

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



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MEETING ANNOUNCEMENT

DATE: June 24, 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. Dave Stonestrom,**
Research Hydrologist
U.S. Geological Survey, Menlo Park

A Hydrogeological Perspective on Nuclear Waste — Tales from the Trenches

The Hanford nuclear complex in Washington State was the premiere plutonium production facility (the larger of only two in the United States), operating between 1944 and 1986. The 1,500 square-kilometer complex housed the world's first full-scale nuclear reactors and fuel-reprocessing facilities—built in wartime haste, without benefit of pilot or environmental studies. Hanford's setting atop massive glacial Lake Missoula jökulhlaups deposits nestled between Rattlesnake Mountain and cliffs across a bend in the Columbia River afforded it secrecy, ample high-quality process and cooling water, and a thick unsaturated zone for waste disposal. However, the capacity of the unsaturated zone to absorb wastes repeatedly threatened to limit production. Eleven-hundred kilometers to the south-southeast, the Amargosa Desert in southern Nevada became home to the Nation's first disposal facility for civilian radioactive wastes. Operating from 1962–92, in early years it accepted virtually the entire waste stream (except fuel rods) from the nascent nuclear industry in California and adjoining states. As at Hanford, a thick sequence of unsaturated alluvial sediments effected waste isolation. Lessons from the restoration of Hanford and ongoing studies at the Amargosa Desert Research Site show the value of high-resolution geologic characterization and the need for process understanding of hydrochemically altered systems to enable the Nation to deal with nuclear waste—past, present and future.

Biography: **Dr. David Stonestrom** is a Research Hydrologist with the US Geological Survey in Menlo Park, California. His research examines the physical, chemical, and biological interactions involved in earth-surface processes controlling flow and transport through unsaturated zones. This research has included laboratory studies of liquid and gas transport through soils and sediments as well as field studies of unsaturated zones from the rain forests of Puerto Rico to the deserts of the southwestern US. Dave has served on various advisory and editorial

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NCGS 2009 Calendar

Wednesday June 24, 2009

A Hydrogeological Perspective on Nuclear Waste—Tales from the Trenches; Dr. Dave Stonestrom, U.S. Geological Survey Research Hydrologist, Menlo Park, California,
7:00 pm at Orinda Masonic Center

As Usual – Our Summer Break!

Wednesday September 30, 2009

Bay Area Geoscapes: Geology of the San Francisco Bay Region – Photos That Didn't Make it Into the Book; Dr. John Karachewski,
Dept. Toxic Substances Control
7:00 pm at Orinda Masonic Center

Wednesday October 28, 2009

The Loma Prieta Earthquake Turns 20; What we Have Learned From Seismology, Engineering & Politics; Dr. Jack Boatwright, U.S.G.S, Menlo Park
7:00 pm at Orinda Masonic Lodge

Wednesday November 18, 2009

EARLY DATE!!

Massive Ionization at the Air-to-Ground Interface as Possible Pre-Earthquake Indicator – Dr. Friedmann Freund, NASA Ames Research Center, Moffett Field, CA

December 2009 - As usual no meeting!

Wednesday January 27, 2010

The Earthquake of 1868 and the Birth of Seismically Resistant Architecture in California
Dr. Stephen Tobriner, Professor Emeritus of Architecture, UC-Berkeley

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 Rob Nelson at jmc62@sbcglobal.net or John Christian at: jmc62@sbcglobal.net. In the mean while there is one upcoming field trip!

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. (However, note that PGS is taking their summer break also – they'll be back for the next academic year!)

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:

- For further meeting details go to: <http://www.aegsf.org/>

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

Text & Photos by John Karachewski

On Saturday August 23, 2008, 30 friends and colleagues joined Dr. Philip Stoffer (USGS) to examine the geology and landscape features of the central Calaveras Fault along the western flank of the Diablo Range in Santa Clara County. This field trip was also conducted as part of the NCGS commemoration of the 1868 Hayward earthquake. The field trip included morning stops at Coyote Lake and Harvey Bear Ranch County Parks (near Gilroy) and afternoon stops at Anderson County Park (near Morgan Hill).

The Calaveras Fault is part of the greater San Andreas Fault system and extends for nearly 100 miles from the San Ramon Valley near Danville in the north to about 20 miles south of Hollister. The Calaveras Fault was named for Calaveras Creek located east of San Jose where it was first identified. The Calaveras Fault was first mapped, but not named by Andrew Lawson in 1908. This field trip examined the central section of the Calaveras Fault, which is characterized by historic

creep of as much as 14 to 15 mm per year near its southern end, and has an earthquake recurrence interval estimate of about 530 years. The central section of the Calaveras Fault has experienced numerous moderate earthquakes during the past several decades, including the M5.9 Coyote Lake earthquake of 6 August 1979, M6.2 Morgan Hill earthquake of 24 April 1984, and M5.6 Alum Rock earthquake of 30 October 2007.

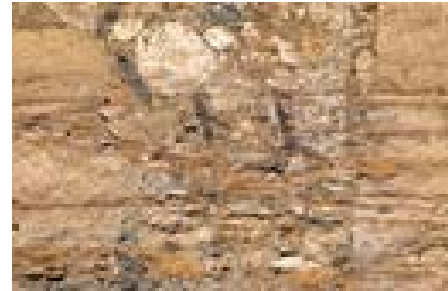


Bedrock exposures in the area include the Mesozoic Franciscan Complex, Coast Range Ophiolite, and Great Valley Sequence rocks that are juxtaposed with late Cenozoic volcanic rocks and terrestrial sedimentary rocks, including alluvial gravels which were folded and offset by later faulting. The rural setting of this trip also preserves many geomorphic features related to the progressive deformation and mass wasting of the landscape, such as landslides, stream terraces, tectonic modification of stream drainages and alluvial fans. In addition, the field trip examined the impacts of dam construction and hydrogeologic development on Coyote Creek (Anderson and Coyote dams) and also provided scenic vistas of the Santa Clara Valley region. Evidence of past and ongoing creep and earthquake activity along the Calaveras Fault were also discussed.



The field trip began in the fog at the Mendoza Ranch entrance of Coyote Lake-Harvey Bear County Park several miles northeast of Gilroy. The Calaveras Fault is located a short walk west of the parking area and is expressed as a series of linear troughs with vernal pools or sag pounds during the rainy season. Although poorly

exposed, vesicular basalts and Quaternary stream gravels are locally present. Coyote Ridge is a great shutter ridge uplifted along the west side of the fault valley. Mass wasting including active landslides and erosion of adjacent Coyote Ridge results in the accumulation of sediments within the fault zone.



Field trip stops along the west side of Coyote Reservoir, included Lookout Point, with late Miocene basalts and mantle-derived xenoliths; Calaveras Picnic Area, with serpentine slickensides and fault gouge; and Calaveras Dam constructed in the vicinity of the fault zone. The original dam design had to be changed when it was learned that it was located within the Calaveras Fault zone. An extra year was required to reinforce and complete construction of the dam in 1936. The Santa Clara County Water District owns and maintains the dam and reservoir, which has a capacity of approximately 23,000 acre feet of water. A Cretaceous conglomerate consisting of granitic and quartzite clasts as well as spectacular soft-sediment deformation is exposed along the east side of the dam.



With the morning's fog burned off, the participants hiked from the park's Harvey Bear entrance to a large active landslide just east of the mountain front. Perennial springs are associated with this landslide.

The group ate lunch at Woodchoppers Flat near East Dunne Road, which eventually accesses Henry Coe State Park. This picnic area lies almost directly on the Calaveras Fault, which is masked by a large, partially active landslide. Many different rock types excavated during the construction of Anderson Reservoir are on display around the parking area. The rocks include: Mesozoic Franciscan greenstone, greywacke sandstone, serpentinite, and chert as well as late Cenozoic volcanic rocks (basalts and hydrothermally altered rocks) and travertine (spring deposits). Massive deposits of cobbles are also exposed along the lake and are derived from weathering of poorly consolidated Quaternary Packwood Gravels that underlie the eastern shore of the reservoir.



In the afternoon, the group drove to the top of Anderson Dam, where participants had a beautiful vista overlooking Morgan Hill, the southern Santa Cruz Mountains, Loma Prieta Peak, and the Santa Clara Valley region. Anderson Reservoir completed in 1950 is the largest man-made lake in Santa Clara County and can store about 91,000 acre-feet of water. Surface water from the reservoir is also channeled into percolation ponds, where it recharges sand and gravel aquifers that underlie much of the valley. Due to the recent drought, the group was able to hike along an unmaintained trail near the spillway to examine faults, cinnabar-bearing serpentinite, silica-carbonate rocks, and volcanic rocks.

The final stop was at the Live Oak Group Area, where participants hiked to a large outcrop area below the dam's spillway to observe complexly folded and faulted Franciscan chert and greenstone.



The NCGS wishes to thank Dr. Philip Stoffer (USGS) and Dr. Richard Sedlock (San Jose State University) for preparing the richly illustrated guidebook. Unfortunately, only Dr. Stoffer was able to participate as a field trip leader. The NCGS also expresses gratitude to Tridib Guha for planning and organizing this interesting field trip to the South Bay.

Recent California Geological Survey Releases

Have You Had Time To Catch Up With the More Recent CGS Releases? Here Are a Number of Releases Ready for Purchase or Download:

Special Report 211
Radon Potential in the Lake Tahoe Area, California. [See Release Statement.](#) [Click here to view the map and report.](#) May 2009. \$30.00

Map Sheet 48 (Revised)
Earthquake Shaking Potential Map of California. [See Release Statement.](#) [Click here to view the map.](#) December 2008. \$5.00

Map Sheet 55A
Age and Character of Silicic Ash-Flow Tuffs at Haskell Peak, Sierra County, California: Part of a Major Eocene(?)-Oligocene Paleovalley Spanning the Sierra Nevada-Basin and Range Boundary. [See Release Statement.](#) November 2008. \$15.00

CD 2008-01
GIS Data for the Geologic Map of the Lake Tahoe Basin, California and Nevada. [See Release Statement.](#) September 2008. \$15.00

Special Publication 117A (revised)
Guidelines for Evaluating and Mitigating Seismic Hazards in California. [See Release Statement.](#)
September 2008. \$30.00 or [Free Download](#)

RGM Map No. 3
Geologic Map of the San Diego 30' x 60' Quadrangle. [See Release Statement and Sample Map.](#) July 2008. \$20.00

The ShakeOut Scenario - Effects of a Potential M7.8 Earthquake on the San Andreas Fault in Southern California. [Click here for the release statement.](#) May 2008. \$50.00

Special Report 207
The ShakeOut Earthquake Scenario - A Story That Southern Californians Are Writing. [Click here for the release statement.](#) May 2008. [Free Download](#)

Special Report 203
The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2). [Click here to view the release statement.](#) [Click here for the report.](#) April 2008. \$30.00

Bulletin 189
Minerals of California. [Click here to view the release statement.](#) [View the new cover image.](#)
\$15.00

Special Report 201
Radon Potential in Monterey County, California. [Click here to view the release statement.](#) [Click here for the report.](#) February 2008.

RGM Map No. 2
Geologic Map of the Oceanside 30' x 60' Quadrangle. [See Release Statement and Sample Map.](#) October 2007. \$20.00

Map Sheet 52 (Updated 2006)
Aggregate Availability in California. [See Release Statement.](#) [Download Report and Map.](#) 2006
\$25.00

Landslide Inventory Map Series
Landslide Inventory Maps of the Santa Teresa Hills, Morgan Hill and Mt. Sizer 7.5-Minute Quadrangles, Santa Clara County, California. [Map Release Statement.](#) [Download Maps.](#) December 2006 \$12.00/Each

Special Report 196
Landslides in the Highway 1 Corridor between Bodega Bay and Fort Ross, Sonoma County,

California. [Map Release Statement.](#) [Download Report.](#) November 2006 \$15.00

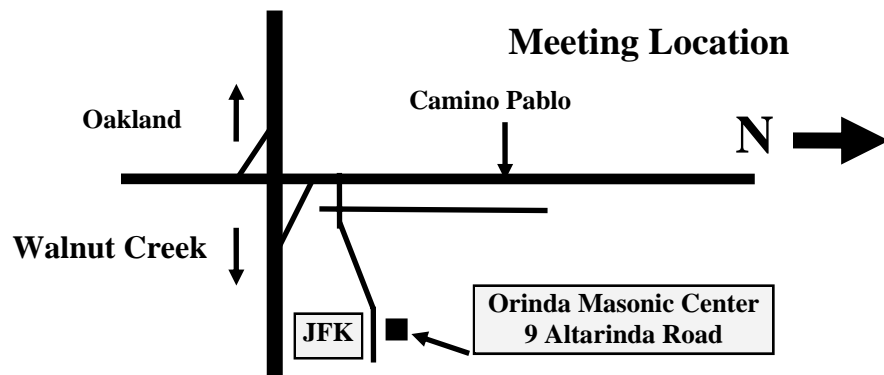
Special Report 195
Landslides in the Highway 299 Corridor between Blue Lake and Willow Creek, Humboldt County, California. [Map Release Statement.](#) [Download Report.](#) November 2006 \$15.00

Map Sheet 57
Simplified Geologic Map of California. [Map Release Statement.](#) October 2006 \$4.00

CGS Note 53
Regulatory Earthquake Hazard Zones - San Francisco - [Download here.](#) Free

Updated Website - "Access USGS – San Francisco Bay and Delta"
<http://sfbay.wr.usgs.gov/maps.html>

As of late April 2009 the USGS Western Region website for the San Francisco Bay Region has been updated and renamed. The biological portions of the new USGS have been incorporated into the website. There is a large emphasis on providing more content electronically. Publications, with links where available, can be browsed by author, keyword searches (author, title), and a link to the main USGS search engine is provided. Digital maps are available for download. Specialized satellite imagery (full size is up to 6 feet in length) with faults, landscape, and seascapes is downloadable. Coastal and Marine Remote Sensing Research and Applications (such as seafloor mapping of Monterey Bay, San Francisco Bay, and other central coast areas) and other applications are provided. Geologic map drapes on to Google Earth can be accessed and downloaded through a link to the *San Francisco Bay Region Geology and Geologic Hazards* page maintained in a cooperative arrangement with the CGS. This webpage contains links to Geologic Maps, Quaternary-Active Fault Maps, Liquefaction Susceptibility Maps, and a link to the old and familiar San Francisco Bay Region Geology Website. If you've not recently explored the new websites and links take a bit of time and explore!



boards including a National Research Council committee making recommendations to the US Department of Energy on environmental restoration of the Hanford facility. Dave is a founding co-leader of the USGS Toxic Substances Hydrology Program's Amargosa Desert Research Site. He holds a BS in Geology from Dickinson College and MS and PhD degrees in Hydrology from Stanford University. Recent publications include:

Garcia, C.A., Andraski, B.J., Stonestrom, D.A., Cooper, C.A., Johnson, M.J., Michel, R.L., and Wheatcraft, S.W., 2009, Transport of tritium contamination from the shallow unsaturated zone to the atmosphere in an arid environment: *Vadose Zone J.*, v. 8, no. 2, p. 450–461, doi:10.2136/vzj2008.0022.

Maher, K., Steefel, C.I., White, A.F., and Stonestrom, D.A., 2009, The role of reaction affinity and secondary minerals in regulating chemical weathering rates at the Santa Cruz soil chronosequence, California: *Geochimica et Cosmochimica Acta*, v. 73, no. 10, p. 2804–2831, doi:10.1016/j.gca.2009.01.030.

Niswonger, R.G., Prudic, D.E., Fogg, G.E., Stonestrom, D.A., and Buckland, E.M., 2008, Method for estimating spatially variable seepage loss and hydraulic conductivity in intermittent and ephemeral streams: *Water Resources Research*, v. 44, doi:10.1029/2007WR006626.

Scanlon, B.R., Stonestrom, D.A., Reedy, R.C., Leaney, F.W., Gates, J., and Cresswell, R.G., 2009, Inventories and mobilization of unsaturated zone sulfate, fluoride, and chloride related to land use change in semiarid regions, southwestern US and Australia: *Water Resources Research*, v. 45, doi:10.1029/2009WR006963.

Stonestrom, D.A., 2009, Assessing recharge across the Southwest: *Southwest Hydrology*, v. 8, no. 1, p. 10–11.

Stonestrom, D.A., Scanlon, B.R., and Zhang, L., 2009, Introduction to special section on Impacts of Land Use Change on Water Resources: *Water Resources Research*, v. 45, doi:10.1029/2009WR07937.

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