

Source Model for the Great Tohoku Earthquake and Tsunami

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We derive a source model for the Tohoku earthquake and Tsunami on March 11, 2011 by inverting coseismic offsets from more than 500 onshore GEONET [1] GPS stations as well as 5 geodetic sea floor measurements [2]. Resulting moment magnitude is 9.0, with a peak slip around 60 meters. The ruptured area has an extension of about 330 km along strike and 120 km down dip. Coseismic slip resulted in up to 14 m vertical and up to 28 m horizontal displacement of the sea-floor. The earthquake ruptured the zone of maximum locking ($\sim > 75\%$) offshore Sendai previously reported by Loveless and Meade [3]. Tsunami waveforms computed using our purely geodetic source model fit very well wave observations at deep ocean DART buoys.

References

- [1] GPS Earth Observation Network. Permanent nationwide GPS array with more than 1200 stations, operated by the Geographical Survey Institute (GSI) Japan.
- [2] Sato, M., Ishikawa, T., Ujihara, N., Yoshida, S., Fujita, M., Mochizuki, M., Asada, A., (2011), Displacement Above the Hypocenter of the 2011 Tohoku-Oki Earthquake, *Science*, doi:10.1126/science.1207401.
- [3] Loveless, J. P., Meade, B. J., (2010), Geodetic imaging of plate motions, slip rates, and partitioning of deformation in Japan, *J. Geophys. Res.*, doi:10.1029/2008JB006248.