

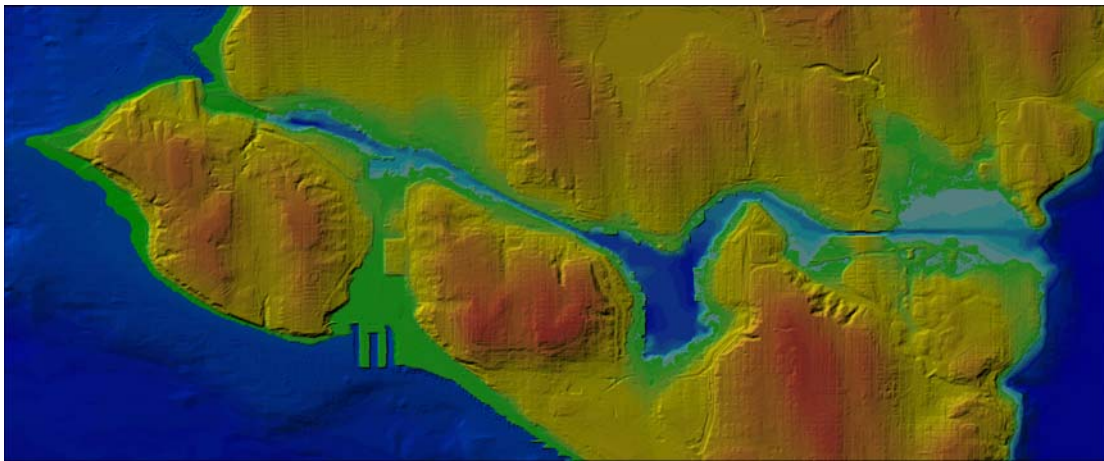
# Investigating the Damage Potential of Seiches Initiated by Seismic Wave Motions: A Case Study of the Puget Lowland, Washington State

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## Abstract

The recording of the 3 November 2002 Denali, Alaska earthquake by the strong-motion stations of the Pacific Northwest Seismic Network (PNSN) provided a unique opportunity to study the spectral amplification of long period (1 to 100 sec) seismic waves in the Puget Lowland, and the coupling of seismic and water waves. Because of damage concentrated around Lake Union and Portage Bay we have selected Lake Union as our case study (Fig. 1).



**Figure 1.** Map view of Lake Union and surrounding topography (courtesy of Harvey Greenberg).

The primary objective of this research is to investigate and characterize water motion in lakes during strong ground shaking. The problem we consider here is a problem of shallow water sloshing. Shallow water sloshing is not a trivial problem and depends on factors such as frequency of excitation, depth and geometry of the lake basin.

A 2-D finite difference code (MOST) originally developed for tsunami propagation and runup, has been modified for this problem and is used for predicting the response of water bodies during local and regional earthquakes. Since damaging earthquakes in the Pacific Northwest happen on three main zones: shallow locations in the crust, deep locations in the subducted oceanic plate and the interface of the subduction zone it is appropriate to include all of these in such an analysis.