January 2015

The Record – Newsletter of the South Coast Geological Society

MEETING DATE: Monday, January 12th, 2015

In this Edition:

Meeting Information

Time: 6:00 P.M. – Social Hour
6:50 P.M. – Dinner
7:45 P.M. – Presentation
Place: DoubleTree Club Hotel
7 Hutton Centre Drive
Santa Ana, CA
Cost: $25 (member), $30 (non-member), $15 – Student/Professor – includes a free gift for first time students!
Additional $5 fee applies to reservations made after noon on Friday, January 9th **and there is an additional $2 fee for credit card purchases.**

Please make your Reservation Online: www.southcoastgeo.org/meetings.shtml or contact our Secretary

Speaker: Dr. Matthew Kirby

Topic:

10,000 Years of Summer vs. Winter Influence on Mojave Hydroclimates where and what time?

Bio:

Matthew kirby obtained his A.B. from Hamilton College. He is an Associate Professor at Cal State Fullerton. He studies past climate using lake and wetland sediments.

Abstract:

Silver Lake is the modern terminal playa of the Mojave River. As a result, it is well located to record both influences from the winter precipitation dominated San Bernardino Mountains – the source of the Mojave River – as well as the late-summer to early-fall North American monsoon. Here, we present various physical and geochemical data from a new 8.2 m sediment core taken from Silver Lake, CA that spans modern through 14.8 kcal yrs BP. Age control is based on six bulk organic C radiocarbon dates processed with Bacon v2.2 to generate an age model. Texturally, the core varies between a clayey sand and a silty sand, often with abrupt sedimentological transitions. Our working hypothesis states that high percent clay values indicate persistent standing water wherein the deposition, accumulation, and preservation of fine grain sediment exceeds some undefined thickness that inhibits deflation during succeeding desiccation events or ephemeral lake environments. Based on this clay – lake status hypothesis, the sediment core is divided into five lake status intervals. Clay values are highest between 14.4 – 13.6 kcal yrs BP, coeval to Lake Mojave II. Clay values decrease abruptly at 13.6 kcal yrs BP (encapsulating the Younger Dryas) indicating a return to an ephemeral lake. At 11.6 kcal yrs BP, clay values rise abruptly indicating a return to a perennial lake; this early Holocene pluvial ended abruptly at 7.4 kcal yrs BP. From 7.4 – 4.2 kcal yrs BP, clay is low, but variable and mudcracks are common. At 4.2 kcal yrs BP, clay values increase but only moderately indicating a return to more frequent sustained perennial lakes. The early Holocene pluvial is likely a result of higher summer insolation, which generated a more intense and spatially expansive North American monsoon. Coupled with lower winter insolation and thus more winter storms across the region, Silver Lake flourished. A comparison to stable carbon isotope data from Leviathan Cave (NV), support our interpretation as indicated by more productive soils (i.e., wetter) (Lachniet et al., 2014). The resurgence of a wet Mojave ca. 4.2 kcal yrs BP is also supported by the NV cave data. We attribute this late Holocene pluvial to the strengthening of El Niño.

2015 Membership Information

The regular membership rate continues to be $20 (deal!) and Student membership continues to be free of charge. If you know a student, please forward them a form. Students, we want you here!

Interested in a Corporate Sponsorship? We hope so! Corporate sponsorships start at $250 and include the placement of a corporate logo and contact information in the monthly newsletter, on our website and in our Annual Guidebook. Your corporate sponsorship will enable us to continue to offer stellar field trips, publish our guidebooks and increase student attendance!

President's Corner

Holiday Greetings to SCGS!

As we take time to enjoy the holidays I want to first of all thank the 2014 officers for their hard work in producing a great 2014 for the SCGS! Special thanks to Sandy for his time at the helm, to Chris for his work on the monthly newsletters, to Dan for keeping us solvent, to Corey for handling publications, to Stephen for his continued support as Society historian, and not the least to past Presidents Paul and Jeff for their support and continuity. We had some informative guest speakers (Dr. Lucy Jones comes to mind), a well-attended annual field trip to the White-Inyo Mountains (kudos to Sandy and the team), and a great poster session – very informative. This year has also seen a surge in new members, especially students for which I'm grateful that we have a secured future for our profession and the Society – keep it up!.

For 2015, in addition to my time as the President, we'll have another great officer list:

Chris Baker, Vice President
Gregory Shagam, Secretary
Michael Cronin, Treasurer
Corey Stout, Publications
Stephen Jacobs, Historian
Jeff Miller, Social Media Manager

You'll notice that Jeff has offered to fill a new role for the Society in a social media capacity – thanks Jeff! This is also the time of year to renew membership, so if you haven't yet, please do so at the January meeting, or pass along the invite to someone you know. Additionally, now is the time for us to get corporate sponsors, of which funding helps us create a meaningful Society, including the ability to provide local scholarships, etc.

For 2015 we are working on getting interesting speakers, starting with Dr. Matt Kirby of CSUF talking about his studies on past climate using lake and wetland sediments, and likely in March we will have a meeting again at CSULB. We will be sending out more announcements, but the 2015 annual field trip looks to be in the Southern Sierras sometime in early fall, so stay tuned (and I may call on some of our members for help!).

Best Wishes,

Bob Ruscitto

2015 SCGS President

Local Business Highlight

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After 20 years in Nevada we have relocated to Orange County. We feature the largest selection of earth science publications (new, used & rare) in one location in North America; as well as minerals, fossils, meteorites, decorator items, and unique colored stone jewelry.

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This Month in Geology

Historic Earthquakes- The New Madrid Seismic Zone is at Significant Risk for Damaging Earthquakes

A Sequence of Three Main Shocks in 1811-1812

This sequence of three very large earthquakes is usually referred to as the New Madrid earthquakes, after the Missouri town that was the largest settlement on the Mississippi River between St. Louis, Missouri and Natchez, Mississippi. On the basis of the large area of damage (600,000 square kilometers), the widespread area of perceptibility (5,000,000 square kilometers), and the complex physiographic changes that occurred, the New Madrid earthquakes of 1811-1812 rank as some of the largest in the United States since its settlement by Europeans. They were by far the largest east of the Rocky Mountains in the U.S. and Canada. The area of strong shaking associated with these shocks is two to three times as large as that of the 1964 Alaska earthquake and 10 times as large as that of the 1906 San Francisco earthquake. Because there were no seismographs in North America at that time, and very few people in the New Madrid region, the estimated magnitudes of this series of earthquakes vary considerably and depend on modern researchers' interpretations of journals, newspaper reports, and other accounts of the ground shaking and damage. The magnitudes of the three principal earthquakes of 1811-1812 described below are the preferred values taken from research involved with producing the 2008 USGS National Seismic Hazard Map (http://pubs.usgs.gov/of/2008/1128/).

A Robust Aftershock Sequence for each Main Shock

The first principal earthquake, M7.5, occurred at about 2:15 am (local time) in northeast Arkansas on December 16, 1811. The second principal shock, M7.3, occurred in Missouri on January 23, 1812, and the third, M7.5, on February 7, 1812, along the Reelfoot fault in Missouri and Tennessee. The earthquake ground shaking was not limited to these principal main shocks, as there is evidence for a fairly robust aftershock sequence. The first and largest aftershock occurred on December 16, 1811 at about 7:15 am. At least three other large aftershocks are inferred from historical accounts on December 16 and 17. These three events are believed to range between M6.0 and 6.5 in size and to be located in Arkansas and Missouri. This would make a total of seven earthquakes of magnitude M6.0-7.5 occurring in the period December 16, 1811 through February 7, 1812. In total, Otto Nuttli reported more than 200 moderate to large aftershocks in the New Madrid region between December 16, 1811, and March 15, 1812: ten of these were greater than about 6.0; about one hundred were between M5.0 and 5.9; and eighty-nine were in the magnitude 4 range. Nuttli also noted that about eighteen hundred earthquakes of about M3.0 to 4.0 during the same period.

Large Area of Damaging Shaking

The first earthquake of December 16, 1811 caused only slight damage to man-made structures, mainly because of the sparse population in the epicentral area. The extent of the area that experienced damaging earth motion, which produced Modified Mercalli Intensity greater than or equal to VII, is estimated to be 600,000 square kilometers. However, shaking strong enough to alarm the general population (intensity greater than or equal to V) occurred over an area of 2.5 million square kilometers.

Shaking Caused Sand Blows, River Bank Failures, Landslides, and Sunken Land

The earthquakes caused the ground to rise and fall - bending the trees until their branches intertwined and opening deep cracks in the ground. Deep seated landslides occurred along the steeper bluffs and hillslides; large areas of land were uplifted permanently; and still larger areas sank and were covered with water that erupted through fissures or craterlets. Huge waves on the Mississippi River overwhelmed many boats and washed others high onto the shore. High banks caved and collapsed into the river; sand bars and points of islands gave way; whole islands disappeared. Surface fault rupturing from these earthquakes has not been detected and was not reported, however. The region most seriously affected was characterized by raised or sunken lands, fissures, sinks, sand blows, and large landslides that covered an area of 78,000 - 129,000 square kilometers, extending from Cairo, Illinois, to Memphis, Tennessee, and from Crowley's Ridge in northeastern Arkansas to Chickasaw Bluffs, Tennessee. Only one life was lost in falling buildings at New Madrid, but chimneys were toppled and log cabins were thrown down as far distant as Cincinnati, Ohio, St. Louis, Missouri, and in many places in Kentucky, Missouri, and Tennessee.

A notable area of subsidence that formed during the February 7, 1812, earthquake is Reelfoot Lake in Tennessee, just east of Tiptonville dome on the downdropped side of the Reelfoot scarp. Subsidence there ranged from 1.5 to 6 meters, although larger amounts were reported.

Other areas subsided by as much as 5 meters, although 1.5 to 2.5 meters was more common. Lake St. Francis, in eastern Arkansas, which was formed by subsidence during both prehistoric and the 1811-1812 earthquakes, is 64 kilometers long by 1 kilometer wide. Coal and sand were ejected from fissures in the swamp land adjacent to the St. Francis River, and the water level is reported to have risen there by 8 to 9 meters.

Large waves (seiches) were generated on the Mississippi River by seismically-induced ground motions deforming the riverbed. Local uplifts of the ground and water waves moving upstream gave the illusion that the river was flowing upstream. Ponds of water also were agitated noticeably.

Surface Deformation--Evidence for Pre-Historic Earthquakes

The Lake County uplift, about 50 kilometers long and 23 kilometers wide, stands above the surrounding Mississippi River Valley by as much as 10 meters in parts of southwest Kentucky, southeast Missouri, and northwest Tennessee. The uplift apparently resulted from vertical movement along several, ancient, subsurface faults. Most of the uplift occurred during prehistoric earthquakes. A strong correlation exists between modern seismicity and the uplift, indicating that stresses that produced the uplift may still exist today. Within the Lake County uplift, Tiptonville dome, which is about 14 kilometers in width and 11 kilometers in length, shows the largest upwarping and the highest topographic relief. It is bounded on the east by 3-m high Reelfoot scarp. Although most of Tiptonville dome formed between 200 and 2,000 years ago, additional uplifting deformed the northwest and southeast parts of the dome during the earthquakes of 1811-

January 2015

1811, December 16, 08:15 UTC Northeast Arkansas - the first main shock
2:15 am local time
Magnitude ~7.5

This powerful earthquake was felt widely over the entire eastern United States. People were awakened by the shaking in New York City, Washington, D.C., and Charleston, South Carolina. Perceptible ground shaking was in the range of one to three minutes depending upon the observers location. The ground motions were described as most alarming and frightening in places like Nashville, Tennessee, and Louisville, Kentucky. Reports also describe houses and other structures being severely shaken with many chimneys knocked down. In the epicentral area the ground surface was described as in great convulsion with sand and water ejected tens of feet into the air (liquefaction).

1811, December 16, 13:15 UTC Northeast Arkansas - the "Dawn" Aftershock
7:15 am local time
Magnitude ~7.0

A large event felt on the East Coast that is sometimes regarded as the fourth principal earthquake of the 1811-1812 sequence. The event is described as "severe" at New Bourbon, Missouri, and was described by boatman John Bradbury, who was moored to a small island south of New Madrid, as "terrible, but not equal to the first". Hough believes that this large aftershock occurred around dawn in the New Madrid region near the surface projection of the Reelfoot fault.

1812, January 23, 15:15 UTC, New Madrid, Missouri
9:15 am local time,
Magnitude ~7.3

The second principal shock of the 1811-1812 sequence. It is difficult to assign intensities to the principal shocks that occurred after 1811 because many of the published accounts describe the cumulative effects of all the earthquakes and because the Ohio River was iced over, so there was little river traffic and fewer human observers. Using the December 16 earthquake as a standard, however, there is a general consensus that this earthquake was the smallest of the three principals. The meizoseismal area was characterized by general ground warping, ejections, fissuring, severe landslides, and caving of stream banks.

1812, February 7, 09:45 UTC, New Madrid, Missouri
3:45 am local time,
Magnitude ~7.5

The third principal earthquake of the 1811-1812 series. Several destructive shocks occurred on February 7, the last of which equaled or surpassed the magnitude of any previous event. The town of New Madrid was destroyed. At St. Louis, many houses were damaged severely and their chimneys were thrown down. The meizoseismal area was characterized by general ground warping, ejections, fissuring, severe landslides, and caving of stream banks.

Corporate Sponsorship

The South Coast Geological Society (SCGS) is one of the most active geological societies in California. This is due to the continued excellent participation of its members, the celebrated monthly speakers, and the renowned annual field trips and guidebook publications. The SCGS is devoted to promoting the Earth Sciences and minimize business and political debate.

SGGS members include persons in geologic professions largely living and/or working in Orange County, California. Membership includes all disciplines, ranging from hydrogeologists, geotechnical engineers, petroleum geologists, mining geologists, environmental geologists, college professors, to students. It is a society run by volunteers, with the purpose of sharing geologic ideas and fellowship during monthly meetings and an annual field trip.

To encourage student membership and participation, the student membership dues are free, and dinner costs are reduced for all professors and students attending a meeting.

Corporate sponsorship is encouraged and greatly appreciated. Sponsorships assist by funding guidebook publication, offsetting the food and supply costs for the annual field trip, and funding scholarships.

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Forms

Links to all forms and information will later be found here, such as Member application forms, List of publications order form, Field-trip release forms and Itinerary, Corporate sponsorship and membership forms, Etc.

Upcoming Meetings

San Diego Association of Geologists Meeting: – **Upcoming SDAG meetings - 2015**

January 21: Renee Deutsch - The Impossible Landslide (Carrizo Gorge's 1932 Goat Canyon Disaster)

February 18: Chuck Houser - Calcite

http://www.sandiegogeologists.org/Meeting.html

AEG Meeting: – January 12-17—Basin and Range Province Seismic Hazard Summit III, Salt Lake City, UT

http://www.aegsc.org/calendar/

LA Basin Geological Society Meeting: – Last meeting was Oct 23. 2014. No 2015 schedule posted.

http://www.labgs.org/

AEG Inland Empire Meeting: – Last meeting November 13th, 2014. No meeting information posted for 2015.

http://www.aegsc.org/chapters/inlandempire/meetings/

Groundwater Resources Association of California: –

GRACast

Land Subsidence Series, Part 2

January 14, 2015

http://www.grac.org/

GRA Symposium

Oil, Gas, and Groundwater in California

February 18-19, 2015 - Long Beach, CA

Society for Mining, Metallurgy &Exploration: –

Event: Section Meeting
When: Tuesday, February 21 @ 6:00PM - 9:00PM
Where: Pomona Valley Mining Co Restaurant, 1777 Gillette Road, Pomona, CA 91768
Presentor: G. Todd Ririe
Topic: BP Energy Outlook http://www.smenet.org/docs/public/SoCal-2012FebSMENewsletter.pdf

http://http://www.smenet.org/SouthernCalifornia/