

# THE CAPE MENDOCINO TSUNAMI, 25 APRIL 1992

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**Abstract.** On 25 April 1992, a magnitude 7.1  $M_s$  earthquake occurred near Cape Mendocino, California, at the southern end of the Cascadia Subduction Zone. Seismological analyses suggest an almost pure dip-slip reverse fault, with subduction of the Gorda Plate beneath the North American Plate. Modeling of crustal deformation due to this fault mechanism produces uplift of the ocean bottom in relatively shallow water just offshore and along the coast, consistent with coastal observations.

A tsunami was generated that was measured by the National Oceanic and Atmospheric Administration sea level gauges along the California, southern Oregon, and Hawaii coastlines and in the deep ocean in the Gulf of Alaska. Several records are characterized by two distinct packets of tsunami energy, the first representing propagation along a minimum time path traversing deep offshore water, the second an apparent edge wave mode trapped along the coast. The largest peak-to-trough amplitude of 1.1 m was recorded at Crescent City in the second packet, approximately 3-4 hours after arrival of the first tsunami wave.

**Key Words.** Tsunami, measurements, Cape Mendocino

## 1. Measurements of the Cape Mendocino Tsunami

On 25 April 1992, at 1806 GMT, a tsunami was generated by the magnitude 7.1  $M_s$  earthquake which occurred near Cape Mendocino, California (Oppenheimer et al., 1993). The waves were measured by National Oceanic and Atmospheric Administration (NOAA) sea-level gauges along the California, southern Oregon, and Hawaii coastlines (González and Bernard, 1992). Figure 1 presents the data acquired at 12 of these stations, and Table 1 presents the station names, their abbreviations, and our preliminary estimates of the tsunami travel time from the source region to eight of the west coast stations.

With one exception, the tidal signal has been removed from all data presented in Figure 1, and all vertical scales range from -25 cm (below) to +25 cm (above) the mean of the record. The single exception is the additional plot for Crescent City in the upper

right-hand corner of the figure; here, the tides have not been removed, and the vertical scale is in meters. All horizontal axes represent elapsed time in hours since the occurrence of the earthquake main shock, and a vertical line on this axis marks the expected tsunami arrival time (Table 1). Note that the Crescent City tidal record begins

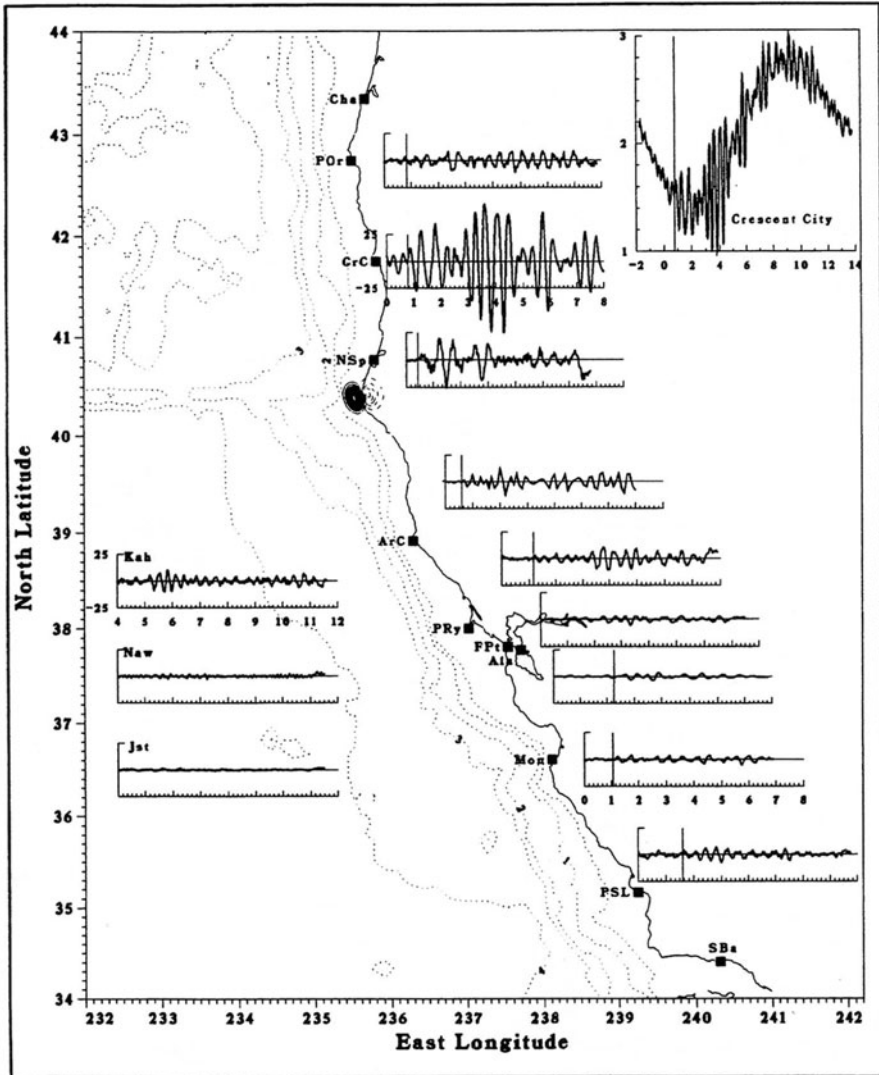


Fig. 1. Records of the April 25 tsunami at NOAA sea level stations in California, Oregon, Hawaii, and on Johnston Island (see Table 1). The small ellipses (left center) plotted near Cape Mendocino denote areas of permanent vertical displacement predicted by a simple fault-plane model of the earthquake. The darkened ellipse indicates uplift of the ocean bottom just offshore, and the dashed lines denote the onshore subsidence area.