Reprinted from California and the World Ocean '97
Proceedings of the Conference
American Society of Civil Engineers
Held March 24-27, 1997, San Diego, California

EVALUATING THE TSUNAMI RISK IN CALIFORNIA

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Abstract We present existing pre–1985 predictions on the tsunami risk in California, and we evaluate them given the more recent field results and advances in computational methods. We find that the existing predictions quantitatively only account for farfield events, they don't consider the possibility of a CSZ event, they do not consider tsunami generation from nearshore strike–slip faults, and they use threshold computations which have been shown to substantially underpredict inundation. Using a field–validated state–of–the–art methodology, we present preliminary results on current tsunami simulations in California, suggesting a method for addressing the problem of estimating the tsunami risk in the State.

1. Introduction Tidal waves or tsunamis are long water waves generated by impulsive geophysical events such as submarine earthquakes, coseismic coastal or submarine landslides, and volcanoes. In the deep ocean, tidal waves may travel at speeds up to 500mph, and they can propagate rapidly across the world oceans and strike distant shorelines.

Up until 1992, the tsunami hazard in California was primarily attributed to teletsunamis, i.e., to tidal waves generated farfield; pre–1985 hazard predictions had only identified an overall small risk, subject to disclaimers. As a result, most of the tsunami risk reduction in the US concentrated to mitigating the hazard in Hawaii and Alaska. The Cape Mendocino tsunami triggered more comprehensive analyses of historic events in California, and now the risk from locally generated (nearshore) tsunamis is believed to be high along the coast from Crescent City to Cape Mendocino, moderate, south of the Cape to north of Monterey, high, south of Monterey to Palos Verdes, and moderate south of PV to Sand Diego (McCarthy et al, 1993).

In the period 1992–1996 and immediately following the Cape Mendocino event, eight large earthquakes, generated tsunamis with runup heights ranging from five to thirty meters around the Pacific; before these events, the last major tsunami of similar magnitude occured in 1983. These events caused extensive inundation and claimed the lifes of at least 2000 people. The post—event surveys produced field data, at exactly the time when inundation codes had started breaking the computational barriers of the notoriously difficult shoreline calculation, and as seismological interface models started producing seafloor deformation contours instead of average deformations. Also, the surveys identified previously unrecognized generic land and seafloor features which greatly increase the inundation potential, as well as unidentified generation

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