Geophysical Research Abstracts
Vol. 12, EGU2010-7008, 2010
EGU General Assembly 2010

The Samoa tsunami of 29 September 2009: Field survey in Tonga and preliminary modeling

E.A. Okal (1), H.M. Fritz (2), J.C. Borrero (3,4)

(1) Dept. Earth Planet. Sci., Northwestern Univ., Evanston, IL, USA, (2) Dept. Civil Eng., Georgia Inst. Tech., Savannah, GA USA, (3) Dept. Civil Eng., USC, Los Angeles, CA, USA, (4) ASR Ltd., Raglan, New Zealand

The two northernmost islands in Tonga, Niuatoputapu and Tafahi, were hit hard by the Samoa tsunami of 29 September 2009, with considerable devastation on the former, where nine people were killed.
A surveying team consisting of HMF and EAO visited the islands in late November. On Niuatoputapu, we document extreme inundation reaching 600 m on the Southern coast, and a complete overrun of the Northeastern tip at Hikuniu Point, with flow depths reaching 10 m for a total wave height of 16 m.
The forests were totally destroyed, and apparently provided no barrier to waves of such height. On the small stratovolcano island of Tafahi, run-up reached 22.8 m on the lee side of the island. The three villages of Niuatoputapu were provided a relative level of protection by the fringing coral reef present on the Northern shore. Seven of the nine victims were riding in a pick-up truck on a road parallel to the coast.
One point, with run-up of 4 m, was also surveyed on the island of Niuafo'ou, 200 km further West.
We present a number of numerical simulations, using several models of the seismic source, which correctly predict enhanced amplitudes in the direction of the Northern Tonga Islands as a result of focusing by shallow bathymetry at the bend marking the Northern end of the Tonga subduction zone.