

# Inland Geological Society

January 2013

Newsletter of the Inland Geological Society

Volume 29 No. 1

*This Meeting:*  
**Thursday,  
January 10<sup>th</sup>**

Time:  
Social: 6:00pm  
Dinner: 6:30pm  
Lecture: 7:00pm

Location:  
**LSA Associates  
1500 Iowa Ave  
Suite 200  
Riverside, CA  
92507  
(Map on Pg. 4)**

Coming to  
Dinner?  
**Please RSVP:  
By Monday 1/7  
(951) 784-2168  
dixie.lass@att.net**

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## **January Speaker:**

**Dr. Steve Lipshie**

**Retired, L.A. County, Department of Public Works**

## **Quaternary volcanic history of the Long Valley caldera and Mono Craters**

### *Abstract*

The Long Valley caldera is a volcanic collapse depression east of the Sierra Nevada in southern Mono County. The caldera is elliptical in shape, measuring 29 km east-west and 16 km north-south. It was formed 760,000 years ago during the cataclysmic eruption of the Bishop Tuff, an event that released ~600 cu km of magma that was deposited as 800 cu km of volcanic ash and tuff, possibly in less than a week. The partial emptying of the magma chamber resulted in the floor of the caldera dropping vertically 3 km, of which 2 km have been filled in by subsequent volcanic eruptions and sediment deposition. During the first 100,000 years after the caldera formed, a series of rhyolite domes and flows were emplaced in the center of the caldera to form a “resurgent dome,” surrounded by lowlands called “moats.” The resurgent dome is roughly circular in shape and about 10 km across, with total topographic relief of ~400 m. Around the margin of the resurgent dome are three clusters of later rhyolite domes and flows that erupted at approximately 200,000-year intervals, starting 500,000 years ago and ending 100,000 years ago (so far).

About 160,000 years ago, mafic (basalt and andesite) lava started erupting in the western part of the caldera, spreading across the western and southern moats. Mafic eruptions continued until about 60,000 years ago. The intrusion of mafic magma at depth provided the heat to melt shallow crustal rocks and form rhyodacite magma. A series of rhyodacite eruptions along the southwest margin of the caldera between 110,000 and

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55,000 years ago formed Mammoth Mountain, which has over 800 m of relief. The rhyodacite magma chamber is chemically different from the rhyolite magma chamber for the main Long Valley caldera. Increases in seismic activity and carbon dioxide outgassing at Mammoth Mountain in 1989-90 suggested that a magma dike had gotten within 3 km of the surface at that time, but since then no further dike movement has been reported.

Farther north, the Mono Craters area was a later focus of volcanic activity. Beginning about 40,000 years ago, a series of rhyolite domes and flows was emplaced along a 15-km-long arc that extended from Mono Lake southward to about 7 km north of the Long Valley caldera. The youngest Mono Craters rhyolite domes formed about 700 years ago at the north and south ends of the chain, although there is evidence of subsurface magma intrusion around 300 years ago under Mono Lake. Also at about 700 years ago, most of the rhyolite domes of the Inyo Craters chain were formed. The Inyo Craters lie along a north-south line between the south end of the Mono Craters and the northwest quadrant of the Long Valley caldera. The Inyo Craters rhyolite is a mixture of magmas from the Long Valley and Mono Craters magma chambers. The Inyo Craters domes were fed by rhyolite dikes that intruded along a vertical fracture connecting the two magma chambers. The most recent volcanic activity in the Inyo Craters chain occurred about 600 years ago.

While another cataclysmic eruption like that which produced the Bishop Tuff is highly unlikely – the remaining magma chamber is too small for that – a possibility of significant volcanic activity, mafic or silicic, still exists. The geologic record of the past millennium suggests that another volcanic eruption in the next several hundred years is not out of the question. But if you are a skier, don't let that deter you from your ski trips to Mammoth.

### ***Biography:***

**Steve Lipshie** has a B.S. degree in geophysics from Caltech and M.S. and Ph.D. degrees in geology from UCLA. His M.S. thesis dealt with the engineering geology of the Mammoth Lakes area, a project that launched his interest in the topic of his talk. His first employment after the bachelor's degree was in seismic exploration, looking for oil in south Louisiana for ARCO (but mostly finding places not to drill). After graduate school he taught in temporary positions at North Carolina State University, Iowa State University, and Cal State Northridge. From 1990 to 2010 he worked as an engineering geologist for the L.A. County Department of Public Works, where he was involved in various hydrogeology, engineering geology, and environmental geology projects. In 2004 and 2007 he taught engineering geology at Cal State Northridge. Since 2010 he has been retired and living a life of leisure.

## **SPEAKERS WANTED**

**We are still looking for more speakers for future meetings.**

**Tell us what you have been working on!**

**Students of all levels are encouraged to participate!**

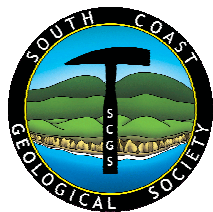
**Contact Jon Smith, Debbie Kunath or Steve Mains  
to get your name in the schedule!**

## Upcoming Meetings/Events

### Rock & Gem Shows—Various locations

Various rock and mineral shows will be throughout So. California. To find one near you, visit [www.rockngem.com/showdates.asp](http://www.rockngem.com/showdates.asp)

### South Coast Geological Society Meeting



Eleanora (Norrie) Robbins from the San Diego State University, Department of Geological Sciences, will be giving a talk on "Geoethics: Past, Present, Future". The meeting will be on **Monday,**

**January 14, 2013** at the DoubleTree Club Hotel in Santa Ana, CA. For more info., visit [www.southcoastgeo.org](http://www.southcoastgeo.org)

### San Diego Assoc. of Geologists Meeting



Christie Hale and Megan Williams, NRC Region IV, will be speaking at the SDAG joint meeting with EERI and SEAOD on **Wednesday, January 16, 2013.** For more info, visit [www.sandiegoeologists.org](http://www.sandiegoeologists.org)

### L.A. Basin Geological Society Meeting



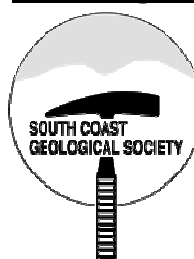
Ted Johnson, Chief Hydrogeologist of the Water Replenishment District of Southern California, will be presenting a talk on "Hydraulic Fracturing and Groundwater: A Perspective from an LA Water District". The meeting will be held on **Thursday, January 24, 2013.** For more info, visit [www.labgs.org](http://www.labgs.org)

### San Diego Assoc. of Geologists Meeting



Al Trujillo from Palomar College will be giving a talk at the February meeting on **Wednesday, February 27, 2013.** For more info, visit [www.sandiegoeologists.org](http://www.sandiegoeologists.org)

### San Diego Assoc. of Geologists Meeting



Dr. Mario Caputo from San Diego State University will be giving a talk at the March meeting on **Wednesday, March 20, 2013.** For more info, visit [www.sandiegoeologists.org](http://www.sandiegoeologists.org)

## IGS Meeting Schedule

### **February 6, 2013 (Wednesday)**

TBA

### **March 7, 2013 (Thursday)**

Dr. David Bowman

TBA

### **April 3, 2013 (Wednesday)**

TBA

### **May 2, 2013 (Thursday)**

TBA

### **June 5, 2013 (Thursday)**

Mr. John Jansen

2013 NGWA McEllhiney Lecturer

TBA

**IGS MEETING LOCATION:**

**LSA Associates, Inc.  
1500 Iowa Ave, Suite 200  
Riverside, CA 92507**

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