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New research findings impact Seattle, Sierra Nevada
October 2011 issue of Bulletin of the Seismological Society of America

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Improved ground motion prediction for Seattle Basin
Seattle, Washington sits atop a deep, complex sedimentary basin that is known to amplify seismic shaking. Researchers at University of Washington have developed a new model to evaluate the velocity of seismic waves at shallow depth, offering new detail of the top 3.5 kilometers (~2.1 miles) that will lead to refined seismic hazard assessments for the area.

Many existing velocity models are sufficient for predicting grounds motions on rock sites, but not in the more complex crustal and sedimentary basins found in the Seattle area. Developed using passive recording of noise, this model reveals the internal structure of the sedimentary basin beneath Seattle including areas with lower velocities than previous models. There is a pronounced low velocity zone just north of the Seattle Fault in the vicinity of Elliott Bay as well as more subtle variations in other parts of the city. Velocity variations within the basin suggest diverse geological features, such as sub-basins, and will change predictions of amplified ground motion.

"Basin Shear-Wave Velocities beneath Seattle, Washington, from Noise-Correlation Rayleigh Waves," by Andrew A. Delorey and John E. Vidale, University of Washington.

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Two faults exposed in eastern Sierra Nevada

Excavated trenches reveal two faults that bound the eastern flank of the Sierra Nevada in Antelope Valley, California and the Carson Range in Reno, Nevada. Observations by researchers at University of Nevada, Reno, suggest new details about the active faulting of the area.

Fault scarps that vertically offset young alluvial fan deposits along the Antelope Valley fault suggest the most recent surface rupture was at least 14 miles (23 km) long. Radiocarbon dating of bulk soil samples suggests the most recent earthquake occurred approximately 1350 years ago and the penultimate earthquake almost 5000 years earlier (or 6250 years before present day).

The trench along the Carson Range provides insufficient data to quantify an earthquake event history, though large offsets appear to happen infrequently. The fault dips at a very low angle, which could have significant meaning for the behavior of the fault and the severity of related ground motion.

"Paleoseismic Trenches across the Sierra Nevada and Carson Range Fronts in Antelope Valley, California and Reno, Nevada," by Alexandra Sarmiento, Steven Wesnousky and Jayne Bormann of University of Nevada, Reno.

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