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## **Highlights from the April issue of the *Bulletin of the Seismological Society of America***

### ***“Stringing pearls” – Linking pre-historic seismic events on the San Andreas Fault***

The complex San Andreas Fault is the focus of great earthquakes in California’s history. In order to assess the likelihood of future great ruptures along the fault, scientists need to understand how many large earthquakes have occurred in the past, where and when. This problem is inaccessible to conventional paleoseismic studies at individual sites because each individual site cannot tell us how much of the fault ruptured in one earthquake.

In research published today, authors Biasi and Weldon combine paleoseismic event data from multiple sites on the fault into all possible rupture scenarios allowed by event dating. They use a total of 56 event observations at eight paleoseismic sites spread from central California to the Coachella Valley. Of all scenarios only a fraction are approximately consistent with the fault slip rate and other constraints. Scenarios in that fraction, however, have common properties that indicate what the fault is likely to have done in the past. Rupture scenarios can be used directly to produce estimates of seismic hazard from the San Andreas fault that do not depend on resolving which paleoseismic event correlates precisely with which other event. Based on current data it appears that several events similar to the historical 1857 earthquake, the largest known earthquake in southern California, have occurred on the southern San Andreas Fault since approximately A.D. 900.

San Andreas Fault Rupture Scenarios From Multiple Paleoseismic Records: “Stringing Pearls,” *BSSA*, Volume 99:2A, by Glenn P. Biasi, University of Nevada Reno.

### ***Evidence for Great Tsunamigenic Quakes along Mexican Coast.***

In 1787 a great earthquake struck the western coast of Mexico and Central America, producing a tsunami so large that it swept fishermen and fish inland about six kilometers from the sea. New analysis suggests that similar great earthquakes of magnitude 8.6 with very long recurrence times may take place along the coast of Mexico and Central America, even though the region has been dominated by lesser quakes during the last 100 years.



The series of earthquakes in 1787 appear to be one of the larger events to have occurred along the Mexican subduction zone during the last 500 years. The rupture length of the main earthquake was at least three times longer than those normally observed for earthquakes that take place in the Mexican subduction zone. The earthquake appears to have ruptured a long fault segment that has recently produced earthquakes of more moderate magnitude and relatively short recurrence times of about 30 – 40 years.

“Evidence for Great Tsunamigenic Earthquakes (M8.6) along the Mexican Subduction Zone,” *BSSA*, Vol. 99:2A. Authors: Gerardo Suárez, Instituto de Geofísica, Universidad Nacional Autónoma de México, México D.F.; and Paola Albinì, Istituto Nazionale di Geofisica e Vulcanologia, Milano, Italy.

### ***Icequakes and glacier flow***

While most seismologists study earthquakes that occur due to the movement of the Earth's tectonic plates, glacial earthquakes are seismic signals due to the fracturing of the ice and these events can teach us about the processes which influence how glaciers flow. The glacial earthquakes associated with large glaciers in Alaska, Antarctica, and Greenland have been observed on global seismic networks and glacial earthquakes can also be observed by seismometers both on and in the immediate vicinity of the glaciers.

Fabian Walter, et al., present a method for identifying the seismic source of icequakes, based on the seismograms of icequakes recorded during the summers of 2004 and 2006, respectively, on glacier Gornergletscher, Switzerland. The authors suggest that most icequake signals recorded reflect tensile faulting due to the opening of surface crevasses, and to a much lesser degree, shear faulting similar to earthquakes in the Earth's crust. At intermediate depths of about 100 meters within a glacier, seismic events are related to the presence of water that reduces the effective stress to allow for tensile faulting.

Moment Tensor Inversions of Icequakes on Gornergletscher, Switzerland, *BSSA*, Volume 99:2A. Authors: Fabian Walter, ETH Zurich; John F. Clinton, Nicholas Deichmann, Douglas S. Dreger, Sarah E. Minson and Martin Funk.