

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



JUNE MEETING ANNOUNCEMENT

DATE: Wednesday, June 26, 2002

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

TIME: 6:30 p.m. Social; 7:00 p.m. talk (no dinner)
Cost is \$5.00 per person

RESERVATIONS: Leave your name and phone number at 925-424-3669 or at danday94@pacbell.net before the meeting.

SPEAKER: John A. Karachewski, Weiss Associates

California Geoscapes

This nontechnical slide show was developed to highlight the remarkable beauty and diversity of California's geologic landscapes and dynamic processes and share this information with the general public. The numerous presentations have been well received and personally rewarding because they reflect the interest of the public and K-12 teachers in geologic and environmental issues. This program highlights the state's many geologic provinces, including the Basin and Range, Coast Ranges, Great Valley, Sierra Nevada, and Cascades as well as their structural and tectonic development, their broad range of sedimentary rocks, and their natural history. Come explore the geology of our national parks and monuments, national forests and state parks, and discover new destinations for your next outdoor adventures.

John A. Karachewski is a Senior Project Hydrogeologist for Weiss Associates and is supporting projects for the Environmental Restoration Division at Lawrence Livermore National Laboratory. He has conducted and managed geology, hydrogeology, and environmental projects throughout the western United States and Pacific region for government agencies and industrial clients. John received his doctorate from the Colorado School Mines, his M. Sc. from Western Washington University, and his B. Sc. from the University of Illinois-Chicago. John's photography has been extensively published and examples of his work can be seen on his website at: www.geoscapesphotography.com

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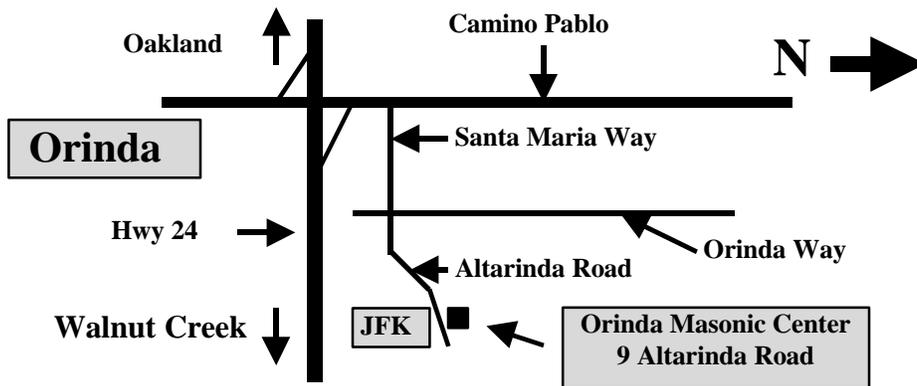
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NCGS 2002 Calendar

Wednesday, June 26, 2002

John Karachewski, Weiss Associates

"California Geoscapes" A photo journal of California geological scenery.

Orinda Masonic Center

June 28-30, 2002 Weekend Field Trip

"Geology of the Eastern Belt of the Northern Sierra Nevada and 16:1 Gold Mine Tour"

Led by **Dr. Elwood R. Brooks**, Cal State University Hayward, Emeritus and **Ray Wittcopp**, 16-to-1 Mine

Please see dlyer in this newsletter for details.

In the Works...

The following field trips are being pursued, but have not been finalized! Watch future newsletters for details.

Rogers Creek/Maacama Fault Zones Bob McLaughlin, USGS Fall 2002

Hayward Fault Trench Field Trip Jim Lienkaemper, USGS October, 2002 (Date TBA)

Bay Area Geophysical Society

Mike Wilt of EMI/Schlumberger in Richmond, CA will talk about *"Crosswell Electromagnetics in a Production Environment."* The talk will be set for **June 20, 2002** at ChevronTexaco, Room D2193, 6001 Bollinger Canyon Road, San Ramon. Check <http://sepwww.stanford.edu/bags/> for directions.

Mike Clark of ChevronTexaco in Bakersfield, CA will talk about *"Reservoir Architecture and Trapping Mechanisms of the Miocene Temblor Formation at Coalinga Field, San Joaquin Basin, California "* The talk is set for July 18, 2002

John Etgen of British Petroleum in Houston will talk about *"High-end Imaging for Exploration and Development."* Exact title TBA. The talk will be sometime this summer or fall. Please check back later for more details.

Jon Claerbout of Stanford University is tentatively scheduled to speak. Exact title TBA. The talk will be sometime this summer or fall. Please check back later for more details.

Oz Yilmaz of Anatolian Geophysics in Turkey will talk about *"A Unified 3-D Seismic Workflow."* Please check back later for more details.

The **SEG Fall Distinguished Lecture** for the Autumn 2002 will be delivered by Stanford Professor **Jerry M. Harris**. The title of his talk is *"Crosswell Seismic Profiling: The Decade Ahead."* Exact time and date TBA.

Please check the BAGS website at <http://sepwww.stanford.edu/bags/> regularly for meeting updates.

May 15th AAPG Distinguished Lecture Probes Egyptian Archaeological Geology

The May 15th AAPG Distinguished Lecture featured the University of Toledo's **Dr. James A. Harrell**, a sedimentary geologist by training who has ventured into the realm of archaeological geology. His primary interest has been ancient Egyptian archaeological sites. Dr. Harrell proceeded to thrill his audience with his talk "*Archaeological Geology in Egypt: Ancient Oil Wells and Mummy Bitumen, Earliest Geological Map, First Paved Road, Pyramid Temple Pavements, and the Sphinx Age Controversy.*" Throughout this lecture, Dr. Harrell gave examples of the clever sleuthing he and his co-workers have used to interpret features at ancient sites worked by the Egyptians over 4,000 years ago.

Since 1989, Dr. Harrell has been involved in the archaeological geological characterization of ancient stone quarries in Egypt and northern Sudan, and in the excavation of several Egyptian archaeological sites. His field expertise and literature searches have helped locate 162 quarries, 30 of which he and his colleagues discovered. Dr. Harrell and his associate Dr. V. Max Brown from the University of Toledo have personally visited 122 of these quarry sites to pinpoint their exact location and characterize petrographically the rocks that were mined at each site. Samples from 76 of these sites have been collected and analyzed by thin section, by x-ray fluorescence analysis (major element chemistry), by neutron activation analysis (trace element analysis), by x-ray diffraction analysis (mineral composition), and by carbon and oxygen isotope techniques (an isotopic trace element fingerprint identification). His work in these areas contributed to each of the four topics he discussed in his lecture.

Basalt was a favorite rock used for pavements in several of the Old Kingdom pyramid temples constructed between 2625 to 2250 B.C. This volcanic rock forms numerous flows adjacent to the rich organic soils of the Nile River floodplain, without which the Egyptian civilization would not have flourished. The Egyptians named their country "kemet" or black land, after this dark soil, and the black basalt rock symbolized this precious agricultural resource. The quarry that provided this basalt rock was only recently discovered. It lies about 12-km. northwest of the El Faiyum Depression, in Oligocene basalt flows capping an escarpment that overlooks the depression. The quarry was a narrow bench cut into the flows measuring 5 to 10 meters wide by 3 to 5 meters deep. The rock was too hard to quarry using conventional bronze tools, so the workers used rock tools to pry loose the blocks of basalt. Pottery shards found on the quarry floor definitively date the site at 2650 to 2150 B.C., during the Fourth Dynasty. A road leads from the quarry to a large quay on the shore of El Faiyum, which was a lake at that time. The roadbed has a uniform width of four Egyptian cubits (about 6 feet) and does not show any surface abrasions. The latter indicates

to Dr. Harrell that workers may have used wooden sleds and beams to reduce frictional forces as the blocks were hauled to the lakeshore. There the basalt blocks were loaded onto barges during the spring flood season, when the lake connected with the Nile River, and delivered to their destinations. The quarry road is the oldest paved road in existence, and is lined with scattered stone rings that are thought to be tent weights used by the quarry workers.

The next topic focused on a papyrus scroll that contains an illustration that Dr. Harrell feels is the first geologic map. It predates Englishman William Smith's 18th Century geologic map of England by 2900 years, having been drawn about 1500 B.C. It details a quarrying expedition authorized by King Ramses IV to Wadi Hammamat in the Eastern Desert. The fragmented papyrus is three meters long by one-half meter wide, and clearly marks the progress of an expedition along a wadi (arroyo) to a gold mining site. Brown, white, and green-colored boulders in the wadi are pictographically depicted, and the distance from the gold mine to the quarry is noted. Here the Egyptians quarried Precambrian metaconglomerates, metagraywackes, and metasilstones; the latter two were the ancient *bekhen* stone that subsequently became known in modern times as "basalt". The latter is derived from a series of Greco-Roman transliterations of Egyptian Hieroglyphic text and a medieval misspelling by Agricola. Oddly enough, the original bekhen rocks were metamorphics not of volcanic parentage! The papyrus map includes several short descriptions of gold-bearing sites in the map area and uses two color schemes to depict the areal distribution of key rock types. In addition to its geological significance, the papyrus is also one of the first topographic maps. The mapmaker was Amennakht, Chief Scribe of Luxor, a wealthy member of the Egyptian upper class.

The third topic addressed mummies and bitumen-based preservatives. This key preservative was originally thought to come only from petroleum seeps on the southern end of the Dead Sea in the Holy Land. Researchers examined petroleum-derived bitumen from five Egyptian mummies dating back to 900 B.C., and compared it with bitumen from the Dead Sea source, from fault-fed oil seeps in Pleistocene reef limestone at Gebel Zeit on the southwest shore of the Gulf of Suez, and from another site on the Gulf of Suez. Molecular biomarkers defined by gas chromatography and mass spectrometric techniques indicated that the oldest of the mummies, the Libyan Pasehor from 900 B.C., was preserved with Miocene bitumen from Gebel Zeit, whereas the other four used bitumen from the Cretaceous Dead Sea source. This study proved that Egyptians had once used indigenous sources of bitumen to mummify their dead.

Dr. Harrell closed with a commentary on a recent controversy regarding the age of the Great Sphinx statue at Giza. Recent documentaries produced by the media-savvy team of Boston College professor **Robert Schoch** (Ph.D. in

Geology and Geophysics, Yale University) and writer-scholar-Egyptologist **John Anthony West** debated the accepted 2500 B.C. age of the Great Sphinx. Their media attack on this conventionally accepted age drew national attention and catapulted them into the public limelight. Dr. Harrell and his colleagues, which include many renowned Egyptian archaeological scholars, found this attack on an accepted age for the landmark discomfiting. Their adversaries suggest that the Sphinx is considerably older than 2500 B.C. based on the weathering characteristics of its Eocene limestone precursor and on other sedimentary arguments. Dr. Harrell and his associates contend that the Sphinx weathering patterns clearly link it to nearby tombs dating from the 5th Egyptian Dynasty and the reign of King Khafre (2520-2494 B.C.), whose pyramid looms in the background behind it. The talk did not allow a detailed discussion of the facts surrounding this controversy, but interested readers are urged to visit Dr. Harrell's website at <http://www.eeescience.utoledo.edu/faculty/harrell/>. Dr. Schoch's research can be viewed at his websites http://www.antiquityofman.com/Schoch_redating.html and <http://robertschoch.homestead.com/>. Egyptologist, scholar, and writer John Anthony West maintains a personal website at <http://www.jawest.com/>.

The NCGS gratefully acknowledges the generosity of **ChevronTexaco**, who annually funds the AAPG Distinguished Lecture series by a generous donation to the NCGS. This gift defrays much of the cost for hosting these lectures. ChevronTexaco also provides its lecture facilities for many of the AAPG lectures. These talks represent some of the finest presentations in our monthly calendar.

Mt. Diablo Field Trip Explores Complex East Bay Regional Geology

By Michelle McMahan, Cal State University Hayward

On May 18th NCGS sponsored a field trip to look at the geology of the Central California Mount Diablo Region, led by Ron Crane and Craig Lyon. The group enjoyed hot coffee and donuts as Ron introduced the tectonic history of the region, proposing that the uplift of Mount Diablo was the product of an underthrust from the west, which is passively uplifting the range. Ron continues to postulate that the strike slip movement of the faults in the region is a secondary by-product of the SW to NE thrusts. Ron's interpretation was supported by an impressive series of cross-sections. Craig, in a heroic attempt to contain the resulting discussion, introduced the regional stratigraphy and we loaded into the vehicles, knowing we were spending the day with two regional experts.

The first stop was at the Hamilton Sandstone (Maganos D), which is associated with Eocene Meganos Canyon fill. This stop included a discussion of the Brentwood gas fields, important because these fields had oil production in what otherwise, is considered a gas province. Driving back down-section the next stop was a well-exposed Upper Cretaceous turbidite sequence. Craig noted that these turbidite deposited units and many others in northern California do not contain complete Bouma sequences.

Mining related stops included the tailing pile for the now abandon Mount Diablo Mercury Mine, run-off from this mine empties directly into Marsh Creek and the Marsh Creek Reservoir. The diabase, part of the Mt Diablo Pillow basalt ophiolite terrain, is currently being quarried at the RMC Pacific Material quarry on the east and west flank of Mt Zion. We also passed the, now abandon, Cowell Cement Company which mined the 20' thick travertine deposit that overlies the Domengine Sandstone on Lime Ridge.

After a picnic lunch and a visit to the Mt Diablo Interpretation Center we headed into the State Park. A stop at the Rock City –Wind Caves introduced the group to the Eocene Domengine Formation. This stop provided the group our first overview of the San Ramon Valley beginning with the Miocene Briones Sandstone on Fossil Ridge just to the west. A quick cultural history stop was included at the Wind Caves, at a spot where Native American had ground holes in the Domengine Formation while pulverizing acorns.

As the group moved up the flank of Mt Diablo through road cut exposures of the Franciscan cherts and graywackes a stop at Curry Point allowed for an opportunity to overlook the Franciscan Complex exposed at the summit of Mt Diablo, and the Tertiary ridges of the south flank. Discussion and debate of the structural interpretation for the region continued.

The trip was concluded at the top of Mt Diablo with a summit walk through exposures of the Franciscan graywacke, sandstones, cherts, and greenstone as well as excellent views to the west, north and east. This was the perfect location to reflect on a great day and the vast complexities of the geology of the Mt. Diablo region.

The NCGS sincerely thanks Michelle McMahan, instructor at California State University, Hayward, and new NCGS member for writing this article.

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



Geology of the Eastern Belt of the Northern Sierra Nevada and 16:1 Gold Mine Tour

June 28-30, 2002 Weekend

**Saturday field trip led by Elwood R. Brooks, CSU Hayward, Emeritus
with a Sunday morning 4 hour tour of the 16:1 Active Gold Mine**

Saturday's field trip will be in the vicinity of Upper Salmon Lake in the Lakes Basin, Sierra County. The field trip will focus on the greenschist and prehnite-actinolite assemblages in the Devonian-Mississippian Elwell and Taylor Formations. There will be some moderate hiking around Upper Salmon Lake to see outcrops of pillow lava embedded in a tuffaceous matrix, debris-flow deposits of broken-pillow breccia, and ash turbidites with trace fossils in the Taylor Formation. A hike up past Horse Lake will take us to a columnar-jointed andesite sill, and chert and volcanogenic sandstone in the Elwell Formation. Also, world-class exposures of peperite will be viewed and collected.

The Sixteen to One Gold Mine in Allegheny is the last deep active hard-rock gold mine operating in California. On Sunday morning, Ray Wittcopp, one of the geologists working at the 16:1, will take us on a four hour tour into the mine to show us the mining operations, the hard-rock that they are currently mining from, and discuss both historic and current mining practices.

Logistics: To be more flexible with members' schedules, the SFSU Sierra Nevada Field Camp has been setup for either Friday evening or Saturday morning arrivals. The drive up to the Sierra Nevada Field Campus from the Bay Area is about 4 hours. Woody would like to start early, at 8 am Saturday, so depending on your work schedule or personal preference, you can come up the mountain to arrive at the field camp from 7 pm Friday through 8 am Saturday. SFSU Sierra Nevada Field Campus offers "luxury camping". Large 12' x 16' tents with mattresses on platforms situated alongside the North Yuba River. Accommodations include hot water and showers, flush toilets, and a dining hall with a cook to prepare meals. You may opt to stay in a nearby town and still partake in the dining services and after field trip discussions. If the non-fire conditions are favorable, we will have a Saturday night campfire.

For those of you who wish to explore other lodging, you can browse a list of accommodations on the Sierra County website: <http://sierracounty.org/pages/county/county.html> It is wise to make reservations early, as most rooms are full by late June.

Things to bring: Sleeping bag and pillow (all tents have mattresses), towel, warm clothes for the evening campfire. Be prepared for some off-trail hiking in the Lakes Basin area, including a pack to carry your lunch and beverage. Hiking boots and long pants are recommended; don't forget sun protection.

***** **REGISTRATION FORM --- Please rsvp by Saturday, June 22** *****

Name _____ Address (Street/City/Zip) _____

Phone (day) _____ Phone (evening) _____ E-mail/Fax _____

Driving/carpooling: We have reserved a 15 (seats 10 with gear) passenger van to drive up on Friday night, leaving @ 6:30 from the Hercules park 'n ride, near Hwy 4 and I-80. We will stop in route for dinner. We will also try to create car pooling groups from people attending, once all of the rsvp's for the trip are in the week before the field trip.

Indicate if you are willing to drive (gas cost shared by riders) _____

Would like to arrive: Friday night _____ Saturday morning _____

Would like to: carpool _____ come in van _____ drive up on my own _____

We will be carpooling from the field camp to the field trip locations. If some people want to extend their weekend in the Sierras, they can go to Malakoff diggings which is close by and on the way down the mountain from the 16:1 gold mine on Sunday.

Cost: \$60 to \$120

Cost depends on camping arrangements, van rental, and arrival time. Deduct tent camping if you arrange for staying in a nearby hotel. If you are staying at the Sierra field camp, add 'X's as appropriate, tally the fees, and submit a check with the appropriate total amount.

Friday

Friday night platform tent/cot camping	12.00	_____
- or bring your own tent and sleep on the ground	6.50	_____

Saturday

Saturday 7 am breakfast	5.75	_____
Saturday morning, pack your own lunch	4.25	<u> X </u>
Saturday 6 pm dinner prepared by camp cook	7.00	<u> X </u>
Saturday night platform tent/cot camping	12.00	_____
- or bring your own tent and sleep on the ground	6.50	_____

Sunday

Sunday 7 am breakfast and pack your own lunch	10.00	<u> X </u>
Sunday 16:1 mine tour	25.00	<u> X </u>

General

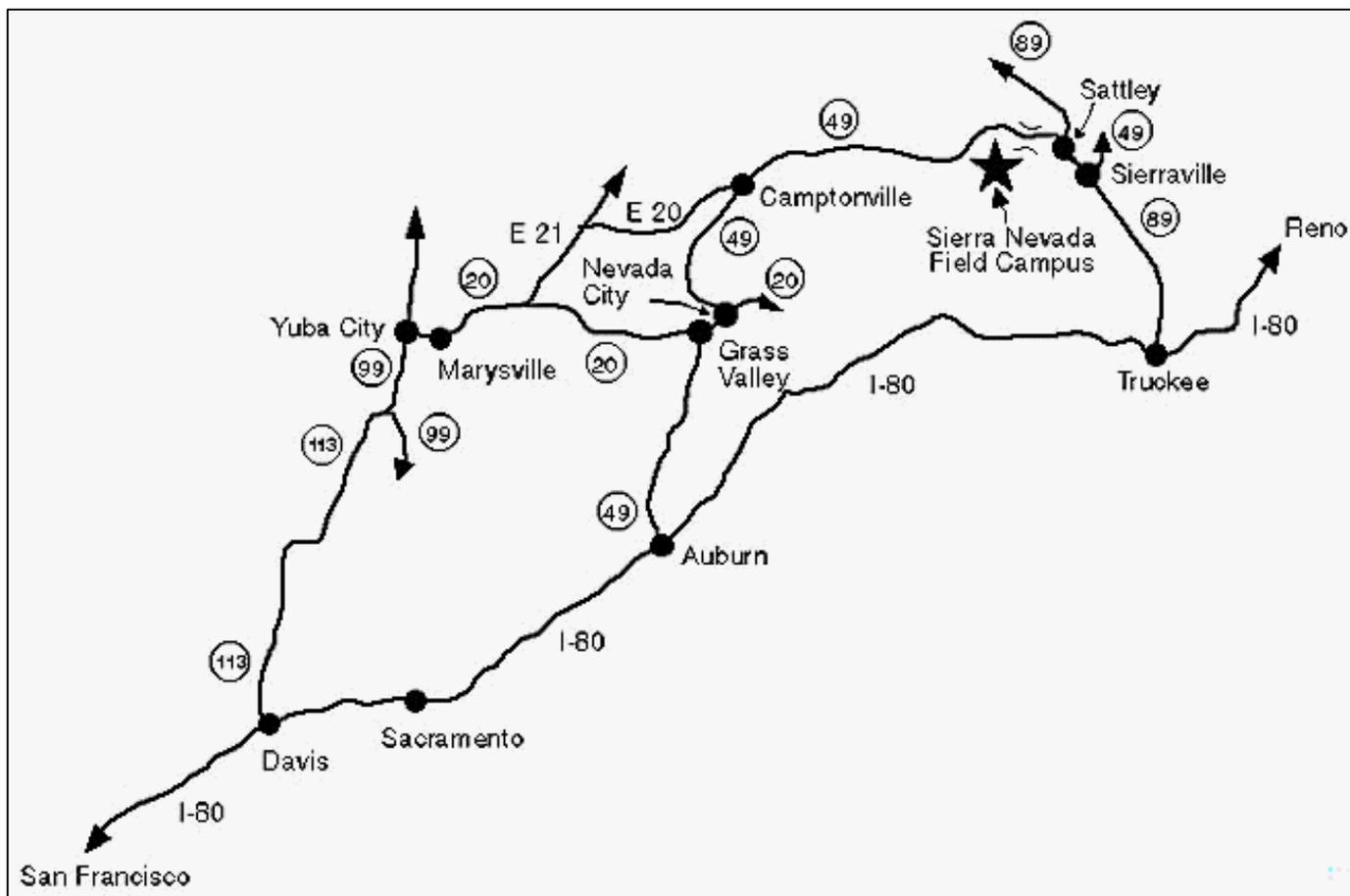
field guide, refreshments, misc items	14.00	<u> X </u>
van rental per person	30.00	_____
shared gas, to be determined		

Indicate if you are a nonmember (add \$10 to cost) _____

Please mail form and a check made out to NCGS to: **Jean Moran, P.O. Box 1861, Sausalito, CA. 94966.**
 If you have any questions or need additional information, e-mail Jean at jeanm@stetsonengineers.com
 or call **415-331-6806** (evening).

Directions to the Sierra Nevada Field Campus

(from the SNFC web site at <http://thecity.sfsu.edu/snfc/map.htm>)



From The Bay Area:

1. Take I-80 to Truckee, proceed north on Hwy 89 to Sierraville: take a left at the junction of Hwy 89 and Hwy 49 in Sierraville and proceed to Sattley; One mile past Sattley take the left fork, Hwy 49, where Hwy 49 and Hwy 89 separate; Continue up and over Yuba Pass, the Campus is 6 miles from the top of Yuba Pass on the left hand side of the Hwy. If you pass it, one mile later you will arrive at Bassett's Station and the turn off to the Lakes Basin.

2. Take I-80 to Auburn where you take Hwy 49 through Grass Valley to the Campus. Be careful in Nevada City where Hwy 49 takes a left near Uren Street exit. The Campus is located 6 miles above Sierra City, on the right of Hwy 49. About 3/4 mile after Bassett's Station (a small grocery store and gas station, you will find a parking area on the right hand side of the road.

From Reno:

3. Take 395 north to Hallelujah Junction and Hwy 70 west. Shortly after the town of Beckwourth (and the west edge of Sierra Valley) turn left on county road A-23 and continue to Sattley. Turn right on Hwy 49 / Hwy 89; One mile past Sattley take the left fork, Hwy 49, where Hwy 49 and Hwy 89 separate; Continue up and over Yuba Pass, the Campus is 6 miles from the top of Yuba Pass on the left hand side of the Hwy. If you pass it, one mile later you will arrive at Bassett's Station and the turn off to the Lakes Basin.