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Embargoed: Jan. 26, 2012, 3 PM Eastern

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New seismology research on Haiti, slow earthquakes and the southern San Andreas Fault, featured in Feb. 2012 issue of *BSSA*

Please cite the *Bulletin of the Seismological Society of America* (*BSSA*) as the source of these papers. BSSA is published by the Seismological Society of America

2010 Haiti quake possible start of new cycle of seismic activity, according to new study

The January 2010 quake that destroyed much of Port-au-Prince may have marked the start of a new cycle of active seismicity, putting Haiti and the Dominican Republic at high risk of future devastating earthquakes.

The island of Hispaniola, which is home to the two countries of Haiti and Dominican Republic, has a long seismic history, recorded by explorers, pirates and settlers from Spain, France, England and Holland. There are ample accounts of the physical condition of the island over the last 500 years that U.S. Geological Survey researchers used to evaluate the intensity of past earthquakes and estimate their location and magnitudes.

This article documents the seismic activity along the Enriquillo fault system, which reflects a period of significant earthquakes with intense aftershocks, followed by a long 240-year period of relative seismic quiescence. The island's last intense period of seismic activity was from 1700 to 1770. Author William Bakun and his colleagues point to the similar seismic pattern in the San Francisco Bay Area, where the seismic cycle includes a period of significant earthquake activity followed by a period of relative quiescence.

While the January 2010 earthquake that struck Haiti was only magnitude 7.0, it caused great damage and loss of life due to poor planning and inadequate building practices. Bakun and his colleagues suggest planning for strong earthquakes based on the pattern of earthquakes that have occurred since

1500.

"Significant Earthquakes on the Enriquillo Fault System, Hispanioloa, 1500 - 2010: Implications for Seismic Hazard," by William Bakun, Claudia Flores and Uri ten Brink of the U.S. Geological Survey.

Corresponding author: William Bakun, who can be reached at bakun@usgs.gov.

Slow slip events vs. earthquakes

Slow slip events (SSE), or slow earthquakes, reflect a transient release of strain over days or weeks and have been documented worldwide, particularly in subduction zones where one tectonic plate lurches slowly under another plate. SSEs have also been documented along the San Andreas Fault and Hawaii, and the mechanics of slow slip events are not entirely understood.

In this paper, researchers from University of Rhode Island and University of Oregon explore the scaling relationships of various source parameters of SSEs and compare them to similar scaling laws for earthquakes. Source scaling similarities and differences between slow slip and earthquakes are presented and interpreted here.

Further study is needed, say the authors, to understand well the physical mechanisms of slow slip events, whose occurrence brings some new insights into our knowledge about fault mechanics. Whether occurrence of SSEs increases or decreases the potential probability of the next megathrust earthquakes in subduction zones is still enigmatic.

“Scaling Relationships of Source Parameters for Slow Slip Events,” by Haiying Gao at University of Rhode Island (formerly at University of Oregon) and David A. Schmidt and Ray J. Weldon II at University of Oregon, Eugene.

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Newly defined "propeller-like" geometry of southern San Andreas Fault, implications for ground motion assessments

The San Andreas Fault (SAF) in Southern California may not be primarily vertical or steeply dipping, as is widely thought. A new study suggests a geometry that crudely resembles a propeller, which may require a re-thinking of the anticipated ground motions from future quakes.

By analyzing near surface and subsurface data from various studies, researchers at U.S. Geological Survey and UCLA constrained the direction of the dip of the SAF, which appears to change in a systematic way throughout the Transverse Ranges.

Since existing ground motion calculations for the southern San Andreas Fault assume a vertical fault in most places, the authors suggest new calculations be made based on the new interpretation of the fault's geometry.

"A New Perspective o the Geometry of the San Andreas Fault in Southern California and its Relationship to Lithospheric Structure," by Gary Fuis, Daniel Scheirer and Victoria Langenheim at the U.S. Geological Survey; and Monica D. Kohler at UCLA.

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