

Slip inversion for the 2016 Mw=7.8 Ecuador Earthquake from Sentinel-1 InSAR and tsunami data

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The Mw=8.3 earthquake occurred offshore of Illapel on 16th September, 2015 at 22:54 UTC. A tsunami several metres high was generated that reached the coast of Chile within minutes and traversed the entire Pacific. We use geodetic displacements from Sentinel-1 radar interferometry and records of tsunami propagation across the Pacific from seafloor pressure gauge data, to constrain the fault slip distribution. We correct the interferograms for long wavelength tropospheric phase delay using the ECMWF weather model. We divide the fault into patches and invert for slip using a Bayesian Markov chain Monte Carlo algorithm to provide the full probability distribution for the slip on each patch. We validate our model by running the simulated tsunami through a flooding model and comparing this to tide gauge and tsunami run-up data. We find that slip reached the trench and also likely re-ruptured part of the fault that ruptured in 1943 M8.1 earthquake. We analyse the slip in the context of other historic earthquakes that have occurred on the subduction zone, and estimate the impact of this earthquake on the hazard for the region.