

# **Fast magnitude estimation for the 2011 M 9.0 Great Tohoku Earthquake**

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## **Abstract**

We follow Wu and Teng (2002) method to determine the magnitude of 2011 M 9.0 Great Tohoku Earthquake. It is an empirical approach of near real-time, near-field magnitude determination for large ( $M > 6.5$ ) earthquakes. Integration of the entire strong-shaking duration of accelerogram surrounding large earthquake source is carried out for a large data set in Japan. The integrated quantity, having a unit equivalent to energy and called total effective energy here, is used in a regression process to derive an empirical relationship for a quick (near real-time)  $M_w$  determination useful for a reliable operation for earthquake rapid reporting and Tsunami early warning systems.

Key word: Great Tohoku Earthquake, Earthquake, Tsunami, Early Warning System