

Enormous Tsunamis in Hawaii from Great Earthquakes in the Aleutians Islands

Rhett Butler

Hawaii Institute of Geophysics & Planetology
University of Hawaii at Manoa

MSB 114

02/15/2012

3:00-3:30 pm Coffee Hour
3:30-4:30 pm Seminar

Abstract

The magnitude Mw 9.1 Tohoku earthquake of March 11, 2011 was much larger than anticipated, and generated a devastating tsunami along the eastern coast of Japan. The largest tsunamis historically affecting Hawaii came from the Aleutians Islands from Mw 8.6 earthquakes in 1946 and 1957. Since Tohoku, my research has focused on determining the greatest potential tsunami threat to Hawaii from the Aleutians. The tsunami amplitudes observed from the 1946 event in Hawaii and on the US west coast are modeled using the NOAA tsunami forecast code to establish a baseline for a Mw 8.6 earthquake. The historical seismicity of the Aleutians is reviewed in the context of the largest earthquakes observed in the circum-Pacific and globally. The Aleutians are capable of Mw >9 earthquakes, and the greatest threat comes from the eastern Aleutians between the fault zones of the 1946 and 1957 earthquakes, where tsunami energy is directed toward Hawaii. Parametric models of tsunamis in seven Hawaiian harbor regions are forecast for a range of great Aleutian earthquakes. Maximum tsunami run-ups greater than 30m are forecast for Haleiwa and Hilo for Mw 9.3 events, where harbor embayment resonance contributes. Lower tsunami amplitudes are predicted for south-facing harbors, but substantial inundation is forecast for the Honolulu coast. Paradoxically, the largest earthquakes do not generate the largest tsunamis, and this is hypothesized as due to the interaction of long-period tsunami energy with harbor embayment resonance. The impact on coastal infrastructure and need for additional tsunami sensors deployed between the Aleutians and Hawaii are discussed.

To receive ORE Seminar announcements by e-mail, please visit

http://www.ore.hawaii.edu/OE/ore_news.htm

Please join us for the coffee hour at the seminar venue a half hour before the seminar, 3:00 – 3:30 pm