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Magnitude of the 2011 Off the Pacific Coast of Tohoku Earthquake from HFER duration and displacement amplitudes

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We determined magnitude of the 2011 Off the Pacific Coast of Tohoku Earthquake using durations of high frequency energy radiation (HFER) and the maximum displacement amplitudes of tele-seismic P waves. The estimated HFER duration and magnitude are 170.5 s, and 8.96, respectively. Compared to the December 26, 2004 Sumatra earthquake (Mw 9.0), the HFER duration of this event is shorter, while the displacement amplitude is larger. We discuss the relation between HFER duration and displacement amplitude for other large shallow earthquakes in the presentation. The azimuthal dependence of HFER durations indicates the rupture propagation in the southwest direction. We measured time differences between P-wave arrivals and the times at which absolute amplitudes of high bandpass filtered P-waves became the largest. Most of the time differences normalized by the centroid time shift are in the range between 50 and 80 per cent, which is consistent with the frequency distribution that we obtained for large shallow earthquakes previously.

Keywords: high frequency energy radiation, magnitude