MT ANGEL FAULT CHARACTERIZATION USING SH-WAVE REFRACTION AND REFLECTION METHODS

Zhenming Wang and Ian P. Madin

Oregon Department of Geology and Mineral Industries
800 NE Oregon St. #28, Suite 965
Portland, OR 97232

Tel: 503-731-4100
Fax: 503-731-4066
E-mail: Zhenming.wang@state.or.us

Abstract

Mt. Angel fault is likely one of the most active faults near the Portland metropolitan area, and was probably associated with the 1993 Scotts Mills earthquake. SH-wave seismic techniques used to image the Mt. Angel fault suggest that the fault offsets late Pleistocene gravel (~22 ka) at several locations. Within the study area, displacement of the late Pleistocene gravel along strike of the Mt. Angel fault increases from no obvious displacement on the northwest to approximately 19 m on southeast. This trend of increasing offset along strike of the fault is paralleled by topographic and geomorphic trends. A reconnaissance geologic investigation at an anomalous bend in the Pudding River near the projected trace of the Mt. Angel fault revealed potential tectonic deformation in sediments younger than the late Pleistocene gravels imaged by SH-wave data. The results of this study have contributed to the paleoseismic record of the Mt. Angel fault, laid the groundwork for future geologic investigations along the Pudding River, and determined potential sites for future paleoseismic trenching investigations.

Non-Technical Abstract

The objective of this project is to try to determine whether the Mt. Angel fault is active, and to try to improve the accuracy of slip rate estimates. There are several faults that are probably seismogenic and pose a great seismic hazard in the northern Willamette Valley where about 1.7 million Oregonians reside. The Mt. Angel fault, which is probably the source of the 1993 Scotts Mills earthquake (M5.6), is one of these faults and has been well studied. This study shows that the Mt. Angel fault offset late Pleistocene gravel. The results from this study further refine our knowledge of the Mt Angel fault with regards to fault geometry, slip rate estimates, and the timing of most recent motion along the fault. This information is important for evaluating seismic hazards posed by the Mt. Angel and other faults in the northern Willamette Valley.