

# NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



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## MEETING ANNOUNCEMENT

**DATE:** Wednesday, May 30, 2007 **DINNER MEETING!!**

**LOCATION:** Orinda Masonic Center, 9 Altarinda Rd., Orinda

**TIME:** 6:00 p.m. Social; 7:00 p.m. Dinner; 8:00 p.m. Talk  
**Cost:** \$20 per regular member

**RESERVATIONS:** Leave your name and phone number at  
925-424-3669 or at [danday94@pacbell.net](mailto:danday94@pacbell.net)  
before the meeting.

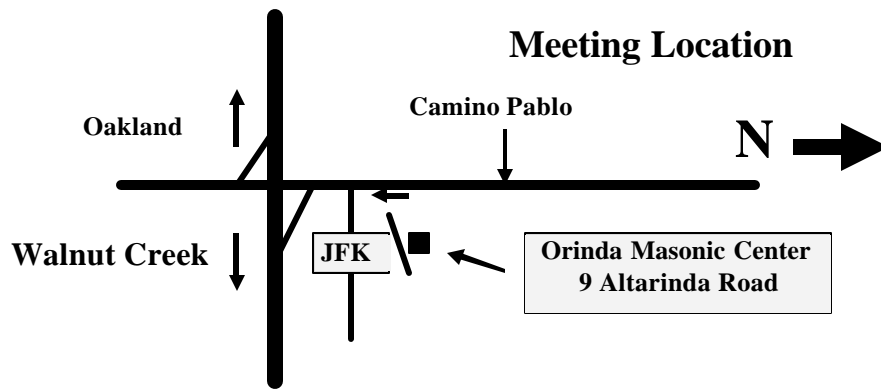
**SPEAKER:** Dr. James Moore, US Geological Survey  
**Watch the Early Reservation Date!! – May 25, 2007**

### *The adventures of Clarence King (First USGS Director) and his survey of the 40th*

“*King of the 40th Parallel—Discovery in the American West*”, was published in 2006 and chronicles the adventures of Clarence King, the founding director of the USGS. The book recounts the life and achievements of Clarence King, widely recognized as one of the most gifted Americans of his era. King’s genius, singular accomplishments, and near-death adventures unfold in a narrative centered on his personal relationship with his lifelong friend, James Gardner. The book covers the adventurous aspects of conducting geological fieldwork in the West, much of it documented by letters written by King and Gardner. The book is copiously illustrated with 150 historical maps, etchings, and historic photographs showing localities and people important to the story. (For more details see: [http://www.sup.org/book.cgi?book\\_id=5222%205223](http://www.sup.org/book.cgi?book_id=5222%205223))

Clarence King was fascinated with volcanoes. Through the close association with two of his Yale professors, James Dana and George Brush, he was captivated by stories of Mount Shasta, and this motivated him and his friend James Gardner to cross the continent by wagon train. He climbed Mount Lassen twice in 1863 and seven years later climbed Mount Shasta. He found there the first active glaciers discovered in the nation. Because of this discovery he sent geologists Samuel Emmons to the unclimbed Mount Rainier and Arnold Hague to Mount Hood. They also discovered moving glaciers. In 1872 King studied the active lava lake in the fire pit Halemaumau at Kilauea volcano.

At the age of 25 he commanded the Geological Exploration of the 40th Parallel, a survey program that mapped a 100-mile-wide strip across the Great Basin and Rocky Mountains on the planned railroad route. King’s leadership and the series of landmark maps and monographs that he



prepared and edited set the standard for excellence in earth science practice and publishing. When the existing four federal surveys were combined in 1879 to create the U.S. Geological Survey, King was the clear choice for Director of the new agency.

**Biography:** **Dr. James G. Moore**, now retired from the U. S. Geological survey, received his BS in geology from Stanford University, MS from the University of Washington, and Ph.D. from Johns Hopkins University. Jim served as Scientist-in-Charge of the Hawaiian Volcano Observatory and has gone on to investigate about 20 ongoing volcanic eruptions world-wide. He has participated in about 25 oceanographic cruises and in 50 dives in research submarines mostly to investigate volcanic rocks on the submerged flanks of young volcanoes.

He has conducted geologic studies for several decades in the central Sierra Nevada with the U. S. Geological Survey, and this familiarity with the area motivated him to write a book published by Stanford University Press titled, *"Exploring the Highest Sierra"* (see: <http://www.geotimes.org/feb01/geomedia.html#review2>). The book weaves together the history of exploration and mapping of the range with the development of pioneering geologic concepts, such as the glacial origin of the giant Sierra canyons, and the magmatic origin of the granitic rock that dominates the range. Another recently published book: *"King of the 40th Parallel—Discovery in the American West"* recounts the adventures of Clarence King who became the first director of the U.S. Geological Survey.

**Signup Form Follows; Please Send EARLY to Confirm Your Reservation!**

Northern California Geological Society  
 c/o Mark Detterman  
 3197 Cromwell Place  
 Hayward, CA 94542-1209

*Would you like to receive the NCGS newsletter by e-mail?* If you are not already doing so, and would like to, please contact **Dan Day** at [danday94@pacbell.net](mailto:danday94@pacbell.net) to sign up for this service.

# NCGS 2006 Calendar

Wednesday May 30, 2007 **DINNER MEETING!!**

**Book signing opportunity --- See Announcement**

**Reservations are required by May 25, 2007**

**We will not be able to accommodate "Walk-Ins"**

**Dr. James Moore**, US Geological Survey

*The adventures of Clarence King (First USGS*

*Director) and his survey of the 40th*

6:00 pm at Orinda Masonic Center

Wednesday June 27, 2007

**Jeffery P Schaffer**, Napa Valley College

*Constraints on Sierra Nevada Uplift and Glaciation*

7:00 pm at Orinda Masonic Center

**As Usual - Our Summer Break**

Wednesday September 26, 2007

**TBA**

7:00 pm at Orinda Masonic Center

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## Upcoming NCGS Field Trips

Summer 2007  
(Pending)

*Modern Geophysical*

*Techniques for Site*

*Characterization,*

**Dr, Mitchell Craig**, Cal State  
University East Bay

July 7 & 8, 2007

*Crustal Deformation of the*  
*Eastern Sierra Frontal Fault,*

**Dylan Rood**, LLNL and UC  
Santa Barbara

Do you have a place you've wanted to visit for the geology? Let us know. We're definitely interested in ideas. For those suggestions, or for questions regarding field trips, please contact Rob Nelson at:

[rlngeology@sbcglobal.net](mailto:rlngeology@sbcglobal.net)

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## NCGS Field Trip - Cross Link

For those who did not make it to the NCGS Sutter Buttes Field Trip on April 21, 2007, you can go to the "About: Geology" website maintained by NCGS member Andrew Alden until we manage to get photos posted at the NCGS website! Visit the "About: Geology" website at: [http://geology.about.com/od/geology\\_ca/ig/sutterbuttes/](http://geology.about.com/od/geology_ca/ig/sutterbuttes/)

## Peninsula Geologic Society

### Upcoming meetings

For an updated list of meetings, abstracts, and field trips go to <http://www.diggles.com/pgs/>. The PGS has also posted guidebooks for downloading, as well as photographs from recent field trips at this web address. Recent field trips include: *The 1906 Earthquake and the San Andreas Fault on the San Francisco Peninsula* (2006), *Granites in the Franciscan* (Fall 2005), *San Andreas Fault - Carrizo Plain* (Spring 2005), *Panoche and Tumey Hills* (2004), *White-Inyo Range* (2002), *Napa Wine County* (December 2001), *Mount Shasta and the Klamath Mountains* (May 2001), *Big Sur (Salina / Nacimiento Amalgamated Terrane, Big Sur coast Central California, 2000)*, and the *Northern Sierra Nevada (Geologic Transect of the Northern Sierra Nevada Along the North Fork of the Yuba River, 1982)*. Posted upcoming meetings include the following topics and dates:

- June 5, 2007, Elizabeth Miller, VP address, *on the Wrangell connection*. Also, Elections. Dinner in Hartley. Lecture in 320-105
- Future events are TBA

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## Association of Engineering Geologists

### San Francisco Section

#### Upcoming meetings

Meeting locations have been rotating between San Francisco, the East Bay, and the South Bay. For further meeting details go to: <http://www.aegsf.org/>.

- June 12, 2007, Matt McMakin, Neotectonics of Death Valley
- September 11, 2007, Doris Sloan and John Karachewski, San Francisco Bay Geology
- November 13, 2007, Bruce Hilton and Tim Bech, Kleinfelder, Ferguson Rockslide on Highway 140 near Yosemite.

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## First North American Landslide Conference

### Vail, Colorado

**June 3 – 10, 2007**

It's not too late to register for this Conference and join the many International attendees who will be participating in this event June 3 through June 10 in Vail, Colorado. To date, there are attendees coming from 31 countries from around the world to be a part of this first ever North American Landslide Conference and share their knowledge about landslides. You can register on the Conference web site:

[www.mines.edu/academic/geology/landslidevail2007/](http://www.mines.edu/academic/geology/landslidevail2007/)

## Ores and Orogenesis: Circum-Pacific Tectonics, Geologic Evolution, and Ore Deposits

A Symposium Honoring the Career of  
**William R. Dickinson**  
Tucson, AZ, September 24 – 30, 2007

Sponsored by the Arizona Geological Society the Ores & Orogenesis conference is focused on tectonics, geologic evolution, and ore deposits in the circum-Pacific region. The conference will consist of four days of talks and posters, pre-meeting and post-meeting field trips and short courses, a core shack, a vendor exhibit hall, luncheon speakers, short courses and workshops, a reunion night, and a banquet honoring Bill Dickinson. The meeting seeks to attract industry, academic and government geologists as both technical presenters and attendees. *The Ores & Orogenesis Symposium aims to be one of the premier events of 2007 for both the tectonics community and for economic geologists.*

The conference is being specifically designed to encourage the attendance of spouses and families. The venue is a resort hotel offering numerous recreational activities in a spectacular natural setting, with attractions to fit everyone's tastes available in the greater Tucson area.

Even though it's a long distance, it looks like a dynamite meeting. One of the field trips is in British Columbia and the Yukon, and will look at Cache Creek terrane along the Cassiar. Other field trips are slated for Mexico and the South Pacific.

The website is: [www.AGSsymposium.org](http://www.AGSsymposium.org)

Thanks to Kathleen Burnham for calling this to our attention!

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### Happy 300<sup>th</sup> Anniversary!

Did you know that the 300<sup>th</sup> anniversary of Carolus Linnaeus, father of modern taxonomy is May 23, 2007? Linnaeus standardized the classification and description of plants and animals. The work of Linnaeus is the basis for our modern use of binomial nomenclature, which is the use of genera and species to commonly describe particular plants and animals. Linnaeus is the guy to blame for all the Latin flying around fossil localities! The botanical classification system Linnaeus developed is still in use today, breaking down all life into Kingdoms, Phylum (or Division), Class, Order, Family, Genus, and Species.

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## The More You Know, the More You Learn

This Week in SCIENCE  
April 6, 2007

The ability to remember complex new information often depends on prior knowledge of the topic. This is because we have already formed a relevant mental schema as a framework. **Tse *et al.*** used rats to study the effects of prior learning of schemas on the ability to acquire new episodic associations. These associations were acquired faster when the animals were first trained on a consistent set of associations than when they occurred in the context of a novel set of associations. The acquisition of novel associations was dependent on the hippocampus. However, within 48 hours the associations were independent of the hippocampus, which is substantially faster than typical memory consolidation. Thus, animals--like people--can bring activated mental schemas to bear during learning.

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### Ancient Collagen Signatures

This Week in SCIENCE  
April 13, 2007

Soft tissues have been thought to be rarely if ever preserved in the fossil record, aside from some samples entombed in amber or for a few million years in ice. Recently, a femur of a *Tyrannosaurus rex* dating to about 67 million years ago was recovered that seemed to preserve internal soft tissues, including blood vessels within its bone. **Schweitzer *et al.*** and **Asara *et al.*** have further analyzed these tissues, as well as samples from a mastodon, and show that original collagen proteins were preserved. Mass spectrometry was used to recover at least some of the original collagen sequence. Thus, aspects of genetic information can be obtained from select samples of extinct species preserved for tens of millions of years.

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### Volcanic Release of Buried Greenhouse Gases

This Week in SCIENCE  
April 27, 2007

The Paleocene-Eocene thermal maximum (PETM) about 55 million years ago was marked by a rapid emission of greenhouse gases (either CO<sub>2</sub> or methane) during a period of a few thousand years that increased global temperatures by 5° to 10°C. However, the trigger for this sudden event has been uncertain. **Storey *et al.*** dated a volcanic layer that overlies the marine sections marking the PETM and a volcanic ash at the top of a massive volcanic sequence in Greenland and Europe that likely

erupted within about 300,000 years, marking the beginning of the opening of the Northern Atlantic Ocean. The dates are identical within error, implying that timing of the PETM overlaps that of the volcanic sequence. Massive intrusion of basalt into carbonaceous sediments may have released methane or CO<sub>2</sub> to the atmosphere, perhaps explaining at least some of the causes of the PETM.

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## High Resolution Mapping of Mavericks

The California Ocean Protection Council and National Oceanic and Atmospheric Administration (NOAA) National Marine Sanctuary Program recently announced findings revealing unprecedented detailed imagery of the seafloor, including in areas of the Monterey Bay National Marine Sanctuary off Half Moon Bay, where the famed "Mavericks" waves are among the largest in the Continental United States.

The [California Coast State Waters Mapping Project](#) allows scientists for the first time to see highly detailed, three-dimensional images of the seafloor off California's coast. New data illustrates the rugged seafloor conditions surrounding Mavericks more clearly and helps better explain ocean ecosystems and underwater activities like large waves and earthquakes.

"This type of cutting-edge research is essential to understanding the unique aspects of our national marine sanctuaries, enabling better ecosystem-based management," said Gulf of the Farallones National Marine Sanctuary Superintendent Maria Brown. "The marine sanctuary will use these images to educate future ocean scientists and foster citizen stewardship."

Using advanced sonar equipment called shipboard multibeam echo sounders and aerial light detection bathymetric sensing instruments, detailed underwater pictures were produced. The images distinguish critical underwater habitats and highlight the faults, chasms, fissures, crevices, and pinnacles on the sea floor. Scientists and resource managers will use the information to identify potential biological hot spots to aid their understanding of the highly productive, diverse undersea ecosystem along the California coast.

"This research is extremely valuable in identifying areas important to the California Marine Life Protection Act process and could simultaneously help to predict seismic hazards along California's coast," said Secretary for Resources Mike Chrisman, chair of the Ocean Protection Council.

Also significant is the survey's charting of navigational hazards such as hidden reefs and sunken obstacles. Knowing where hazards are located is essential for the safety of vessels that use these waters each year. This is

the first time scientists have been able to show the shallow nearshore reef in such detail.

Geologic hazards along the seismically active California coast have also been identified. The survey documents the position and physical features associated with the marine segments of the San Gregorio fault in the Half Moon Bay area, a major active fault within the San Andreas Fault System.

The seafloor imaged off Pillar Point and Half Moon Bay is comprised of sedimentary rocks formed during the Pliocene, some 5.3-1.6 million years ago, and more modern sediments, primarily sand. Erosion by waves and currents have caused the weaker, less resistant beds to erode, leaving the stronger, more resistant beds elevated higher above the adjacent sediment-covered seafloor, resulting in the alternating striped pattern of higher ridges and lower troughs seen on the seafloor today. Movement along the San Gregorio fault, which comes ashore in Pillar Point Harbor (see Figure 1b on the website), has folded and uplifted the sedimentary rocks, causing the twists and turns in the seabed today, along with the headland at Pillar Point and the prominent east-west trending bedrock reef that is exposed above the water at Sail Rock.

The dominant wave direction off the central coast of California during most of the year is from the northwest. These waves propagate over the much gentler topography to the northwest of Sail Rock and are generally too small to shoal and break at Mavericks. Sometimes during the winter months, however, strong North Pacific storms generate large, long-period waves from more westerly directions that shoal and break over the bedrock reef just to the east of Sail Rock. The abrupt topography of the bedrock reef causes wave energy to converge over the reef, causing the wave to rapidly slow down, shorten in length and substantially increase in height relative to the areas just to the north and south of the east-west trending reef. This interaction of the geology and oceanography is what makes the wave at Mavericks so spectacular compared to many other locations along central California.

The new data indicates that Mavericks is above a portion of the rocky reef that is shallower than the surrounding rock. As a wave front approaches the shoreline and progressively enters shallow water, it becomes compressed and grows taller. The ridge promontory also has the effect of focusing wave energy and the wave height rapidly increases, creating a huge wave compared to adjacent areas. About here (the highest red we see), the wave becomes unstable and breaks. In fact, the data collection stopped here because the rough sea conditions made it too dangerous for the scientists to operate their boat!

Although interesting for explaining the mystery of Mavericks, scientists and resource managers will be using this data to identify hazards to navigation, classify different habitat types, locate biological hot spots, and study the San Gregorio fault.

Go to:

[http://www.mbnms-simon.org/other/moreLinks/whats\\_new\\_mavericks.php](http://www.mbnms-simon.org/other/moreLinks/whats_new_mavericks.php) for additional maps and information; including wave crest propagation at Mavericks, a Quicktime animation, and more!

## Mavericks - Half Moon Bay, California

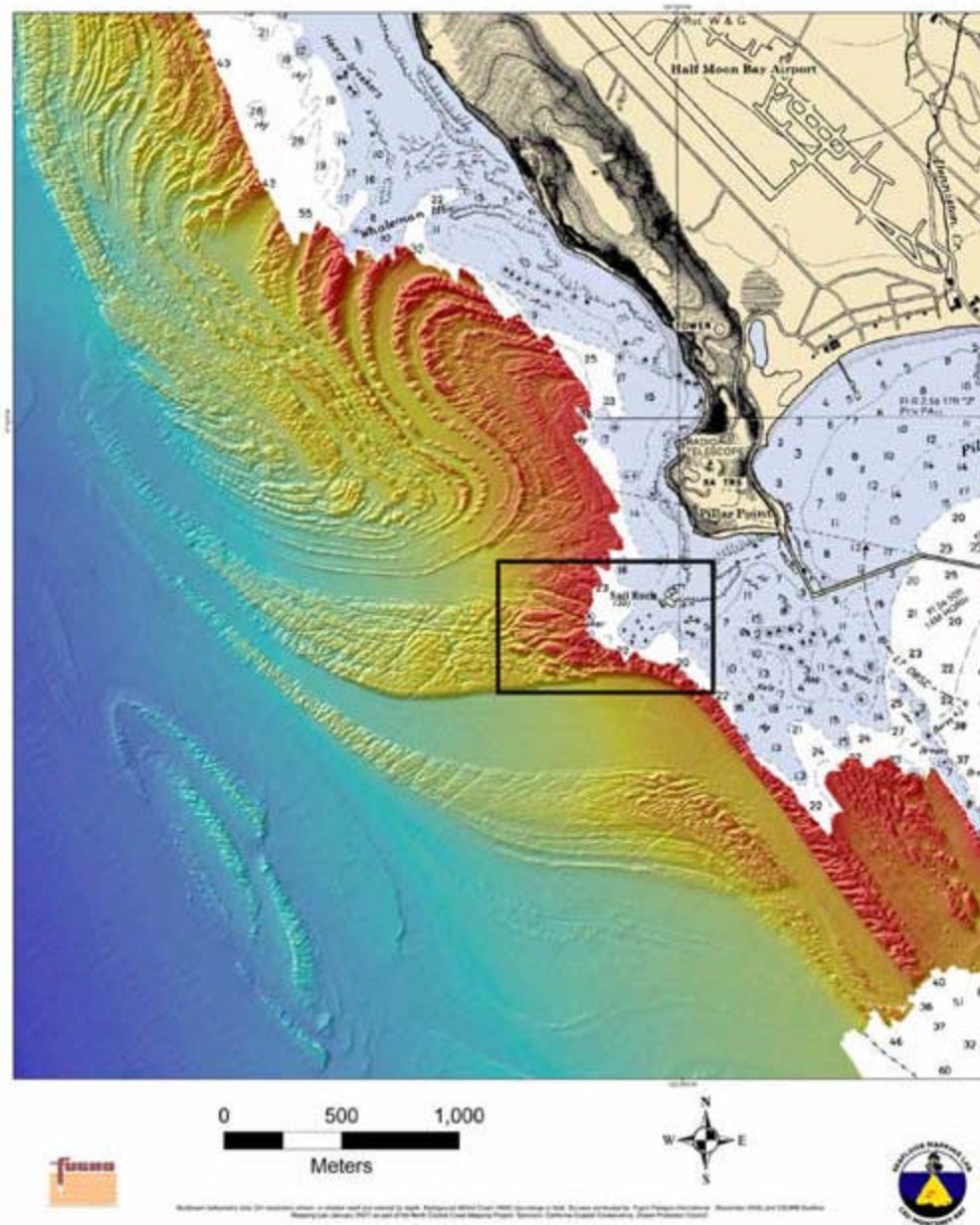


Figure 2. The map shows seafloor bathymetric contours offshore from Pillar Point north of Half Moon Bay. The color gradient ranges from deeper water (blue) to shallow water depths (red). The Mavericks wave break is indicated by a black box offshore from Sail Rock.

# NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



## NCGS DINNER MEETING

### *The adventures of Clarence King (First USGS Director) and his survey of the 40th parallel*

Wednesday May 30, 2007

Speaker: **Dr. James G. Moore**, U.S. Geological Survey, Menlo Park (Retired)

6:00 pm at Orinda Masonic Center

(Reservations are required by May 25, 2007)

We are sorry but we will not be able to accommodate "Walk-Ins"

The Northern California Geological Society is pleased to announce that once again we will be stepping out of our normal meeting routine. Come join the NCGS at this *special dinner and evening* with **Dr. James G. Moore**. Step back in time with us and come listen to Dr. Moore speak about the adventurous time of geologic exploration by Clarence King and the survey of the 40<sup>th</sup> parallel. Jim reports that he will have a supply of books on hand for purchase (And since he wrote the book, we think he might even consider autographing them!).

For this special event, planned for our normal monthly meeting date, but **starting one-half hour early**, we will be in typical NCGS style, with a delicious entrée of **Teriyaki sesame chicken**, with garden and Caesar salads, rolls & butter, and cheese ravioli with a Fettuccini Alfredo sauce. For vegetarian dinners **Vegetarian Lasagna** will be served in place of the Teriyaki Chicken. Desert will include cookies, brownies, fruit bars/carrot cake. Early reports are that we may again be blessed with wines from **Rosenblum Cellars** of Alameda. Please note that a vegetarian option is only available if notified ahead (see attached form).

**Abstract: *The adventures of Clarence King (First USGS Director) and his survey of the 40th parallel***

*"King of the 40th Parallel—Discovery in the American West"*, was published in 2006 and chronicles the adventures of Clarence King, the founding director of the USGS. The book recounts the life and achievements of Clarence King, widely recognized as one of the most gifted Americans of his era. King's genius, singular accomplishments, and near-death adventures unfold in a narrative centered on his personal relationship with his lifelong friend, James Gardner. The book covers the adventurous aspects of conducting geological fieldwork in the West, much of it documented by letters written by King and Gardner. The book is copiously illustrated with 150 historical maps, etchings, and historic photographs showing localities and people important to the story. (For more details see: [http://www.sup.org/book.cgi?book\\_id=5222%205223](http://www.sup.org/book.cgi?book_id=5222%205223))

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**Dr. James G. Moore**

**May 30, 2007**

years later climbed Mount Shasta. He found there the first active glaciers discovered in the nation. Because of this discovery he sent geologists Samuel Emmons to the unclimbed Mount Rainier and Arnold Hague to Mount Hood. They also discovered moving glaciers. In 1872 King studied the active lava lake in the fire pit Halemaumau at Kilauea volcano.

At the age of 25 he commanded the Geological Exploration of the 40th Parallel, a survey program that mapped a 100-mile-wide strip across the Great Basin and Rocky Mountains on the planned railroad route. King's leadership and the series of landmark maps and monographs that he prepared and edited set the standard for excellence in earth science practice and publishing. When the existing four federal surveys were combined in 1879 to create the U.S. Geological Survey, King was the clear choice for Director of the new agency.

**Biography:** **Dr. James G. Moore**, now retired from the U. S. Geological survey, received his BS in geology from Stanford University, MS from the University of Washington, and Ph.D. from Johns Hopkins University.

He has conducted geologic studies for several decades in the central Sierra Nevada with the U. S. Geological Survey, and this familiarity with the area motivated him to write a book published by Stanford University Press titled, "*Exploring the Highest Sierra*" (see: <http://www.geotimes.org/feb01/geomedia.html#review2>). The book weaves together the history of exploration and mapping of the range with the development of pioneering geologic concepts, such as the glacial origin of the giant Sierra canyons, and the magmatic origin of the granitic rock that dominates the range. Another recently published book: "*King of the 40th Parallel—Discovery in the American West*" recounts the adventures of Clarence King who became the first director of the U.S. Geological Survey.

Jim served as Scientist-in-Charge of the Hawaiian Volcano Observatory and has gone on to investigate about 20 on-going volcanic eruptions world-wide. He has participated in about 25 oceanographic cruises and in 50 dives in research submarines mostly to investigate volcanic rocks on the submerged flanks of young volcanoes.

\*\*\*\*\* **Dinner Logistics** \*\*\*\*\*

Meeting Details: Social Hour: 6:00 – 7:00 pm; Dinner: 7:00 – 8:00 pm Presentation: 8:00 – open

**Time** : May 30, 2006, 6:00 pm, Orinda Masonic Center 9 Altarinda Road, Orinda, CA.

**Cost:** \$ 20/person

\*\*\*\*\***REGISTRATION FORM (Dr. James Moore Dinner)** \*\*\*\*\*

Name: \_\_\_\_\_ E-mail: \_\_\_\_\_

Address: \_\_\_\_\_ Phone (day): \_\_\_\_\_ Phone (evening): \_\_\_\_\_

Dinner: Regular: \_\_\_\_\_ Vegetarian: \_\_\_\_\_ (Please check one); Check Amount: \_\_\_\_\_

Please mail a check made out to **NCGS** to: **Tridib Guha**  
**5016 Gloucester Lane,**  
**Martinez, CA 94553**

Questions: e-mail: [tridibguha@sbcglobal.net](mailto:tridibguha@sbcglobal.net) Phone: (925) 370-0685 (evening - PREFERRED)  
(925) 363-1999 (day)



# NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



## NCGS FIELD TRIP

TO

## THE SIERRA NEVADA FRONTAL FAULT ZONE

Saturday / Sunday July 7 & 8, 2007

**Leader: Dylan Rood; LLNL and UC Santa Barbara**

Up to 25% of the plate boundary deformation in the western US is currently localized within a ~100-150 km wide dextral shear zone referred to as the Eastern California Shear Zone (ECSZ) and Walker Lane Belt (WLB). Active deformation near the western edge of the Great Basin is demonstrated by Quaternary fault patterns, seismicity, and geodetic data. The Sierra Nevada Frontal Fault Zone (SNFFZ) is located on the westernmost margin of the Great Basin, at the tectonic boundary between the relatively undeformed Sierra Nevada block and WLB. In the central-eastern Sierra Nevada, the SNFFZ consists of a series of left-stepping fault-bounded basins produced by normal or oblique-slip faulting. Little is known about either the long-term history of slip on many of these faults or the variation in slip rates through time. The major focus of this field trip will be to examine and discuss the location, geometry, kinematics, and rates of deformation across the transition from the Sierra Nevada to the Walker Lane belt (WLB) in the region of the eastern Sierra Nevada from Sonora Pass to Mono Basin.

On this field trip, we will discuss the deformation history of the SNFFZ during Tertiary through Quaternary time. The field trip area is unusual, if not unique, in the Sierra Nevada and western Great Basin, because it offers distinctive strain markers spanning the past 10 My. Well-preserved and regionally extensive Late Tertiary, Pleistocene, and Late Quaternary markers provide accurate estimates of cumulative slip across faults (both vertical and horizontal). We will visit several localities where we constructed fault slip rates by combining geologic and/or geomorphic mapping, GPS surveying, and various geochronologic methods (including  $^{40}\text{Ar}/^{39}\text{Ar}$  and cosmogenic  $^{10}\text{Be}$  exposure dating).

Specifically, we will observe:

- (1) Evidence for Miocene (~10 Ma) faulting along the SNFFZ within the Ancestral Cascades Arc by looking at an angular unconformity exposed within the unique Tertiary volcanic stratigraphy of the Sonora Pass region.
- (2) A long record of Quaternary normal faulting preserved in a suite of glacial deposits in the Sonora Junction area. With differential displacements along the same fault system ranging in age from 10 Ma to 10 ka, we can compare Tertiary and Quaternary fault slip rates.
- (3) Tertiary and Quaternary deformation in the Bridgeport Basin, where both normal and oblique-dextral faulting is expressed in offset Tertiary volcanic and Quaternary glacial/alluvial markers.
- (4) Geothermal evidence for active faulting in the Bridgeport Basin by visiting the beautiful hot springs of this part of the eastern Sierra.

**Meeting Time and Place: 9:00 A.M. on July 7 at Buckeye Campground**

**Directions to Buckeye Campground:** Follow Highway 395 south from Bridgeport, turn left and travel approximately seven miles on Twin Lakes Road. Turn right on Buckeye Road at Doc and Al's Resort and travel about 3 miles. Turn left at fork and travel another mile to campground.

**Camping/Motel:** We will be camping at Buckeye campground on Friday and Saturday nights. Otherwise, motels are available in the Bridgeport area.

**Because of differences in arrival times, you will be responsible for Friday night's dinner. Breakfast and lunch on Saturday and Sunday will be provided. There will be a NCGS sponsored dinner on Saturday Night. Get your BBQ aprons on, or be prepared otherwise to help out!**

**Cost: \$115                      Limit: 30 People**

**\*\*\*\*\*REGISTRATION FORM (Sierra Nevada Frontal Fault Zone Field Trip) \*\*\*\*\***

Name: \_\_\_\_\_ E-mail: \_\_\_\_\_

Address: \_\_\_\_\_ Phone (day): \_\_\_\_\_ Phone (evening): \_\_\_\_\_

Lunch: Regular: \_\_\_\_\_ Vegetarian: \_\_\_\_\_ (Please check one) Check Amount: \_\_\_\_\_

Please mail a check made out to NCGS to: **Rob Nelson  
269 College View Drive,  
Rohnert Park, CA 94928**

**Carpooling is suggested for this fieldtrip.**

Questions: e-mail: [rlngeology@sbcglobal.net](mailto:rlngeology@sbcglobal.net) Phone: (707) 795-8090 (evening)  
(707) 548-3268 (day)