



Slip Distribution of the Giant 2011 Tohoku-oki Earthquake from Joint Inversion of Tsunami Waveforms and GPS Data

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On 11 March 2011 a giant earthquake (Mw 9.0) occurred near the northeast coast of Tohoku, Japan (142.861 °E 38.1035 °N according to Japan Meteorological Agency).

This earthquake ruptured the interface between the Pacific and North America plates, and generated a huge tsunami that devastated parts of the northeastern Honshu Island for up to 5 km inland. This is probably the best instrumentally recorded great earthquake ever. In fact, the extraordinarily dense and high-quality Japanese network provided a huge amount of seismological, geodetic, and tsunami recordings.

In particular, a network of bottom pressure recorders and GPS-buoys, specifically designed for measuring tsunami waves close to the Japanese coasts and in the open Pacific Ocean, together with the Japanese GPS network, allow an unprecedented resolution on the slip distribution for this earthquake.

The results of the joint inversion (GPS and tsunami data) show an unexpected amount of slip concentrated in a very narrow region with the rupture probably reaching to the trench, consistently with analogous results obtained with seismic data.

On the wake of the devastating Japanese tsunami and with a view to a future Tsunami Early Warning System implementation, then we point out the necessity to install a real time monitoring network in the Mediterranean Sea (geodetic and sea level measurements) in order to better constrain real time tsunami forecasts and tsunami source estimation.