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"Hoodoos" possible key to earthquakes and new Osaka Basin map identifies high-rise buildings at risk from quakes, and more in February issue of *BSSA*

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Hoodoos – key to earthquakes?

In the absence of long-term instrumental data, fragile rock formations, called hoodoos, may be key to understanding seismic hazard risk. In this study, researchers consider two hoodoos in Red Rock Canyon region to put limits on expected intensity of ground motion from earthquakes along the Garlock fault.

Hoodoos can be found in desert regions and are highly susceptible to erosion that makes their age uncertain. Despite that uncertainty, existing unfractured hoodoos, tall spires of sedimentary rock, may help put limits on ground motion associated with recent events by understanding the minimal force necessary to break the shafts made primarily of relatively soft sandstone.

The Garlock fault region features an active strike-slip fault. Anooshehpoor, et al., estimated the tensile strength of two hoodoos and considered previously published physical evidence of fault offsets that suggest at least one large earthquake, resulting in seven meters (23 feet) of slip, in the last 550 years. And yet, the hoodoos are still intact, suggesting median or low level of ground motion associated with the large quakes in this region.

While the age of the hoodoos cannot be exactly ascertained, the authors argue that these rocks can still serve as a valuable tool in constraining ground motion and thus contribute to the development of probabilistic seismic hazard assessments in the area.

"Constraints on Ground Accelerations Inferred from Unfractued Hoodoos near the Garlock Fault, California," BSSA 103:1; Rasool Anooshehpoor, U.S. Nuclear Regulatory Commission; James N. Brune, Jaak Daemen and Matthew D. Purvance of University of Nevada, Reno.

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Osaka Basin: a new map identifies high-rise buildings at risk from quakes

The Osaka Basin, Japan is home to many high-rise buildings that sit atop its thick soft sediments, vulnerable to long-period strong ground motions that last minutes. A new map created by Japanese researchers is intended to guide engineers and city planners in new construction and identifies existing buildings with the potential of resonance vibration.

The Osaka Basin in western Japan is surrounded by short mountain ranges, affected by large (M 8+) interplate earthquakes generated outside of the basin. Interplate earthquakes occur at the boundary between two tectonic plates. Historical literature suggests interplate earthquakes have occurred here repeatedly, recurring approximately every 100 years.

Mitigation of future large earthquake damage is of critical importance to the area, particularly given its large population and many high-rise buildings. Using a 3D subsurface structure model of the Osaka Basin, ground motion records and analysis of the basin's geological features, researchers computed the predominate periods of earthquake motion for the entire basin. The resulting map provides useful information for engineers to design earthquake resistant buildings.

While most high-rise buildings in the Osaka Basin, according to this study, show little risk of vibrating resonantly with strong ground motion, the authors suggest that the map "provides a warning concerning resonant vibration to high-rise buildings." The authors identify specific high-rise buildings that should be re-evaluated for seismic safety and retrofitting.

"Long predominant period map and detection of resonant high-rise buildings in the Osaka Basin, western Japan," BSSA, 103:1; by Ken Miyakoshi of the Geo-Research Institute; Masanori Horike and Ryoji Nakamiya of the Osaka Institute of Technology.

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