

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



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MEETING ANNOUNCEMENT

DATE: February 25, 2009

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. Richard B. Firestone**
Lawrence Berkeley National Laboratory

Mammoths, Meteorites, and Supernovae

We have discovered a thin layer at 10 Clovis-age sites across North America and into Europe dating to 12.9 kyr containing magnetic microspherules and grains enriched in iridium, carbon spherules containing soot, nanodiamonds, glass-like carbon containing Fullerenes, all of which are evidence of an ET impact. This layer often lies at the base of a black mat contemporaneous with the onset of Younger Dryas cooling and the disappearance of the mammoths. Analysis of the impact layer indicates that the impact likely occurred as an airburst over the Laurentide Ice Sheet. The layer extends throughout at least 15 Carolina Bays along the Atlantic Coastal Plain which are unique elliptical depressions with parallel major axes pointing towards the Great Lakes that may have been formed in the shockwave following the impact. While searching for evidence of the Younger Dryas impact event in mammoth tusks we found exploded micrometeorites embedded into the surface of several tusks. Those tusks were subsequently dated to ~35 kyr ago and suggest that an earlier impact had occurred in Beringia. The radiocarbon record for the past 50 kyr shows that ^{14}C was much more abundant in the past which can be completely described by the explosion of four supernovae <250 parsecs from Earth during the past 44 kyr. I propose that solar system is currently in a region of the galaxy where supernovae rates are high leading to disruption of the orbit of comets and asteroid and resulting in a high recent ET impact rate.

Continued on back...

NCGS 2008 Calendar

Wednesday February 25, 2009

Mammoths, Meteorites, and Supernovae - **Dr. Richard B. Firestone**, Lawrence Berkeley National Laboratory, (Note: Dr. Firestone is co-author of "Cycle of Cosmic Catastrophes – See: <http://www.innertraditions.com/Product.jmdx?action=displayDetail&id=2139&searchString=1-59143-061-5> or <http://www.amazon.com/Cycle-Cosmic-Catastrophes-Stone-Age-Changed/dp/1591430615>

7:00 pm at Orinda Masonic Center

Wednesday March 25, 2009

New Tools for Understanding and Mitigating Rockfall Hazards in Yosemite National Park
Greg Stock, Park Geologist, Yosemite National Park

Wednesday April 29, 2009

The Travels of Clyde Kluckhohn and the Photographs of James Hanks, 1927-1928: Repeat Photography, Virtual Repeat Photography, and Earth Surface Change in the Photographic Era - **Thomas C. Hanks**, U.S. Geological Survey, Menlo Park, California

Wednesday May 27, 2009 **Dinner Meeting!!**

Mesozoic Transpression, Transtension, Subduction, and Metallogenesis in Northern and Central California – **Dr. W. Gary Ernst**, Emeritus Professor at Stanford University, Palo Alto, California

Wednesday June 24, 2009

Cleanup on Aisle 9 - The Long-Lasting Legacy of Nuclear Waste - **Dave Stonestrom**, U.S. Geological Survey Research Hydrologist, Menlo Park, California

Upcoming NCGS Field Trips

Rob is working on several potential field trips, not ready for prime time. However, 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.

April 25, 2008

Neogene Volcanic Rocks of the Northern San Francisco Bay Area: Timing and Tectonic Implication, **James Allen**, Cal. State Univ. East Bay

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.

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/>.

Richard Chambers Memorial Scholarships

Graduate Scholarships

Last month the Northern California Geological Society (NCGS) Scholarship Committee was very pleased to announce the award of four \$500 Undergraduate Scholarships.

This month the NCGS Scholarship Committee is very pleased to announce the award of **two 2008-2009 Richard Chambers Memorial Masters Degree Scholarships of \$1,000** each. The awards are named after Richard Chambers a long time member who left an endowment for scholarships to the NCGS.

The NCGS Scholarship Committee is also very pleased to announce the award of **one 2008-2009 Richard Chambers Memorial Doctorate Degree Scholarship of \$2,000**.

The awardees are:

\$1,000 Master Degree Scholarships

- Christopher Bowles; University of California, Davis; *Identifying old marine terraces through topographic and geologic analysis near Fort Ross, California*; Advisor Dr. Eric Cowgill.
- Joshua T. Goodman; San Francisco State University; *Mapping a sequence of deformed Plio-Pleistocene lacustrine and alluvial sediments in the Confidence Hills, Death Valley National Park, California*; Advisor: Dr. S. John Caskey.

\$2,000 Master Degree Scholarship

- Richard O. Lease, University of California, Santa Barbara; *Topographic evolution of the southern Sierra Nevada: How much relief was generated since the late Miocene?*; Advisor: Dr. Bodo Bookhagen.

More details on these research topics will be included in future newsletters.

Four \$500 Undergraduate Scholarships

As promised last month additional details on the four undergraduate scholarships have been compiled. The following are seriously shortened synopses from the submittals; blame only the editor for incompleteness.

Chad Carlson, California State University, Fresno; *Re-dating of andesitic and basaltic flows in and around the confluences of the North, Middle and South Forks of the San Joaquin River, California*; Advisor Dr. John Wakabayashi.

Chad Carlson's Senior Thesis intends to re-date up to a dozen separate volcanic units in the San Joaquin River drainage, above the present forks of the San Joaquin. Previous research has used

some of the volcanic flows to provide minimum ages of Late Cenozoic uplift and incision. Some of these units may have flowed into the paleostream at the time of formation. Gravels that may be at the base of some of the units can provide spatial information of the vertical separation between past stream beds, and ultimately a stream incision rate may be resolved. Because rates of incision will change over time as base levels change, comparing the dated units can identify increases and decreases through time, and can help to determine the time frames for significant uplift and tilt to the central portion of the Sierra Nevada Batholith.

The original Potassium / Argon dates (3.6 – 3.4 mya) are decades in print (Dalrymple, 1964), and are suspect of errors based on the re-dating of similar volcanics (Lovejoy) by Argon / Argon. Later K/Ar dating by Bailey (1987) have provided some dates slightly younger than 3.0 mya. Mr. Carlson will be using whole rock Ar / Ar analysis. The results will help refine the understanding of the timing and amount of Late Cenozoic uplift in the central Sierras. Coupled with continuing research in the Northern, Central, and Southern Sierras, the hope is to build a complete understanding of Sierra Nevadian evolution.

Lisa Jacob, University of California, Davis; *Salinity Changes in an Estuary-Using the Geochemistry of Benthic Foraminiferal Shells to Develop a Ba/Ca Relationship for Tomales Bay, CA*; Advisor Dr. Ann D. Russell.

The goal of this research is to test the use of geochemical signatures (Ba/Ca, $d^{18}O$, and $d^{13}C$) in benthic foraminiferal shells and water samples as proxies of salinity, and develop calibration curves necessary to create a paleosalinity profile of Tomales Bay. This approach has been successful in reconstruction salinity in other estuaries; however, Ba/Ca relations must be determined for each estuary. If the Tomales Bay samples support this approach, paleorecords of salinity in the bay can be created from down-core profiles of Ba/Ca and $d^{13}C$ in future research. A paleosalinity profile will allow for the development of a record of freshwater input into Tomales Bay.

The importance of a long-term paleosalinity record is to provide context for the alteration in timing and intensity of freshwater input as predicted by climate change models for Northern California. The study of estuarine salinity is particularly significant due to its sensitivity to climate change.

Luke Martin, Southern Oregon University; *Determining Provenance of Rock Fragments Within Conglomerates of the Payne Cliffs Formation (Eocene), Southwestern Oregon and Northern California*; Advisor Dr. Bill Elliott.

The Payne Cliffs Formation that interests Luke Martin and his advisor consist of a 160 m thick basal conglomerate overlain by over 2,150 m of sandstone with conglomeratic lenses. Located in the Klamath Mountains, previous work (1971 to 1984) has interpreted the provenance to be the Klamath's, whereas a more recent study (1990) found that the formation is consistent with derivation from the Idaho Batholith. This later was based on the lack of young volcanics and/or intrusive rocks of this age in the Klamath's. The objective of the study will be to determine if the Idaho Batholith was a significant source of detritus in the formation.

The study will focus on a significant proportion of the clasts that cannot be identified in the field. If these are determined to be volcanic, it would have significant implications for the timing of volcanic arc development and would verify sediment sources to the east. If they are determined to be metavolcanic or metasedimentary, the source is more consistent with a Klamath source. The clasts may also be found to be mixed from both sources, and that the provenance may have also varied through time. These ideas will be tested by the proposed work.

Daniel McCuan, California State University, Bakersfield; *Developing the Methods and Techniques for Radiometric Dating using Laser-Ablation Inductively-Coupled-Plasma Mass-Spectrometry (LA-ICP/MS)*; Advisor Dr. Staci Lowy.

The purpose of Mr. McCuan's work will be to establish the methods and techniques to use the LA-ICP/MS to assign absolute U/Pb ages of formation of the mineral zircon. Due to the limitations of different LA-ICP/MS machines different techniques must be developed for each facility. Using known standards, he will apply and alter previously developed methods to reproduce isotopic compositions of well-calibrated standard materials. The work will hopefully eliminate the need to outsource radiometric determinations, thus reducing costs and expediting research at the institution.

USGS Earthquake Seminar Series

An email from NCGS member Kathleen Burnham reminded us of the USGS Earthquake Seminar series that one may attend in person or via the internet as it is being held. The seminars typically take place at 10:30 AM Wednesdays in the main USGS Conference Room on the USGS Campus located at [345 Middlefield Road, Menlo Park, CA](http://www.usgs.gov/centers/nca/). Details are available at: <http://earthquake.usgs.gov/regional/nca/seminar/s/> A number of past lectures in the series are available for viewing at the website. In addition, the following talks are currently scheduled:

- *Applied GIS within the Earthquake Hazards Team*; J. Luke Blair, Jacob DeAngelo, Thomas Noce, Stephen Walter, USGS (Wednesday February 11)
- *Spatial correlation of strong ground motion intensities: measurement and implications for engineering applications*; Jack Baker; Stanford University (Wednesday February 18)
- *3D Geometry of Fault Surfaces*; Ole Kaven, Stanford University (Wednesday, February 25)
- *Subduction forearc structure and its relation with episodic tremor and slip*; Pascal Audet, UC Berkeley (Wednesday March 4)

USGS Western Region Colloquium and Other Seminar Series

Be sure to explore the list of other websites on the left side of the *USGS Earthquake Seminar Series*. A number of interesting videos are available through the *Western Region Colloquium*, the *USGS Volcano Hazards*; the *USGS Water Resources*, and the *USGS Evening Public Lecture Series*. Examples from the *Western Region Colloquium* include:

- *Global Energy: Myths and Realities*; Dr. Scott Tinker, University of Texas, Austin; January 14, 2008
- *Carbon Dioxide Capture and Storage in Deep Geological Formations*; Dr. Sally Benson, Stanford University; October 15, 2007
- *Feathered dinosaurs from the “Cretaceous Pompeii” of China and the origin of avian flight*; Dr. Sankar Chatterjee; Texas Tech University; July 9, 2007
- *The structure of mantle plumes – insights from geochemical and isotopic studies in Hawaii*; Dominique Weis; Univ. of BC; April 23, 2007
- *And many more...*

NEW INSIGHTS IN HISTORIC AREAS

Pacific Sections AAPG – SEPM Annual Convention May 2 – 6, 2009; Ventura, California

Message from the Program Chair: Recent increases in the price for crude oil and our need for increased domestic energy production have opened the door for using new techniques to produce more from older historic areas. This was the inspiration for our Convention theme, “**New Insights in Historic Areas**”, which easily extends to all areas of the geosciences. To make the meeting successful we need a few good **short courses** and **field trips** and a major outpouring of **abstracts** for presentation at the **oral and poster sessions**. A tentative **list of session topics is on the next page** along with a list of those session chairs that have already been selected. If you are interested in participating in one or more of the sessions, feel free to contact one of the Chairs through the email address listed:

Tentative Technical Sessions:

- Theme Session: New Insights in Historic Areas; CoChairs: Jon Kuespert and Michelle Glascock
- Renewed Offshore Drilling in California: Pros and Cons; CoChairs: Terry Budden, John Minch, and Ken Hunter
- Energy Minerals of the Pacific Region CoChairs: Creties Jenkins and James Clough
- New Insights into Recent and Past Global Climate Change; Chair: Tessa Hill
- New Insights into Pacific Region Shale Reservoirs
- New Insights into Pacific Region Gas Production; Chair: Scott Hector
- New Insights in Exploration Technology and Seismic Interpretation
- New Insights into Stratigraphy and Sedimentology within the Pacific Region CoChairs: Ray Ingersoll and Kathie Marsaglia
- Modern Sea-Floor and Quaternary Turbidite Systems Offshore the Western Margin of the United States in Honor of Bill Normark; CoChairs: Jacob A. Covault and Andrea Fildani
- Making the Link from Modern to Ancient Turbidite Systems: An Integrated Approach in Honor of Bill Normark; CoChairs: William R. Morris and Brian W. Romans
- New Insights into Marine Geology and Oceanography within the East Pacific Region; CoChairs: Mark Legg and Marc Kamerling
- New Insights into Structural Geology and Tectonics within the Pacific Region; Chair: Nate Onderdonk
- New Insights into Neotectonics and Paleoseismology within the Pacific Region; Chair: Doug Yule
- New Insights into Engineering Geology within the Pacific Region; Chair: Mark Osborne
- New Insights into Hydrogeology within the Pacific Region; CoChairs: Jordan Kear and Ali Tabidian
- New Insights into Environmental Remediation within the Pacific Region Chair: Robert Urban
- Session Commemorating the 100th Anniversary of the Texas Bureau of Economic Geology; Chair: Shirley Dutton
- The Importance of K-12 Geology Education to the Future of Our Planet; Chair: Bob Ballog

For more details, email addresses for all chairs, chair affiliations, and more, please go to:

<http://www.csun.edu/~hcgeo007/psaapgconvheader.htm>

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



NCGS FIELD TRIP

The Geology of Sonoma Mountain

Sonoma County, California

Saturday April 25, 2009

Field Trip Leaders:

James Allen and Dr. Luther Strayer, CSU East Bay, *Dept. of Earth and Environmental Sciences*

Peter Holland, *Vector Engineering, Inc*

Ron Rubin, *AMEC Geomatrix*

Sonoma Mountain in Sonoma County is largely composed of the late Miocene to Pliocene Sonoma Volcanics and interbedded sedimentary units. The Sonoma Volcanics are the largest of several Neogene volcanic fields in the San Francisco Bay Area which young in age to north. These volcanic fields include the Quien Sabe Volcanics, Berkeley Hills Volcanics, the Tolay Volcanics, Sonoma Volcanics, Burdell Mountain Volcanics, and the Clear Lake Volcanics, which are interpreted to be the product of mantle upwelling behind a slab window recording the passage of the Mendocino Triple Junction. This trip will consist of visiting locations within the Sonoma Volcanics on the Sonoma Mountain area to inspect various volcanic and poorly mapped sedimentary units which make up the framework geology of the mountain. Lithology, stratigraphy, slope stability and regional offset along strike-slip faults in the area will be discussed. In an ongoing effort to map the geology of Sonoma Mountain in the detail needed, several challenges arise: The mountain is riddled with numerous faults including the active Rodgers Creek fault, lateral facies changes of poorly mapped sedimentary units, and landslide complexes often hampering mapping. Continuing radiometric age dating, paleontology, and accurate landslide identification greatly aid in bedrock mapping of Sonoma Mountain and our understanding of the geology along the Rodgers Creek fault. This trip compliments the February 23, 2008 NCGS trip by the leaders.

What field trip to wine country goes without samples, so apparently we'll enjoy some products from the fine Far Niente Winery establishment, namely Dolce. Thank us later!

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

THIS FIELD TRIP WILL BE LIMITED TO 30 PEOPLE.

Map of meeting area: April 25, 9:00 AM: Sonoma State University, parking lot F. From northbound Highway 101, take the Sierra Avenue exit eastward. Sierra Avenue changes to East Cotati Avenue, continue east about 2 miles to Sonoma State University.

*******Registration*******

Registration Form for The Geology of Sonoma Mountain, Sonoma County, California, Field Trip

Name: _____ E-mail: _____

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

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

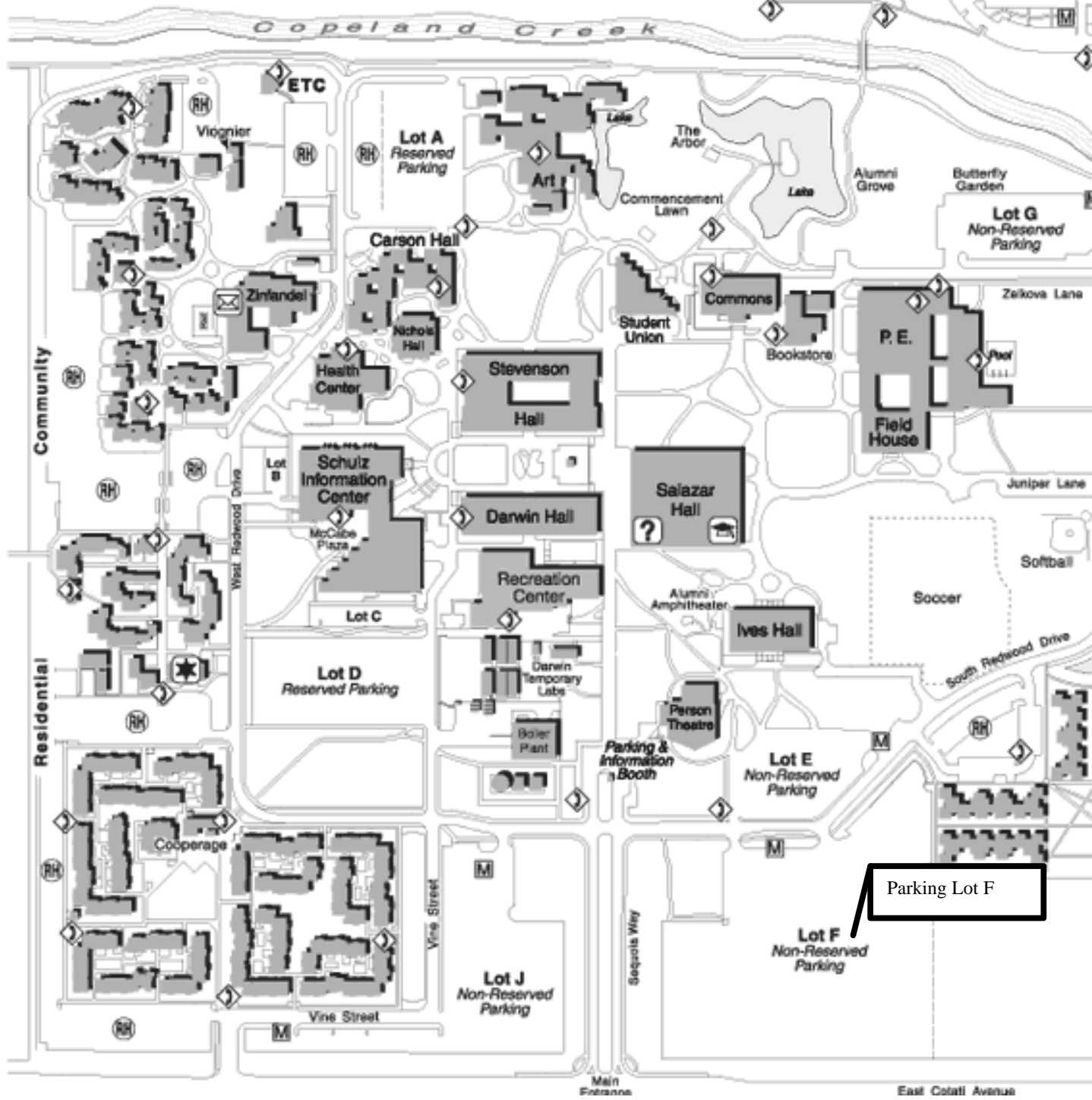
Please mail a check made out to NCGS to: **Rob Nelson, 269 College View Drive, Rohnert Park, CA 94928**

Carpooling is suggested for this fieldtrip. Please let us know if you can provide a van and the NCGS can reimburse your gasoline expenses.

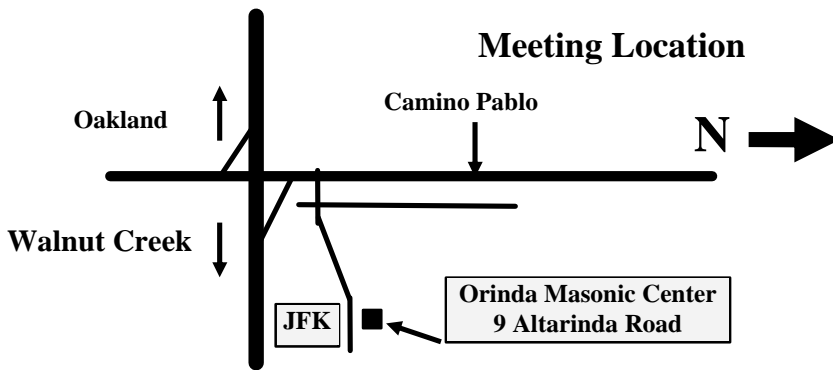
Questions: e-mail: rlngeology@sbcglobal.net Phone: (707) 795-8090 (evening); (707) 548-3268 (day)

SONOMA

STATE UNIVERSITY



Parking Lot F



Biography:

Dr. Richard Firestone was born in Los Angeles, CA and raised in Evanston, IL where he attended Evanston Township High School. He received a B.S. Chemistry degree in 1967 from The University of Michigan and a PhD in Nuclear Chemistry from Michigan State University in 1974. Dr. Firestone has been a staff scientist at the Lawrence Berkeley National Laboratory and is currently group leader of the Isotopes Project. He has published over 200 scientific papers on subjects ranging from nuclear physics and chemistry to denitrification and extraterrestrial impact events. Dr. Firestone is author of seven books including the *Table of Radioactive Isotopes* (John Wiley & Sons, 1986), *Table of Isotopes* (John Wiley & Sons, 1995, 1998, 1999), *Handbook of Prompt Gamma Activation Analysis* (Kluwer Publishers, 2004), and *The Cycle of Cosmic Catastrophes* (Inner Traditions, 2006).

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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.