Geophysical Research Abstracts
Vol. 17, EGU2015-9321, 2015
EGU General Assembly 2015

Effects of rupture complexity on local tsunami inundation: Implications for probabilistic tsunami hazard assessment

Christof Müller (1), William Power (1), Stuart Fraser (2), and Xiaoming Wang (1)

(1) GNS Science, Tectonophysics, Lower Hutt, New Zealand (c.mueller@gns.cri.nz), (2) Joint Centre for Disaster Research, Massey University, Wellington, New Zealand

We investigate the influence of earthquake source complexity on the extent of inundation caused by a resulting tsunami. We simulated 100 scenarios with sources on the Hikurangi subduction-interface in the vicinity of Hawke's Bay/Napier and Poverty Bay/Gisborne (New Zealand). For both target areas rupture complexity was found to have a first order effect on flow depth and inundation extent for the local tsunami sources investigated.

The position of individual asperities in the slip distribution on the rupture interface control to some extent how severe inundation will be. However, predicting inundation extent in detail from investigating the distribution of slip on the rupture interface proves difficult.

The distribution of inundation extent for one earthquake of given magnitude but different realisations of slip distribution is skewed. The extent of inundation predicted by a uniform distribution of slip on the rupture interface is roughly represented by the median of this distribution. Assuming uniform slip on the rupture interface therefore will underestimate the potential impact and extent of inundation. For example, simulation of an MW 8.7 to MW 8.8 earthquake with uniform slip reproduced the area potentially affected by inundation of an equivalent non-uniform slip event of MW 8.4 for Napier.

The extent of inundation does not follow a simple monotonic relationship to the magnitude of the earthquake. Therefore de-aggregation, to establish the contribution of different sources with different slip distributions to the probabilistic hazard, cannot be performed based on magnitude considerations alone.

We propose to use parameters of the tsunami wave field measured offshore as predictors for inundation severity to perform de-aggregation based on simulations with the linear wave equations.