Geophysical Research Abstracts
Vol. 19, EGU2017-11456-1, 2017
EGU General Assembly 2017

Rapid assessment of tsunami impact from real-time seismology and geographic, historical other datasets using machine learning

Alberto Michelini (1) and Anthony Lomax (2)

(1) Istituto Nazionale Geofisica e Vulcanologia, Centro Nazionale Terremoti, Roma, Italy (alberto.michelini@ingv.it), (2) ALomax Scientific, Mouans-Sartoux, France (anthony@alomax.net)

The impact of an earthquake, tsunami, volcanic eruption, severe weather or other natural disaster is related to: the intensity of the hazard; the vulnerability or exposure of the population, such as housing quality, infrastructure and proximity to a coastlines; and the capacity to resist and cope with the disaster. Rapid assessment by monitoring agencies of the impact of a natural event is fundamental for early warning and response.
We previously* proposed the "tsunami importance" parameter, It, for characterizing the strength of a tsunami. This parameter combines 5 descriptive indices from the NOAA/WDC Historical Tsunami Database: 4 tsunami impact measures (deaths, injuries, damage, houses destroyed), and maximum water height. Accordingly, It = 2 corresponds approximately to the JMA threshold for issuing a "Tsunami Warning" whereas the largest or most devastating tsunamis typically have It = 10.
Here we discuss extending this simple, 5-component parameter with additional impact-related measures from relevant databases (e.g., LandScan population density, major infrastructures) and historical / archaeological information, and measures that might be obtained in near-real-time (e.g., emergency services, news, social media). We combine these measures with seismological and other real-time observations as an ensemble of features within automated procedures to estimate impact and guide decision making. We examine using modern machine learning methodologies to train and calibrate the procedures, while working with high-dimensional feature space.

* Lomax, A. and A. Michelini (2011), Tsunami early warning using earthquake rupture duration and P-wave dominant period: the importance of length and depth of faulting, Geophys. J. Int., 185, 283–291, doi: 10.1111/j.1365-246X.2010.04916.x