

## **Time dependent block fault modeling of Japan**

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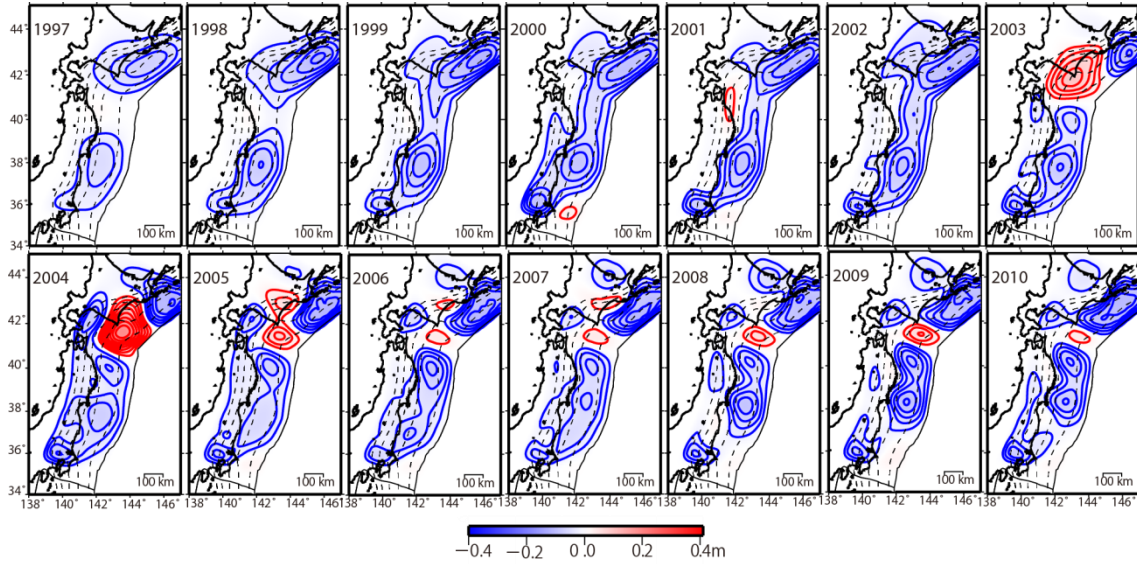
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There are four major plates converging in Japan. In addition to the major plates, there are several microplates constituting Japan. Several block models of Japan were proposed (e.g. Hashimoto et al., 2001) based on geodetic and geological data,.

In block modeling, crustal deformation in Japan is assumed to consist of block motions of plates and slip deficit or slip among plates. Based on this approximation, block motions and slip deficit or slip among plates were estimated from the observed crustal deformation data using several block models of Japan. (e.g. Hashimoto et al. 2000) Because of the accumulation of GNSS data, spatio-temporal evolution of crustal deformation in Japan has become clear for the last two decades. However, block fault modeling usually uses total crustal deformation for a certain period instead of using position time series, which contains spatio-temporal information. Thus, spatio-temporal evolution of coupling among plates are not estimated in usual block fault modeling. In this study, we apply time dependent block fault modeling to the position time series, and investigate spatio-temporal evolution of coupling among plates on the assumption that block motions and slip deficits among microplates are time constant. We used the block model proposed by Loveless and Mead (2010).

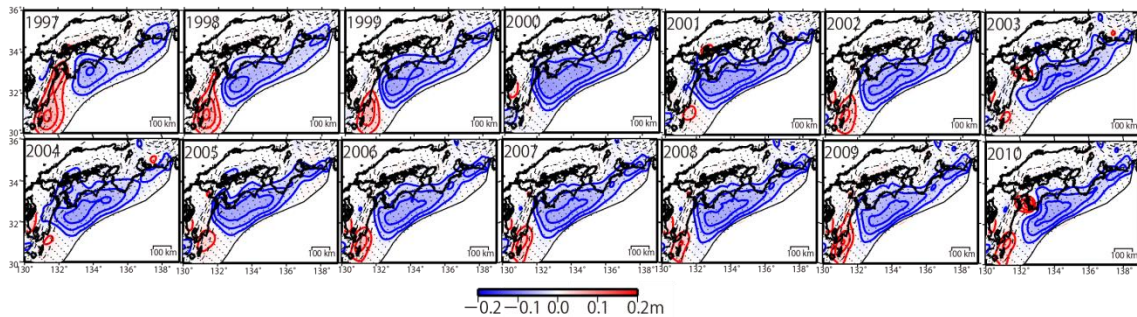
The result shows the interplate afterslip of the 2003 Tokachi-oki earthquake, weakening of slip deficit rates after the 2005 Miyagi-oki earthquake, and also weakening of slip deficit rates after the 2018 Ibaraki-oki and 2018 Fukushima-oki earthquakes along the Japan trench before the 2011 Tohoku earthquake. Afterslip of

the 1996 Hyuga-nada earthquakes, Bungo slow slip, Tokai slow slip, and Kyushu east coast slow slip were also detected along the Nankai trough before the 2011 Tohoku



earthquake.

Figure 1. Slip deficit (blue) and slip (red) on the plate interface between the subducting



Pacific plate and the overriding continental plate. Contour interval is 2cm.

Figure 2. Slip deficit (blue) and slip (red) on the plate interface between the subducting Philippine Sea plate and the overriding continental plate. Contour interval is 2cm.