NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

MEETING ANNOUNCEMENT

DATE: **June 25, 2008**

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

TIME: **6:30 p.m. social; 7:00 p.m. talk (no dinner) Cost: $5 per regular member; $1 per student or K – 12 teachers**

SPEAKER: Dr. John C. Tinsley, U.S. Geological Survey, Menlo Park

Dark holes in Muir's "Range of Light": Insights from southern Sierra Nevada caves and karst

The caves of the southern Sierra Nevada are spectacular natural laboratories that provide surprising geological insights into the region's natural history not obtainable in other ways. Diversely distributed geographically and elevationally, the caves have formed in carbonate-rich belts of marble that partly comprise the proverbial roof pendant terranes. The youngest caves are still developing in the bottoms of canyons; the oldest caves developed several million years ago and provide insights into the uplift history of the Sierra spanning the past 5 million years. Lilburn Cave, California's longest cave at nearly 22 miles has been managed by the National Park Service as an underground research laboratory during the past 30+ years and is easily California's most studied cave system, with research coordinated mainly by the Cave Research Foundation. Lilburn Cave provides insights into the operation of a rare ebb and flow spring. New caves continue to be found, and a few are spectacular both as biological ecosystems for cave-dwelling animals and as paleontological repositories. Please join the Northern California Geological Society for a speleological tour of selected southern Sierran cave systems and scientific insights derived from cave-based studies during the past three decades.

Continued on back page…

NCGS 2008 Calendar

Wednesday June 25, 2008
Dark holes in Muir's "Range of Light": Insights from southern Sierra Nevada caves and karst - Dr. John C. Tinsley, US Geological Survey, Menlo Park
7:00 pm at Orinda Masonic Center

As Usual – Our Summer Break!

Wednesday September 24, 2008
Granites in the Franciscan formation – Dr. Rolfe Erickson, California State University, Sonoma
7:00 pm at Orinda Masonic Center

Wednesday October 29, 2008
The impact of fire on hydrologic systems
Dr. Laura Rademacher, Univ. of the Pacific, Stockton
7:00 pm at Orinda Masonic Center

Wednesday November 19, 2008 **(One Week Early!)**
Late Pliocene to Recent stratigraphy and tectonics in the Death Valley area, California – Dr. John Caskey, San Francisco State University, San Francisco
7:00 pm at Orinda Masonic Center

Wednesday January 28, 2009
Geophysical vignettes from the wine country: implications for the northward continuation of the East Bay fault system - Dr. Victoria E. Langenheim, U.S. Geological Survey, Menlo Park, CA
7:00 pm at Orinda Masonic Center

Upcoming NCGS Field Trips

June 28, 2008 (Repeat Due to Demand; Wilson Grove II) — ***Field Trip to the Wilson Grove & Petaluma Formations, Sonoma County, California*; James Allen, MS, PG,** Dept. of Earth and Environmental Science, CSU East Bay and **Peter Holland, CEG,** Vector Engineering

August 23, 2008 — ***Field Trip to the Calaveras Fault in Santa Clara County, California,* Dr. Phil Stoffer,** US Geological Survey **and Dr. Richard Sedlock,** San Jose State University **(A part of the 1868 Earthquake Alliance)**

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

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. Posted upcoming meetings include the following topics and dates:

- September or October, 2008, Field trip dealing with geology of the Owens Valley (Angela Jayko) and central White-Inyo Range (Gary Ernst).

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/.

1868 Hayward Earthquake Alliance
Dare to Prepare Bay Area
October 21, 2008

October 21, 2008 marks the 140th anniversary of the 1868 Hayward earthquake, which was the first great "San Francisco earthquake" and one of the most damaging earthquakes in the nation's history. The 1868 Hayward Earthquake Alliance was formed to help coordinate and promote efforts and activities between organizations throughout the greater San Francisco Bay Area planning to commemorate the earthquake.

No doubt most members are aware of the Alliance, but here is a convenient link: http://1868alliance.org/ If you have not been to the website you'll find web pages on how to prepare (for your friends and family no doubt), activities and events (for all), news article links (for educational moments), member organizations (including NCGS!), stories, speaker information (line up a speaker), and other resources. It's well designed and worth a visit! And it's where you can find more information on the next item.

Third Conference on Earthquake Hazards in the Eastern San Francisco Bay Area

Science, Hazard, Engineering, and Risk

California State University, East Bay
Hayward Campus
October 22-24, 2008

This conference will highlight information on Eastern San Francisco Bay Area earthquake hazards that has been developed since 1982 and 1992 conferences. The activities and publications will take advantage of interest generated by the 140th anniversary of the 1868 Hayward fault earthquake. In addition to technical sessions, the conference will include a public forum, field trips and tutorials for educators. This conference is an excellent opportunity to help make public and to synthesize the exciting results of earthquake related studies conducted since the last conference in 1992. Please help us spread the word and tell your colleagues. The preliminary technical program and a description of the field trips can be found at: http://www.consrv.ca.gov/cgs/News/Pages/sessions.aspx There will be four related field trips will be conducted Saturday and Sunday, October 25 to 26. For the field trips go to: http://www.consrv.ca.gov/cgs/News/Pages/fieldtrips.aspx
Abstracts are due August 15, and should be submitted online at:
http://www.seismosoc.org/meetings/2008/3ebconf/

For more details see:
www.consrv.ca.gov/cgs/news/eastbayconference.htm.

2007 – 2008 NCGS Richard Chambers Memorial Scholarship Awards - Masters Degree

The **Northern California Geological Society** is pleased to announce **TWO $1,000 Masters Degree Richard Chambers Memorial Awards.** The scholarships were awarded in late February, and are named for former member Richard Chambers who provided a bequest to the NCGS several years ago.

Mr. Kean Bliss is working on his Masters at **San Diego State University,** and expects to complete the degree in May 2009. His project is the *Evaluation of XRD and Raman peak broadening in shock metamorphosed calcite and dolomite from selected carbonate target bolide impact structures.* His advisor is **Dr. Jared Morrow**. The purpose of the study is to determine if peak broadening observed on an XRD analysis curve, interpreted to be a manifestation of shock metamorphism, is unique to carbonate target rocks and if the pattern can be produced by a micro-Raman spectrometer. The impact structure sample analyses will be compared to carbonate samples from other natural, high pressure-temperature geological settings (faults, marbles, carbonatites, etc.) to provide a test that the peak broadening documented in known shocked carbonates from impact craters is a unique feature.

Ms. Abigail Stephens is working on her Masters at **Oregon State University**, under **Dr. John Dilles.** Dr. Dilles anticipates completion of the thesis by middle or late 2008. The thesis is entitled *The Lights Creek Stock copper deposits: porphyry copper or evaporitic-source copper iron-oxide mineralization.* The Lights Creek copper-bearing granitoid intrusion is located in the Plumas copper belt in the northern California Sierra Nevada, south of the Cascade Range, and just west of the Basin and Range physiographic region. Previously identified as a porphyry copper system on the basis of stockwork veinlets and veins in a granitic host, the mineral alteration assemblages and zonation in the stock differ significantly from classic porphyry systems and exhibit some characteristics of iron oxide-copper-gold systems. Field research will help decipher the current ambiguities.

Both applications were selected from a field of highly competitive and well designed submittals. Both thesis document creative approaches to several interesting geologic problems and will provide new data relevant to California geology and geology in general.

2007 – 2008 NCGS Richard Chambers Memorial Scholarship Awards - Ph.D. Degree

The **Northern California Geological Society** is pleased to announce one **$2,000 Ph.D. Degree Richard Chambers Memorial Award.** The scholarship was awarded in late February, and is named for former member Richard Chambers who provided a bequest to the NCGS several years ago. The application was selected from a field of highly competitive and well designed applications.

Ms. Beth Ann Wisely is working on her Ph.D. at the **University of Oregon** with **Dr. Katharine Cashman.** Her project, *Monitoring aquifer deformation in the Klamath Basin, Northern California: Remote*

characterization using InSAR and well level data, seeks to contribute to surface water and groundwater resource management in the Klamath basin of northern California and southern Oregon, a political hotbed issue for over a decade. As the result of recent droughts, increasing groundwater use in agricultural irrigation, and environmental legislation that has shifted the allocation of extracted groundwater towards replenishment and improvement of habitat for native fish species, a fierce struggle over water rights has developed between the local agricultural community and a unique alliance of Native Americans, fishing communities, and environmental interests. In October 2007, in accordance with legislative compromise, two miles of earthen dikes that had kept the Williamson River Delta drained for cultivation were destroyed. The farmland will be reclaimed as marshland habitat. As these types of changes occur, the need for a clear understanding of the hydrologic system becomes imperative.

She will be using an analysis technique developed at the University of Oregon principally for alluvial aquifer basins in a well-established plate boundary fault zones. The study will provide an opportunity to investigate the consistency of the method for use in aquifers comprised primarily of volcanic material, and located in a more dispersed and less studied tectonic province. If the relatively inexpensive analysis technique provides a consistent monitoring technique, or can be adapted to this setting, it could then be generally applied to other Pacific Northwest rural communities that rely heavily on groundwater resources, but that may not have the widely publicized environmental concerns of, or focus on, as the Klamath basin.

NO CHILD LEFT INSIDE

THE 2008 EARTH SCIENCE WEEK THEME

American Geological Institute (AGI)

"No Child Left Inside" will focus the nation on learning about the earth sciences in their natural setting, outside. Schoolchildren across the nation will turn off the TV and step away from their computers to discover the rocks, soil, watersheds, and weather patterns in their community.

"The best earth science classroom, any geoscientist will tell you, is the outdoors," says Ann E. Benbow, AGI Director of Education and Outreach. "We're encouraging students, teachers, and everyone interested in earth science to learn by experiencing it firsthand during Earth Science Week 2008. That means hiking over and digging into the Earth, taking water samples, making cloud observations, and more."

This year marks the 10th anniversary of Earth Science Week. Since the beginning, the event has grown dramatically, enabling more students to focus on the many aspects of the earth sciences and the various careers within the field.

AGI leads Earth Science Week annually in cooperation with its sponsors and the geosciences community as a service to the public. Each year, community groups, educators, and interested citizens organize celebratory events. Earth Science Week offers the public opportunities to discover the earth sciences and engage in responsible stewardship of the Earth. Earth Science Week is supported by the U.S. Geological Survey, the AAPG Foundation, and many other geoscience organizations.

To learn more about this week, ways to become involved; including newsletters, local events, and classroom activities, please go to the Earth Science Week website at:

http://www.earthsciweek.org. or
http://www.agiweb.org/direct/.

Gearing up Geothermal in the Coso Volcanic Range March 28-30, 2008 Field Trip

Text by Anne Sanquini
Photos and Figures courtesy Navy Geothermal Program Office

Against a backdrop of $100 per barrel oil prices (hey, it sounded astronomical at the time!) NCGS members car-pooled their way to east central California to visit the Coso Geothermal Field, situated within the China Lake Naval Air Weapons Station (NAWS). Andrew Sabin, Ph.D. (Andy), who worked in this area for many years and is currently on tap to become the director of the geothermal program, led us on a tour through young rhyolite domes, hissing fumaroles and boiling mud to view several operating geothermal plants and a new geothermal drill site. While the Navy is interested in testing weapons in the air at this location, geologists are interested in features on the ground and more specifically a couple of miles beneath the ground.

Initially developed in 1987, the Coso Geothermal Field today pulls geothermal energy from about 85 wells at any given time. These wells can be up to 20,000 feet deep, tapping into a large hot fluid reservoir that has developed within the granitic basement. Total output capacity of the geothermal field is currently over 270 megawatts, energy which is delivered to the Southern

California Edison power grid. According to this USGS circular, http://pubs.usgs.gov/circ/2004/c1249/c1249.pdf one megawatt can supply a community of 1,000 people. The plant enjoys over 98 percent on-line availability and since 1987 has delivered more than 26,000 gigawatt-hours of electricity.

The Coso Range is located in a transtensional setting east of the Sierra Nevada, north of the Garlock fault and southwest of the Walker Lane belt. The geothermal field itself is in a releasing step-over between the Little Lake fault and the Owens Valley fault, both active right lateral strike-slip faults systems. For more detail including a shaded relief and a structural map see this Geothermal Research Council bulletin http://wthermalww.geo.org/articles/coso.pdf

Our first stop was off Hwy 395, prior to getting to the Coso field. We climbed up the west side of the valley floor to see some spectacular pegmatite. Looking back east across the Indian Wells Valley provided a sweeping view of the Coso Volcanic Range.

After a mid-morning fuel stop at Coso Junction, we reduced the carpools to just three vehicles and entered the China Lake NAWS. Our first stop in the Coso field was at a viewpoint looking east where we could see many young rhyolite domes. Andy provided more detail on the geologic setting. Mesozoic plutonic and metamorphic rocks similar to those of the southern Sierra Nevada underlie the area. It is within these fractured rocks that the hot fluids are trapped. The basement rock is unconformably overlain by Pliocene volcanic rocks, which account for almost 90 percent of the total volume of volcanic rocks in this area. Finally, we have the bimodal Pleistocene/Holocene volcanism: basalt flows or high-silica rhyolite domes.

The next stop took us up-close to a dome where we scrambled about and examined the volcanic products. We then went on to a field overlooking one of four geothermal plants. We were next to the youngest rhyolite dome in the area and could see a well-preserved tuff ring around it. The top of the ring made a convenient location for one of the dirt roads leading towards the plant.

While at this viewpoint, we could see the basic parts of the plant including all the pipes leading from the wells to the plant, the turbine enclosures and the cooling towers. The process to create geothermal power initiates when fluids in liquid or steam phases are brought up from the fractured rock reservoir below. It is then flashed, or depressurized into steam. The steam drives a turbine that in turn drives an electrical generator. After using the hot fluids to generate electricity, the cooled fluids are then re-injected into the ground. This last step is very important, as most geothermal systems will run out of water long before they run out of heat from the magma below.

Since the area is tectonically active, with heat fairly close to the surface, Andy was able to show us surface expression of the faults. We crossed a linear feature that consisted of a series of small red mud volcanoes (erupting!), bubbly carbonate areas and streaks of burned vegetation. These marked the strike one of the many normal faults in the area.

A potential visit to another hot springs area was thwarted by a new gate-lock across a narrow road. After executing 17-point turnarounds, we headed off to investigate a large travertine outcrop.

Our last stop leaving the China Lake NAWS in the late afternoon was a viewpoint where we could see the backside of Red Hill cinder cone and the Sierra fault scarp across the valley floor. Most of the group went on to explore Fossil Falls, where the Owens River sculpted fantastic potholes and other curvy shapes in the basalt flows. Other side trips included a stop to investigate the colorful Ricardo Formation at Red Rock Canyon state park.

We wish to thank **Andy Sabin** for a most informative and jam-packed trip as well as **Mark Sorenson** for suggesting the field trip. We sincerely appreciate that he could take time on his Saturday to give us a tour and an understanding of the "geo" behind the "geothermal" of this area. We also thank **Rob Nelson** for handling trip logistics for this field trip.

Sierra Nevada Rose to Current Height Earlier than Thought - Implications for Modeling Global Climate

Stanford News Service,
News Release, April 23, 2008
Dr. Andreas Mulch,
Hannover University, Germany

Geologists studying deposits of volcanic glass in the western United States have found that the central Sierra Nevada largely attained its present elevation 12 million years ago, roughly 8 or 9 million years earlier than commonly thought.

The finding has implications not only for understanding the geologic history of the mountain range but for modeling ancient global climates.

"All the global climate models that are currently being used strongly rely on knowing the topography of the Earth," said Andreas Mulch, who was a postdoctoral scholar at Stanford when he conducted the research. He is the lead author of a paper published this week in the online *Early Edition of the Proceedings of the National Academy of Sciences*.

A variety of studies over the last five years have shown that the presence of the Sierra Nevada and Rocky Mountains in the western United States has direct implications for climate patterns extending into Europe, Mulch said.

"If we did not have these mountains, we would completely change the climate on the North American continent, and even change mean annual temperatures in central Europe," he said. "That's why we need to have some idea of how mountains were distributed over planet Earth in order to run past climate models reliably." Mulch is now a professor of tectonics and climate at the University of Hannover in Germany.

Mulch and his colleagues, including Page Chamberlain, a Stanford professor of environmental earth system science, reached their conclusion about the timing of the uplift of the Sierra Nevada by analyzing hydrogen isotopes in water incorporated into volcanic glass.

They analyzed volcanic glass at sites from the Coast Ranges bordering the Pacific Ocean, across the Central Valley and the Sierra Nevada and into the Basin and Range region of Nevada and Utah.

The ratio of hydrogen isotopes in the glass reflects changes that occurred to the water vapor content of air over the Pacific Ocean as it blew onto the continent and crossed the Sierra Nevada. As the air gains elevation, it cools, moisture concentrates and condenses, and it rains. Water containing heavier isotopes of hydrogen tends to fall first, resulting in a systematic decrease in the ratio of heavy water molecules to lighter ones in the remaining water vapor.

Because so much of the airborne moisture falls as rain on the windward side of the mountains, land on the leeward side gets far less rain—an effect called a "rain shadow"—which often produces a desert.

The higher the mountain, the more pronounced the rain shadow effect is and the greater the decrease in the

number of heavy hydrogen isotopes in the water that makes it across the mountains and falls on the leeward side of the range. By determining the ratio of heavier to lighter hydrogen isotopes preserved in volcanic glass and comparing it with today's topography and rainwater, researchers can estimate the elevation of the mountains at the time the ancient water crossed them.

Volcanic glass is an excellent material for preserving ancient rainfall. The glass forms during explosive eruptions, when tiny particles of molten rock are ejected into the air. "These glasses were little melt particles, and they cooled so rapidly when they were blown into the atmosphere that they just froze, basically," Mulch said. "They couldn't crystallize and form minerals."

Because glass has an amorphous structure, as opposed to the ordered crystalline structure of minerals, there are structural vacancies in the glass into which water can diffuse. Once the glass has been deposited on the surface of the Earth, rainwater, runoff and near-surface groundwater are all available to interact with it. Mulch said the diffusion process continues until the glass is effectively saturated with water.

Other researchers have shown that once such volcanic glass is fully hydrated, the water in it does not undergo any significant isotopic exchange with its environment. Thus, the trapped water becomes a reliable record of the isotopic composition of the water in the environment at the time the glass was deposited.

"It takes probably a hundred to a thousand years or so for these glasses to fully hydrate," Mulch said. But 1,000 years is the blink of an eye in geologic time and, for purposes of estimating the timing of events that occur on scales of millions or tens of millions of years, that degree of resolution is quite sufficient.

Likewise, you need deposits of volcanic ash that were laid down relatively quickly over a broad area. But that's the norm for explosive eruptions. Though some ash may circulate in the upper atmosphere for a few years after a major eruption, significant quantities are generally deposited over vast areas within days.

The samples they studied ranged from slightly more than 12 million years old to as young as 600,000 years old, a time span when volcanism was rampant in the western United States owing to the ongoing subduction of the Pacific plate under the continental crust of the North American plate.

"As we use these ashes that are present on either side of the mountain range, we can directly compare what the water looked like before and after it had to cross this barrier to atmospheric flow," Mulch said. "If you just stay behind the mountain range, you see the effect of the rain shadow, but you have to make inferences about where the water vapor is coming from, what happened to the clouds before they traveled across the mountain range.

"For the first time, we were able to document that we can track the [development of the] rain shadow on both sides of the mountain range over very long time scales."

Until now, researchers have been guided largely by "very good geophysical evidence" indicating that the range reached its present elevation approximately 3 or 4 million years ago, owing to major changes in the subsurface structure of the mountains, Mulch said.

"There was a very dense root of the Sierra Nevada, rock material that became so dense that it actually detached and sank down into the Earth's mantle, just because of density differences," Mulch said. "If you remove a very heavy weight at the base of something, the surface will rebound."

The rebound of the range after losing such a massive amount of material should have been substantial. But, Mulch said, "We do not observe any change in the surface elevation of the Sierra Nevada at that time, and that's what we were trying to test in this model."

However, Mulch said he does not think his results refute the geophysical evidence. It could be that the Sierra Nevada did not evolve uniformly along its 400-mile length, he said. The geophysical data indicating the loss of the crustal root is from the southern Sierra Nevada; Mulch's study focused more on the northern and central part of the range. In the southern Sierra Nevada, the weather patterns are different, and the rain shadow effect that Mulch's approach hinges on is less pronounced.

"That's why it's important to have information that's coming from deeper parts of the Earth's crust and from the surface and try to correlate these two," Mulch said. To really understand periods in the Earth's past where climate conditions were markedly different from today, he said, "you need to have integrated studies."

The research was funded by the National Science Foundation. (*The editor also thanks member John Christian for forwarding this article*.)

// NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS

By Popular Demand!

THE SECOND NCGS FIELD TRIP TO THE WILSON GROVE & PETALUMA FORMATIONS, SONOMA COUNTY, CA

Saturday June 28, 2008

Leaders: James Allen, MS, PG, Dept. of Earth and Environmental Science, CSU East Bay
Peter Holland, CEG, Vector Engineering

The Petaluma Formation, located in Sonoma County, California, is a Late Miocene to Late Pliocene nonmarine formation with important, recently identified marine interbeds. The formation is located in Sonoma County, California. The formation was originally divided into two members. After further study, we have divided the formation into three informal members based on lithology. The "lower" member is predominantly shale with both nonmarine and newly discovered marine microfauna. This member is prone to sliding. The "middle" member is predominantly conglomerate derived from Franciscan sources, the upper member is conglomerate derived, in part, from the Monterey Group of the East Bay area. Understanding of the three members allows for stratigraphic correlation in areas of poor exposure, such as in core data from the Santa Rosa valley. Other fluvial, conglomeratic formations in the North Bay are the volcaniclastic Huichica and Glen Ellen formations, both younger than the Petaluma. The Petaluma intertongues with the coeval Wilson Grove Formation to the west and both, as a continuous through-going fluvial- to marine system, have been offset from units with identical age, lithologies and source rocks east of the Hayward fault.

The Petaluma Formation has been the focus of geologists' attention for over a century. In the early part of last century, oil was discovered in structural traps east of Adobe Road and there are still active oil seeps in that area, for example at Lynch Creek. Some ranchers near the oil field area have reported hydrocarbon abundance in their groundwater wells, forcing them to abandon the water wells. There are also a number of natural gas wells in the Cotati Gas Field within the paleo-shoreline area where the Wilson Grove is interbedded with the Petaluma. There have been numerous nonmarine and marine microfossil, invertebrate and vertebrate fossils recovered from both the Wilson Grove and Petaluma formations as well. Marine microfauna in the "lower" shale of the Petaluma potentially may shed light on sources of oil. Diatomite analysis reveals new information about the "upper" member of the Petaluma.

The interbedded nature between the Petaluma and Wilson Grove formations has been difficult to understand by previous researchers. This is due in large part to poor exposures. Also, the Wilson Grove formation is largely flat lying with relatively minor deformation affecting it, while the Petaluma Formation has been highly folded and faulted and is overlain in many places by equally deformed Sonoma Volcanics and underlain by Donnell Ranch Volcanics. The geographical location the Petaluma Formation roughly coincides with the major strike-slip fault system in the North Bay, which has led others to erroneously believe that the Petaluma is an older, more deformed formation relative to the Wilson Grove. New paleontological and radiometric data helps to further constrain stratigraphic relationships between both formations.

Some items we will address on the field trip will be the "type" lithology and stratigraphy of the Petaluma Formation in the Cotati area. From there, we will determine stratigraphic position of spotty outcrops exposed between Cotati, Sonoma Mountain and Sonoma Valley based on the "type" section in Cotati. Items to discuss will be strike-slip displacement, source rocks and location of active faulting.

***Field Trip Logistics**

THIS FIELD TRIP WILL BE LIMITED TO 30 PEOPLE. Time & Departure: 8:30 A.M. <u>Sharp!</u> Cost: $25/person

We will meet at the **Southbound** Park and Ride lot at Highway 101 and Rohnert Park Expressway, in Rohnert Park. Take the Rohnert Park Expressway exit. There are northbound and southbound lots; go to the smaller lot on the **west** side of Highway 101. We will try to consolidate into as few cars as possible and **leave at 8:30 sharp**. Bring boots; the first exposure is about a 1/4 mile hike across a grassy hillside. We should finish by 4:00 PM. **Call me on my cell phone at 707-548-3268 if you have any problems.**

**********************Registration Form (Wilson Grove & Petaluma Formation 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. Parking onsite is very limited. Please let us know if you can provide a van and NCGS can reimburse your gasoline expenses.**

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

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY

NCGS FIELD TRIP IN COMMOMERATION OF 1868 HAYWARD EARTHQUAKE

FIELD TRIP TO THE CALAVERAS FAULT IN SANTA CLARA COUNTY, CALIFORNIA

Saturday August 23, 2008

Leaders:

Dr. Philip Stoffer, U.S. Geological Survey, Menlo Park
Dr. Richard Sedlock, San Jose State University, San Jose

This field trip is to examine the geology and landscape features of the central Calaveras Fault along the western flank of the Diablo Range in Santa Clara County. The field trip will include stops in the morning at Coyote Lake-Harvey Bear Ranch County Park (near Gilroy) and in the afternoon at Anderson County Park (near Morgan Hill). Features at Coyote Lake include rift zone geomorphic features associated with the active trace of Calaveras Fault, and a variety of rock types including Late Miocene volcanic rocks (some containing mantle-derived crystals), serpentinite, Mesozoic-age conglomerate, and other sedimentary rocks and landslide deposits. The trip to Anderson Reservoir Park will provide access to more views of the central Calaveras Fault, plus other faults, Franciscan rocks, serpentinite and calci-silicate mineralization. Both parks have high earthen dams constructed on Coyote Creek. The two parks also offer spectacular scenery and the opportunity to observe a variety of wildlife. Be prepared to do moderate hikes totaling several miles over the course of the day. Reservations for camping can be made on a first come, first serve basis at the Coyote Lake Campground (in the park) through www.parkhere.org.

THIS FIELD TRIP WILL BE LIMITED TO 30 PEOPLE.

********** **Field Trip Logistics** **********

Time & Departure: August 23, 2008, 8:30 am (sharp), at entrance to the Coyote Lake-Harvey Bear Ranch County Park.

Cost: $25/person (includes guidebook, lunch, refreshments, soft drinks)

We strongly suggest car pooling. **We will send attendees list to each participant**

**********REGISTRATION FORM (Calaveras Fault Field Trip)**********

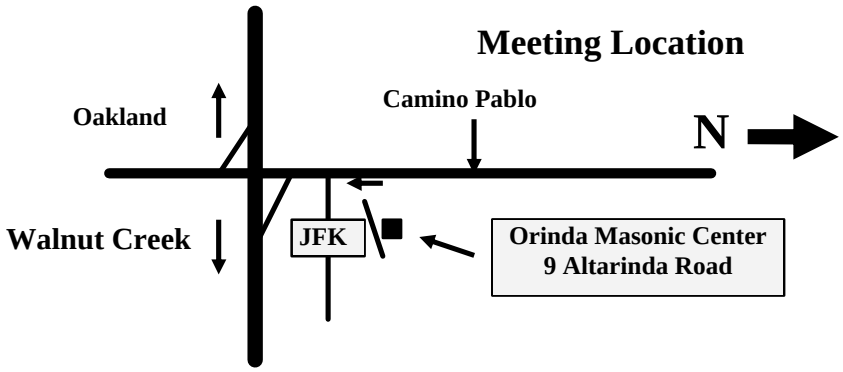
Name:_____ E-mail:_____

Address:_____ Phone (day):_____ Phone (evening):_____

Lunch: Regular:_____ Vegetarian: _____ (Please check one) Check Amount: _____

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

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



Biography: Dr. John Tinsley has been based for 35+ years at the U.S. Geological Survey, Menlo Park, California. A research geologist for the Earthquake Hazards Team, he specializes in Quaternary stratigraphy and the analysis of sedimentary basins, and maps the geologic underpinnings of the dual earthquake hazards of liquefaction and strong ground motion. His most recent endeavors include interpreting the sequence stratigraphy of the Dominguez Gap area, Los Angeles, and characterizing the regional geology of southern California for landslide and liquefaction susceptibility analyses as a part of the Multi-Hazards Demonstration Project's Magnitude 7.8 Scenario Earthquake on the southern San Andreas Fault.

However, John also has conducted a simultaneous and semi-secret life as a speleologist for nearly 35 years. He coordinates the southern California arm of the non-profit Cave Research Foundation and coordinates the Sequoia and Kings Canyon Cave Research Operations. He administered the Foundation's Karst Research Fellowship from 1982-1998 and has served on the Board of Directors and as Secretary of the Cave Research Foundation. He is a Fellow and Life Member of the National Speleological Society, and a past Chairman of the San Francisco Bay Chapter of the NSS, a local caving club of about 80 members. Tonight he will share with us interpretations of active karst processes from cave studies at Lilburn Cave and selected insights that his and others' research in other caves of the region reveal about the Southern Sierra Nevada's geologic history.

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 dandav94@pacbell.net to sign up for this free service.