea, and coffee. Refills free in Banquet room**
  - **Cheese Tray: Cheddar, Jack and Swiss**
* **Meal sections (all)**
  - **Warm soft bread sticks (all you can eat)**
  - **Salad of your selection (or both)**
    - **Caesar**
    - **Greek**
    - **Choice of dressing**
  - **Pasta**
    - **Marinara**
    - **Alfredo**
  - **Main Choices (any and all)**
    - **Oven-baked Lemon Chicken**
  - **BBQ Chicken**
    - **BBQ St. Louis Baby Back pork ribs (More Ribs: add $2.00)**
    - **Desert - Giant Cookie (4 choices)**

* **Beer/wine selections (additional cost)**

Directions to Meeting

Proceeding North or South on I-15 (or I-215 South to Temecula, after Freeways merge), prepare to EXIT at Rancho California Road. Turn LEFT at end of off-ramp on Rancho California Road to head EAST across I-15 less than 1/4-mile to turn Right, after crossing Ynez Avenue, next to a large pond. (SOUTH) and park at Pat N Oscars. If heading North on I-15, Exit Rancho California Road to turn RIGHT going east, and follow above directions.

RSVP Please: send RSVP to Rick Gundry at rick.gundry@verizon.net by Thursday close of business 11-OCT-07, or call RSVP (951) 924-6756 to leave message. IMPORTANT ! Thanks.

Several Students are expected to attend.

Future Meetings

NOV Weds. Nov. 14, 2007, Cal State San Bernardino CSUSB Geology Club & AEG Joint Meeting

– – "Latest Pleistocene slip rate of the San Bernardino strand of the San Andreas fault"

Dr. Sally McGill, Professor of Geology, Geology Department, Cal. State Univ., San Bernardino, CA

DEC Wednesday 19-December 2007, Corona

– – "Accelerating Seismicity Before Large Earthquakes: – – The Life and Death of an Earthquake Prediction Scheme"

Dr. David Bowman, Associate Professor and Chair, Department of Geological Sciences, California State University, Fullerton, Fullerton, California

JAN Wednesday January 16th, 2008, Pomona

** Cal Poly Geology Club & AEG Joint Meeting **

2008 GSA/AEG Jahn's Distinguished Lecturer in Engineering Geology

– – "Tsunamis – Stealth Killers"

Dr. John J. Clague, Shrun Research Professor, CRC Chair in Natural Hazard Research,Department of Earth Sciences, Simon Frasier University, Burnaby, British Colombia, Canada

FEB Wednesday February 20th, 2008, Moreno Valley

– – "Tsunamis and Earthquake Dynamics"

Dr. David Oglesby, Professor of Geophysics, Univeristy of California, Riverside, Riverside, CA

MAR Wednesday Mar 20th -2008, Redlands

– – "Engineering Geophysics"

Anthony Martin, Geophysicist, Geovision Geophysical Consulting, Corona, California

APR Wednesday __ April 2008, Temecula

– – "Rotating Crust along the San Andreas Plate Boundary"

Dr. Nate Onderdonk, Associate Professor of Geology, Department of Geological Sciences, California State University, Long Beach, Long Beach, California

Continuing Education Ongoing Short Course

"An Introduction to Landslides or Mass Wasting"

An Online course

AIPG Accredited (3.5 CEU's)

rgfont@geosciencedm.com,

slbishop@geosciencedm.com

www.geodm.com Robert Font, Ph.D.

AEG Short Courses

The Inland Empire Chapter may again sponsor a one or two-day AEG-approved short course in the coming year.

Perhaps the Chapter may also sponsor a second course. Please keep posted.

FIELD TRIPS

Field trips are likely to be planned and scheduled forthe coming year.

SHORT COURSES

Geology Continuing Education Series

Cosponsored by Inland Geological Society and AEG Inland Empire Chapter:

Continuing education courses are planned for Fall, Winter and Spring 2007-2008. Topics will be:

- landslide analysis,
- fault investigation/soil stratigraphy, and
- environmental issues

Inland Empire Chapter Officers and Section/National Contact Information

NOTE: The title of Chapter President is changed to Chapter Chair in accordance with the Association Bylaws change approved at 2008 Annual Meeting (Rev. Effective 29-Sep-08)

Mike Cook	**Chair**	**MCook@kleinfelder.com**	**(909) 557-1463**
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http://www.aegsc.org/chapters/inlandempire

AEG Southern California Section Web-site

http://www.aegsc.org/

Association of Environmental and Engineering Geologists (Headquarters)

http://www.aegweb.org

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Professionals,

Practice,

and The Public