Earthquake Cycle—Behavior of Active Faults

Pacific Northwest Seismic Network Operations

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The Pacific Northwest Seismic Network (PNSN) is the authoritative source of earthquake locations and information about earthquake ground motions in the states of Washington and Oregon. Washington is the state with the second highest seismic risk in the U.S. Starting in 2006, the PNSN began using seismic data collected from seismometers at the bottom of PBO strainmeter boreholes to help locate earthquakes as part of routing network operations. High quality data from the sensitive PBO short-period borehole seismometers should have better signal to noise characteristics than surface instruments. Data from the PBO sensors is provided in near real time by EarthScope, harvested by the PNSN Earthworm data acquisition system, and processed automatically along with data from broadband, surface short-period, and strong-motion stations (Figure 1). Data from the PBO stations often provide crisp impulsive S-arrivals necessary for precise depth determination. Earthquake locations and magnitudes are reported by PNSN (e.g., Figure 2) within minutes of an earthquake, and data from the PBO seismic sensors help constrain ShakeMaps, and other rapid PNSN data products.

Figure 1. PBO data as it appears in routine daily use at PNSN. Screen shot of PNSN's "Xped" seismic data analysis program showing seismic traces from numerous PNSN sensors, and including data from two PBO sites (circled in Red), B011, and B007. Traces are from earthquake shown in Figure 2. B011, near Sequim, WA, is the second closest station to the earthquake. Dark vertical bars mark the times of automatic picks of seismic phases. Note clear S arrivals on the EH1 component at B011.

Figure 2. Screenshot from the PNSN website of recent earthquakes, used by emergency response agencies, the press, and public for earthquake locations and magnitudes in the Pacific Northwest. Location of the earthquake shown in Figure 1 is pointed to by red arrow.

References

www.pnsn.org

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