Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SSS02-09 Room:IC Time:May 25 11:30-11:45

Rupture dynamics inferred from early stage of the 2011 great Tohoku-oki earthquake

ANDO, Ryosuke[1] ; UCHIDE, Takahiko[2*]

[1]School of Science, University of Tokyo, [2]Geological Survey of Japan, AIST

The occurrence of the 2011 M 9.0, Japan, Tohoku-oki earthquake gives us a unique opportunity to investigate the detailed process of the initiation and propagation of a rupture during a gigantic earthquake. It is observed that the mainshock of the Tohoku-oki earthquake was triggered by the M7 foreshock with time delay of two days occurred near the hypocenter of the mainshock. Therefore, it is expected that the early stage of the mainshock rupture reflects perturbations caused by the foreshock. In order to test this hypothesis, we examine the stress changes during the dynamic rupture propagation of this event. We used the kinematically inverted slip profile obtained by Uchide (2013), JGR, which conducted the multi-scale seismic slip inversion focusing on the first few ten seconds of the mainshock; he showed that the slip profiles around the hypocenter exhibited high-speed rupture propagations. We calculate the dynamic stress changes on the fault plane given the inverted slip profile by applying the 3-D elasto-dynamic boundary integral equation method (Ando and Okuyama, 2010, GRL). The calculated stress changes shows generally the slip weakening behavior consistent with the occurrence of the high speed rupture. The obtained stress change also shows heterogeneous distribution over the fault area, which might reflect the stress perturbation existed before the mainshock.

Keywords: Tohoku-oki earthquake, dynamics, rupture, friction, inversion, simulation