Geophysical Research Abstracts
Vol. 13, EGU2011-5847-2, 2011
EGU General Assembly 2011

A study on rupture propagation between the segments on the MTL based on the simulation of dynamic rupture process

Hongjun Si (1), Akemi Noda (1), Michiharu Ikeda (2), Kazuki Ogiyama (3), Naoki Nishizaka (3), and Yuki Ohno (3)

(1) Kozo Keikaku Eng. Inc., Tokyo, Japan (shj@kke.co.jp, akemi-noda@kke.co.jp), (2) Shikoku Research Institute Inc. (m-ikeda@ssken.co.jp), (3) Shikoku Electric Power Co., Inc. (nishizaka14981@yonden.co.jp, ogiyama15423@yonden.co.jp, oono11374@yonden.co.jp)

In the Shikoku region, west southern part in Japan, there is a great active fault, the Median Tectonic Line fault zone (refer as MTL afterward), which extends from Kyushu to Kii Peninsula, with a length of over 500 km. The earthquake probability on the MTL for the future 30 years in the Shikoku region is about 0.3% or less. Though it is not a high level, the scale of the possible earthquake due to the faulting of the MTL is assumed to exceed M7. Since the MTL is of a complicated fault system, consists of numerous segments accompanied with several jogs and bends, the scale of a possible earthquake depends on the possibility of the rupture propagation between the segments. In this study, we focus on this issue using the simulation technique of dynamic rupture process.

The target segments are the Iyo segment and the Iyo-nada segment in the western part in the Shikoku Island, with a segment length of 33 km 54 km, respectively. The dip angle of the two segments is assumed as 90 degree. In the Iyo-nada segment, there is a small jog with bending branches. In the segment boundary, there is a large scale jog, also with bending branch faults. The overlap and separation distances between the two segments are 0 and 4 km, respectively. The initial rupture is assumed to be start from the western edge of the Iyo-nada segment.

A simulation technique of dynamic rupture process based on three-dimensional finite-difference method proposed by Kase and Kuge (2001) is employed in this study. The initial shear stress on the fault plane is assumed as the same as the results for the 1995 Hyogo-ken Nanbu earthquake estimated by Spudich et al. (1998), because the earthquake is a recent big crustal earthquake near the MTL. A slip-weakening law is used in the simulation. The simulation models are as follows: case (1) Iyo-nada segment with an inactive area in the middle, upper part, representing the small jog in the segment; case (2) Simulation of the rupture propagation between the Iyo-nada and the Iyo segment.

The results of the simulation shows that, for case (1), the inactive area in the segment affects the slip distribution, leads to relative smaller slips in the area beneath the inactive area; for case (2), if the rupture strength of the segment is low enough, the rupture jumps from Iyo-nada to Iyo segments; if, however, the strength is large enough, the jumps will not happen.