

## 3月9日に発生した東北地方太平洋沖地震の前震 (Mw7.3) の津波波形解析 Tsunami waveform analysis of the foreshock (Mw7.3) of the great Tohoku-oki earthquake

福岡光輝<sup>1</sup>, 谷岡 勇市郎<sup>1\*</sup>, Gusman Aditya<sup>1</sup>, 酒井 慎一<sup>2</sup>

Mitsuteru Fukuoka<sup>1</sup>, TANIOKA, Yuichiro<sup>1\*</sup>, GUSMAN, Aditya<sup>1</sup>, SAKAI, Shin'ichi<sup>2</sup>

<sup>1</sup> 北海道大学大学院理学研究院地震火山研究観測センター, <sup>2</sup> 東京大学地震研究所

<sup>1</sup>Institute of Seismology and Volcanology, Hokkaido University, <sup>2</sup>Earthquake Research Institute, University of Tokyo

On March 9, 2011, the largest foreshock (Mw7.3) occurred before the 2011 great Tohoku-oki earthquake (Mw9.0). The epicenter of the foreshock was located about 60 km northeast from the epicenter of the 2011 great Tohoku-oki earthquake. The tsunami was generated by this foreshock and observed by two ocean bottom pressure gauges, TM1 and TM1, off Kamaishi and three GPS buoys operated by the Nationwide Ocean Wave Information Network for Port and Harbors (NOWPHAS). In this paper, we estimate the fault model which explains the observed tsunami waveforms. The tsunami is numerically computed by solving the linear long-wave equations. We assumed that the fault parameters, strike=188.1 degree, dip=12.0 degree, rake=73.3 degree. The fault length and width are varied to find the best fault model which explains the five observed tsunami waveforms. The best fault model we found has a length of 40 km and a width of 55 km and is located northwest from the epicenter. In other words, the epicenter is located almost southeast corner of the fault model. The estimated slip amount by comparing the observed tsunami waveforms with the computed ones is 1.25m. The calculated seismic moment is  $1.27 \times 10^{20}$  Nm (Mw 7.3) which is similar to the seismic moment estimated by JMA using teleseismic body-waves,  $1.34 \times 10^{20}$  Nm. One day aftershocks of this foreshock occurred mostly north from the epicenter. Our estimated fault model is consistent with the one-day aftershock distribution. Kato et al. (2012, Science) suggested that the propagation of slow slip from the epicenter of the foreshock to the epicenter of the mainshock of the 2011 great Tohoku-oki earthquake. Our estimated fault model also indicates that the foreshock did not rupture the plate interface located south of the epicenter where the slow slip occurred after the foreshock.

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