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 (∼ > 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