

Panama Canal, Panama City at risk of large earthquake, says new research

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New data suggest that the Limon and Pedro Miguel faults in Central Panama have ruptured both independently and in unison over the past 1400 years, indicating a significant seismic risk for Panama City and the Panama Canal, according to research published today by the *Bulletin of the Seismological Society of America* (BSSA).

The Panama Canal is undergoing expansion to allow for greater traffic of larger ships, scheduled for completion by 2014. As part of a seismic hazard characterization for the Panama Canal Authority (ACP) expansion project, Rockwell, et al., studied the geologic and geomorphic expression of the Pedro Miguel, Limon, and related faults, followed by an in-depth study into their earthquake and displacement history, critical factors in the design of the Panama Canal new locks and associated structures.

"The Pedro Miguel fault actually runs between the existing Pacific locks - the Pedro Miguel and Miraflores locks - and last ruptured in a large earthquake in 1621," said lead author Thomas K. Rockwell, professor of geology at San Diego State University. "That earthquake resulted in nearly 10 feet of displacement where the fault crosses the canal, and a similar amount of offset of the historical Camino de Cruces, the old Spanish cobblestone road that was used to haul South American gold across the isthmus. Another such earthquake today could have dramatic effects."

The Republic of Panama sits atop two colliding [tectonic plates](#) -- Central

and South America -- and is internally deforming at a significant rate. The Pedro Miguel, Limon and related faults comprise a zone that extends from the southern flank of the Sierra Maestra in north central Panama southward for at least 40 km (about 25 miles) crossing the Panama Canal between the Miraflores and Pedro Miguel Locks, and extending southward offshore into the Gulf of Panama.

Paleoseismic work by Rockwell, et al., demonstrates that both the Limon and Pedro Miguel faults are seismically active, having a relatively short recurrence rate for large earthquakes, with displacements in the range of 1.5 to 3 meters (4.9 to 9.8 feet). The oldest event on the Pedro Miguel fault is estimated at 455 AD and is older than any of the events recorded for the Limon fault. However, the penultimate Pedro Miguel event and the third Limon fault event identified in this study have very similar ages at about 700 AD and may represent rupture of the entire onshore zone.

The apparent ability for these two distinct faults to fail in unison has important implications for [Panama Canal](#). While no fault passes through or beneath any critical structures, the area and structures would be subject to significant shaking. The authors note that the close proximity of Panama City to this active fault zone, and the lack of consideration of earthquake loads in structural design codes, puts this area at high [seismic risk](#), particularly before current buildings can be replaced with stronger, more earthquake-resistant construction.

Provided by Seismological Society of America

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