

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



Website: www.ncgeolsoc.org

NCGS OFFICERS

President:

Mark Sorrensen,
msorensen@itsi.com
Innovative Technical Solutions, Inc.

President-Elect:

Open

Field Trip Coordinator:

John Christian,
jmc62@sbcglobal.net
Patent Legal Assistant

Treasurer:

Phil Reed, philecreed@yahoo.com
Consultant

Program Chair:

Tom Barry,
Tom.Barry@shawgrp.com
Shaw Group, Inc.

Scholarship:

Phil Garbutt,
plgarbutt@comcast.net
Retired, Cal State East Bay

K-12 Programs:

Paul Henshaw,
candphenshaw@comcast.net
Retired, K-12 education

Membership:

Rob Nelson,
rlngeology@sbcglobal.net
Clearwater Group, Inc.

NCGS Newsletter & Website Editor:

Mark Detterman
mdetter1@gmail.com
Alameda County Environ. Health

Secretary:

Dan Day: dandav94@pacbell.net
NCGS Voice Mail: 925-424-3669
VA Engineering, Inc.

COUNSELORS

Mel Erskine,

mcerskine@comcast.net
Consultant

Tridib Guha,

Tridibguha@sbcglobal.net
Advanced Assessment Services, Inc.

Don Lewis, donlewis@comcast.net

Consultant

Ray Sullivan,

sullivan@lucasvalley.net
Emeritus, San Francisco State University

MEETING ANNOUNCEMENT

DATE: May 26, 2010

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

TIME: **ANNUAL DINNER MEETING**

6:00 p.m. SOCIAL HOUR; 7:00 p.m. DINNER;

8:00 TALK Cost: \$20 per regular member

- **Please note earlier start time!**
- **Walk-ins cannot be accommodated!**
- **Please reserve by Friday May 21st!**

Dr. Carol Prentice, USGS, Menlo Park

SPEAKER: *The Haiti Earthquake of 12 January 2010: A Geologic Perspective*

The M7.0 earthquake that occurred in Haiti last January produced unprecedented destruction given the size of the earthquake. It caused more than twice as many casualties as any previous M7 earthquake of any size since 1900. The tectonic setting of Hispaniola, the island shared by the nations of Haiti and the Dominican Republic, within the plate-boundary zone between the Caribbean and North American plates guarantees that future large earthquakes are inevitable. There are three major structures that take up plate-boundary slip in the vicinity of Hispaniola, and likely many other poorly known secondary faults that are capable of producing large, potentially damaging earthquakes. Geologic investigations indicate that the 12 January earthquake was a complex event, causing coastal uplift and only minor surface rupture along a short section of the major fault in southern Haiti. The details of the 12 January event held many surprises from a scientific perspective, but the inevitability of earthquakes this size in this region is no surprise, and the tragic loss of life due to poor construction practices is also no surprise.

Biography: Carol Prentice received both MS and Ph. D. degrees in Geoscience from the California Institute of Technology, and her B. A. degree in Geology from Humboldt State University. Dr. Prentice taught earth science for three years at the high-school level after college and before entering graduate school. She is currently a research geologist at the U.S. Geological Survey, and is the project chief for the San Francisco Bay Area Earthquake Hazards Project. Carol's research involves the geologic study of active faults in northern California, the Caribbean, and Asia.

NCGS 2009 – 2010 Calendar

Wednesday May 26, 2010

SPECIAL DINNER MEETING!!

The Haitian Earthquake

(Tentative; Carol is still in Haiti)

Dr. Carol Prentice, USGS, Menlo Park

6:00 pm at Orinda Masonic Lodge (**EARLY**)

Wednesday June 30, 2010

Dr. Jacob Covault; Clastic Stratigraphy R&D,
Chevron, San Ramon

*Natural “Laboratories” of Southern
California: Integrated Methodologies to
Predict Coarse-Grained Sediment Flux to the
Deep Sea*

7:00 pm at Orinda Masonic Lodge

Our Usual Summer Break: July – August 2010

Upcoming NCGS Field Trips

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 John Christian at: jmc62@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. Please check the website for current details.

- June 1, 2010, Victoria Langenheim, Presidential address

Association of Engineering Geologists San Francisco Section

Upcoming meetings

Meeting locations rotate between San Francisco, the East Bay, and the South Bay. Please check the website for current details:

- June 8, 2010, John Wakabayashi
- July 13, 2010, Jordana Jackson, Bay Bridge Seismic Retrofit Project

To download meeting details and registration form go to: <http://www.aegsf.org/>.

USGS Evening Public Lecture Series

The USGS Evening Public Lecture Series events are free and are intended for a general public audience that may not be familiar with the science being discussed. Monthly lectures are usually scheduled for the last Thursday evening of each month during most of the year but are occasionally presented on the preceding Thursday evening to accommodate the speakers. For more information on the lectures, including a map of the lecture location (Building 3, 2nd floor; Conference Room A) go to:

<http://online.wr.usgs.gov/calendar/>

- May 27, 2010; 7:00 pm, USGS Ecologist Todd Esque & Wildlife Biologist Ken Nussear, *The Heat is On – Desert Tortoise & Survival*

Update on the BGG

Tom Berry (NCGS Programs Chair and former Board of Geology and Geophysicists (BGG) Examination Committee Member) reports that at the Board of Professional Engineers and Land Surveyors (BPELS) meeting in Sacramento on May 5th, the Board voted to establish a Geologists and Geophysicists Technical Advisory Committee (G&G TAC). Five Geologists including Tom were appointed to the G&G TAC.

K-12 NCGS/AAPG California Geologic Map Program

Paul Henshaw, Chair NCGS K – 12 Programs

The NCGS board voted to provide \$500 seed funding to initiate a California Map Program for K-12 schools in Northern California. In addition, Don Lewis led our effort to obtain \$3,000 in start-up funding from the AAPG Foundation. Additionally the California Geological Survey donated 150 copies of their 20-inch by 23-inch Simplified Geologic Map of California. We are currently working with the Bay Area Earth Science Institute (www.baesi.org) and their K-12 Science Teacher Workshop Program. The map program is inspired by the Geologic Maps in Schools program (<http://www.aapg.org/k12resources/>) initiated by Owen Hopkins of the Corpus Christi Geologic

Society (<http://www.ccgeo.org/phase1.asp>). That program mounts and frames geologic maps of the United States and has been funded by the Corpus Christi society, GCAGS, AAPG and \$26,000 from the Foundation. Given the great variability of California geology and the high local interest in geologic hazards associated with our geology, we will be using the Simplified Geologic Map of California rather than a United States map. This will be much more meaningful to our K-12 students. Dave Miner of the San Joaquin Geologic Society in Bakersfield is also distributing California maps to teachers for the same reasons. Copies of the donated map can be downloaded at the CGS web page: <http://www.conservation.ca.gov/cgs/information/publications/ms/Documents/MS057.pdf>

Initial distribution of maps and map work sets will be through BAESI Workshops for K-12 teachers, starting May 2010. Materials distributed include a mounted/laminated 20 X 23 map (see figure), a set of questions for the teachers' use in their lesson plans and laminated, letter-sized maps, with more detailed geologic timescale, for student teams to use during the map session. During the BAESI Workshop, the teachers will learn about the maps and key elements of California geology. NCGS personnel will also inform the teachers that NCGS members are willing to assist in their classrooms during the California Map exercises. If you have questions about the program please contact Paul Henshaw (candphenshaw@comcast.net) or Don Lewis (donlewis@comcast.net).

Asphalt Volcanoes Discovered Off Santa Barbara's Coast

Scientific Blogging

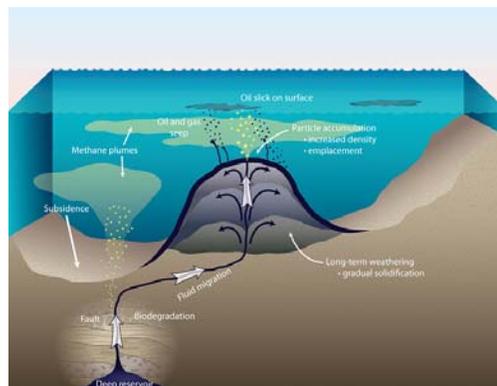
Scientists have discovered a series of 400,000-year-old asphalt volcanoes about 10 miles off the California coast, at the bottom of the Santa Barbara Channel.

The largest of these undersea Ice Age domes lies at a depth of 700 feet (220 meters), too deep for scuba diving, which explains why the volcanoes have never before been spotted by humans. The discovery is documented this week in *Nature Geoscience*.

"They're larger than a football-field-long and as tall as a six-story building," says David Valentine, a geoscientist at University of California, Santa Barbara. "They're massive features, and are made completely out of asphalt."

Researchers first viewed the volcanoes during a 2007 dive on the research submersible Alvin. Using the sub's robotic arm, the researchers broke off

samples and brought them to labs at UCSB and WHOI for testing.



Schematic diagram highlighting the formation of an asphalt volcano and the associated release of oil and methane to the surrounding environment.

(Illustration by Jack Cook, Woods Hole Oceanographic Institution)

In 2009, the team made two more dives to the area in Alvin. They also conducted a detailed survey of the area using an autonomous underwater vehicle, Sentry, which takes photos as it glides about nine feet above the ocean floor.

"When you 'fly' Sentry over the sea floor, you can see all of the cracking of the asphalt and flow features," says Valentine. "All the textures are visible of a once-flowing liquid that has solidified in place. "That's one of the reasons we're calling them volcanoes, because they have so many features that are indicative of a lava flow."

Tests showed that these aren't your typical lava volcanoes, however, found in Hawaii and elsewhere around the Pacific Rim.

Using a mass spectrometer, carbon dating, microscopic fossils, and comprehensive, two-dimensional gas chromatography, the scientists determined that the structures are asphalt. They were formed when petroleum flowed from the sea-floor about 30,000-40,000 years ago.

Chris Reddy, a scientist at WHOI and a co-author of the paper, says that "the volcanoes underscore a little-known fact: half the oil that enters the coastal environment is from natural oil seeps like the ones off the coast of California."

The researchers also determined that the volcanoes were at one time a prolific source of methane.

The two largest volcanoes are about a kilometer apart and have pits or depressions surrounding them. These pits, according to Valentine, are signs of "methane gas bubbling from the sub-surface." That's not surprising, he says, considering how much

petroleum was flowing there in the past. "They were spewing out a lot of petroleum, but also lots of natural gas," he says, "which you tend to get when you have petroleum seepage in this area."

The discovery that vast amounts of methane once emanated from the volcanoes caused the scientists to wonder if there might have been an environmental impact on the area during the Ice Age. "It became a dead zone," says Valentine. "We're hypothesizing that these features may have been a major contributor to those events."

While the volcanoes have been dormant for thousands of years, the 2009 Alvin dive revealed a few spots where gas was still bubbling.

"We think it's residual gas," says Valentine, who added that the amount of gas is so small it's harmless, and never reaches the surface.

Citation: David L. Valentine et al., 'Asphalt volcanoes as a potential source of methane to late Pleistocene coastal waters', *Nature Geoscience*, April 2010; doi:[10.1038/ngeo848](https://doi.org/10.1038/ngeo848) [Letter](#)

The Volcano Explosion Intensity Scale and Super Eruptions

John Carter, September 16, 2008
Eruptions Richter Scale

Like many other natural disasters, volcanic explosions have been given numbers to measure the intensity of their eruptions. The scale is called the "Volcanic Eruption Intensity" scale (VEI). The VEI goes from "0" to "8" according to intensity. "0" is a volcano that doesn't display any explosive action such as Mona Loa on the island of Hawaii. The lava from this volcano is so fluid that explosive eruptions are rare or nonexistent. A volcanic eruption of "8" intensity is so powerful that you don't want to be around when one occurs.

There are any numbers of ways that a volcano can explode, but the most common way is simply the viscosity of the lava being produced. The more vicious lava is the more gas it can entrain; the more gas entrained the more explosive it becomes. The VEI scale works exactly the same as the Richter scale does, for each increase of a whole number the explosion is 10 times greater. In effect the scale is open ended with the largest explosion found in the geologic column is rated at VEI 9.1. This was a volcano named "La Garita" that is in the San Juan Mountains in the southwest corner of Colorado. It erupted as a caldera eruption in one blast it ejected more than 1,200 cubic miles of tuff; enough to fill Lake Michigan to overflowing.

More and more supervolcanos are being discovered by geological mapping. They are a worldwide phenomena present us with a danger of unprecedented proportions. A most likely scenario is that Yellowstone Park is apt to explode as a supervolcano as it has done in the past. On a schedule of an explosion every 600,000 years it is past due.

The VEI scale (Magnitude, Description, Plume, Ejecta, Frequency, Example):

- 0 - Nonexplosive, >1000 m³, Daily, Mauna Loa
- 1 - Gentle, 100-1000m, 10,000m³, Daily, Nyiragongo
- 2 - Explosive, 1-5 Km, 1 million m³, Weekly, Unzen
- 3 - Severe, 3-15 Km, 10 million m³, Yearly, Nev. del Ruiz
- 4 - Cataclysmic, 10-25 km, >0.1 Km³, Decades, Galunggung
- 5 - Pyroxysmal, >25 Km, >1 Km³, Centuries, St. Helens
- 6 - Colossal, >25 Km, >10 Km³, Centuries, Krakatau
- 7 - Supercolossal, >25 Km, >100 Km³, Millennia, Tambora
- 8 - Megacolossal, >25 Km, >1000 Km³, +10,000s, Mt. Toba
- 9 - Gigacolossal, >25 Km, >10,000 Km³, +1 million, La Garita

Video of Seiche in Devils Hole Pupfish Pond

April 27, 2010

The USGS has released a video montage from two surveillance cameras that captured the violent shaking from the M7.2 Baja (El Mayor - Cucapah) quake, creating a seiche in the Devils Hole pupfish pond in Death Valley National Park. The description from the USGS news release says,

For tiny Devils Hole pupfish, startling [video](#) shows it must have felt like a "huge tsunami" when violent water-level oscillations from an earthquake 300 miles away disturbed the small ledge they live on in a single Mojave Desert cavern pool for some 15 minutes.

These water-level oscillations in the cavern in Death Valley National Park were caused by the magnitude 6.9 Baja California earthquake and an immediate aftershock that occurred on April 4.

The [video](#) from four U.S. Geological Survey cameras shows significant water-level oscillations, causing great disturbance to the shallow feeding and spawning shelf critical for the continued existence of these fish, said Ambre Chaudoin, a graduate student

in fisheries with the USGS Arizona Cooperative Fish and Wildlife Research Unit at the University of Arizona, Tucson.

"The shelf substrate sediment was largely redistributed as a result of the water oscillations," said Chaudoin.

How Old Is The Grand Canyon?

Scientific Blogging

New geological evidence radiometric dating indicates the Grand Canyon may be so old that dinosaurs once lumbered along its rim, pushing back its assumed origins by 40 million to 50 million years.

The researchers from the University of Colorado at Boulder and the California Institute of Technology gathered evidence from rocks in the canyon and on surrounding plateaus that were deposited near sea level several hundred million years ago before the region uplifted and eroded to form the canyon.

"As rocks moved to the surface in the Grand Canyon region, they cooled off," said CU-Boulder geological sciences Assistant Professor Rebecca Flowers. "The cooling history of the rocks allowed us to reconstruct the ancient topography, telling us the Grand Canyon has an older prehistory than many had thought."

The team believes an ancestral Grand Canyon developed in its eastern section about 55 million years ago, later linking with other segments that had evolved separately. "It's a complicated picture because different segments of the canyon appear to have evolved at different times and subsequently were integrated," Flowers said.

The ancient sandstone in the canyon walls contains grains of a phosphate mineral known as apatite -- hosting trace amounts of the radioactive elements uranium and thorium -- which expel helium atoms as they decay, she said. An abundance of the three elements, paired with temperature information from Earth's interior, provided the team a clock of sorts to calculate when the apatite grains were embedded in rock a mile deep -- the approximate depth of the canyon today -- and when they cooled as they neared Earth's surface as a result of erosion.

Apatite samples from the bottom of the Upper Granite Gorge region of the Grand Canyon yield similar dates as samples collected on the nearby plateau, said Caltech's Wernicke. "Because both canyon and plateau samples resided at nearly the same depth beneath the Earth's surface 55 million

years ago, a canyon of about the same dimensions of today may have existed at least that far back, and possibly as far back as the time of dinosaurs at the end of the Cretaceous period 65 million years ago."

One of the most surprising results from the study is the evidence showing the adjacent plateaus around the Grand Canyon may have eroded away as swiftly as the Grand Canyon itself, each dropping a mile or more, said Flowers. Small streams on the plateaus appear to have been just as effective at stripping away rock as the ancient Colorado River was at carving the massive canyon.

"If you stand on the rim of the Grand Canyon today, the bottom of the ancestral canyon would have sat over your head, incised into rocks that have since been eroded away," said Flowers. The ancestral Colorado River was likely running in the opposite direction millions of years ago, she said.

When the canyon was formed, it probably looked like a much deeper version of present-day Zion Canyon, which cuts through strata of the Mesozoic era dating from about 250 million to 65 million years ago, Wernicke said. From 28 million to 15 million years ago, a pulse of erosion deepened the already-formed canyon and also scoured surrounding plateaus, stripping off the Mesozoic strata to reveal the Paleozoic rocks visible today, he said.

The prevailing belief is that the canyon was incised by an ancient river about six million years ago as the surrounding plateau began rising from sea level to the current elevation of about 7,000 feet. The new scenario described in the GSA Bulletin by Flowers and her colleagues is consistent with recent evidence by other geologists using radiometric dating techniques indicating the Grand Canyon is significantly older than scientists had long believed.

A paper on the subject will be published in the May issue of the Geological Society of America Bulletin. Flowers collaborated with Caltech geology Professor Brian Wernicke and Caltech geochemistry Professor Kenneth Farley on the study.

The National Science Foundation and Caltech funded the study.

As usual of late, the editor sincerely thanks John Christian for suggesting more than several of these articles for the newsletter! Please thank him for spotting some of these gems!

Geologists: 'We May Be Slowly Running Out Of Rocks'

MAY 1, 2010

RALEIGH, NC—A coalition of geologists are challenging the way we look at global stone reserves, claiming that, unless smarter methods of preservation are developed, mankind will eventually run out of rocks.

Geologists theorize that areas like this may have once been filled with rocks.

"If we do not stop using them up at our current rate, rocks as we know them will be a thing of the past," renowned geologist Henry Kaiser said at a press conference Tuesday. "Igneous, metamorphic, even sedimentary: all of them could be gone in as little as 500,000 years."



"Think about it," Kaiser added. "When was the last time you even saw a boulder?"

The scientists warned that, although people have long considered the world's rock supply to be inexhaustible, it has not created a significant number of new rocks since the planet cooled some 3.5 billion years ago. Moreover, the earth's rocks have been very slowly depleting in the last century due to growing demand for fireplace mantels, rock gardens, gravel, and paperweights.

Kaiser claims that humanity has "wreaked havoc" on the earth's stones by picking them up, carrying them around, and displacing them from their natural habitat.

"A rock can take millions of years to form, but it only takes a second for someone to skip a smooth pebble into a lake, and then it is gone." Dr. Kaiser

said. "Perhaps these thoughtless rock-skippers don't care if they leave our planet completely devoid of rocks, but what about our children? Don't they deserve the chance to hold a rock and toss it up and down a few times?"

Continued Kaiser, "We are on a collision course to a world without rocks."

Geologist Victoria Merrill, who has been at the forefront of the rock conservation battle since 2004, said there are simple steps people can take to reduce their rock consumption.

"Only take as many rocks as you absolutely need," said Dr. Merrill, author of the book *No Stone Unturned: Methods For Modern Rock Conservation*. "And once you are finished with your rocks, do not simply huck them into the woods. Place the rock down gently where you found it so that others may look at the rock and enjoy it for years to come."

Merrill went on to point out that, even if there were some "magic hole" in the earth's crust that could miraculously spew out rocks every 10 years or so, modern society's obsession with rocks means that we would still run out of them far more quickly than they could be replenished.

"Just look at the pet rock craze: In 10 years, millions upon millions of rocks were painted, played with, and discarded like trash," Merrill said. "Looking back, mankind's arrogance and hubris is startling."

But critics of the movement have already begun to surface, claiming that Kaiser and his colleagues are simply preying on people's fears of losing rocks.

While acknowledging that we should reduce our dependence on foreign rocks, many have argued that the current rock supply could easily last for the next 2 million years, by which time technology will have advanced enough to allow for the production of endless quantities of cheap, durable basalt.

Others who oppose the rock-loss theory claim that rocks were put on the earth to be used by humans in marble statues or kitchen countertops as they see fit.

"Take the Rocky Mountains, for example: There's plenty of rocks right there," Colorado resident Kyle Peters said. "It's our right as Americans to use as many rocks as we need for whatever purposes we decide, and no scientist is going to scare me into thinking otherwise."

"This country was built on rocks," he added. "Remember that."

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



NCGS DINNER - MEETING

The Haiti Earthquake of 12 January 2010: A Geologic Perspective
Wednesday May 26, 2010

Speaker: Dr. Carol Prentice, U.S. Geological Survey, Menlo Park
6:00 pm at Orinda Masonic Center

(Reservations are required by May 21, 2010)

We are sorry but we will not be able to accommodate "walk-ins"

Stepping out of our normal routine, the **Northern California Geological Society** is pleased to announce this *special dinner and evening* with **Dr. Carol Prentice**. She just returned from four weeks of fieldwork in Haiti in late March. For this special event, planned for our normal monthly meeting date, but starting one-half hour early, we are planning in typical NCGS style, a Back Forty Texas BBQ dinner consisting of **Pork Ribs and BBQ Chicken, Tossed Green Salad, BBQ Beans, Fresh Corn Cobettes**. For vegetarian dinners deluxe veggie burger will be served in place of BBQ. Desert will include assorted cookies and brownies. We may be again serving wines from BevMo specials (90 pts +). Please also note that a vegetarian option is available if notified ahead (see registration form below).

Abstract: The Haiti Earthquake of 12 January 2010: A Geologic Perspective

The M7.0 earthquake that occurred in Haiti last January produced unprecedented destruction given the size of the earthquake. It caused more than twice as many casualties as any previous M7 earthquake of any size since 1900. The tectonic setting of Hispaniola, the island shared by the nations of Haiti and the Dominican Republic, within the plate-boundary zone between the Caribbean and North American plates guarantees that future large earthquakes are inevitable. There are three major structures that take up plate-boundary slip in the vicinity of Hispaniola, and likely many other poorly known secondary faults that are capable of producing large, potentially damaging earthquakes. Geologic investigations indicate that the 12 January earthquake was a complex event, causing coastal uplift and only minor surface rupture along a short section of the major fault in southern Haiti. The details of the 12 January event held many surprises from a scientific perspective, but the inevitability of earthquakes this size in this region is no surprise, and the tragic loss of life due to poor construction practices is also no surprise.

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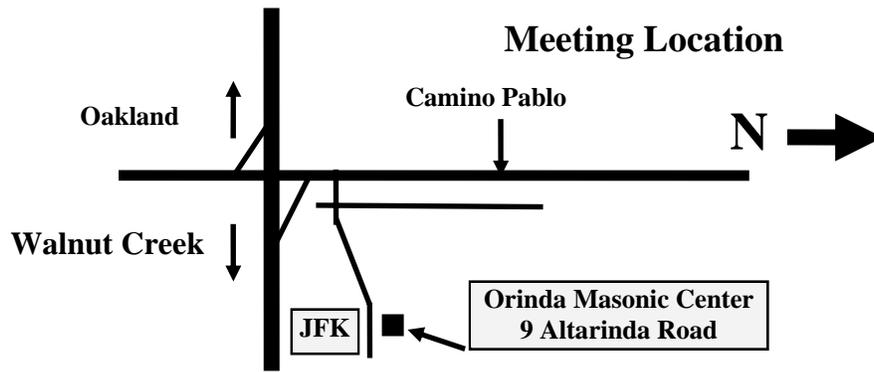
***** Dinner Logistics *****

Meeting Details: Social Hour: 6:00 – 7:00 pm; Dinner: 7:00 – 8:00 pm Presentation: 8:00 – open
Time: May 26, 2010, 6:00 pm, Orinda Masonic Center 9 Altarinda Road, Orinda, CA. **Cost:** \$20/person

*****REGISTRATION FORM (Dr. Carol Prentice Dinner)*****

Name: _____ E-mail: _____
Phone (day): _____ Phone (cell) _____ 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 Phone: (925) 370-0685 (evening) (925) 691-9002 (day)



NCGS DINNER - MEETING

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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 to sign up for this free service.