Abstract

This study describes a methodology to assess the severity of a tsunami in progress based on real-time water-level data near the source. The inverse method, which uses water-level data to infer seismic source parameters, is extended to predict the tsunami waveforms away from the source. This study focuses on the Aleutian-Alaska source region and its potential threat to Hawaii. In the algorithm, the source region is divided into 41 sub-faults based on Johnson's (1999) analyses of major tsunamigenic earthquakes from 1938 to 1986. A linear long-wave model is used to generate a database of synthetic mareograms at 13 selected water-level stations near the source and at 6 strategic locations in the Pacific. Given tsunami signals at the water-level stations, a least-square routine provides the expected waveforms near the Hawaiian Islands and a jackknife re-sampling scheme provides the confidence interval bounds of the predictions. The algorithm along with the database is tested and verified using numerically simulated and actual water-level data of past tsunami events.