

Spatio-temporal evolution of interplate coupling off the east coast of Kii Peninsula

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Abstract

We estimated the slip deficits and slip on the plate interface applying the block fault modeling method to the GNSS data. The result shows slight weakening of slip deficit rates off the east coast of Kii peninsula from around 2016 compared with those for the period between 2013 and 2014. The analysis using detrended data set which was derived from subtraction of a linear trend for 2013-2014 from raw position time series shows slip off the east coast of Kii peninsula. It is necessary to monitor the slip deficit or slip off the east coast of Kii peninsula.

Introduction

It is very important to estimate where and how large slip deficit and slip are on the plate interface in considering the place and magnitude of the future subduction earthquakes. In particular, the probability of the future Tokai and Nankai earthquakes are high in southwest Japan. Under this circumstance, there occurred an interplate earthquake with Mw5.8 off the east coast of Kii peninsula on April 1, 2016. In this study, we estimate slip deficit rate and slip on the plate interface in Japan employing block fault modeling together with the detailed analysis of the east coast of Kii peninsula.

Analytical Procedure

We developed a time dependent block fault modeling program following the method of the time dependent inversion developed by Stanford University group (McGuire and Segall 2003). We applied the developed program to approximately 1200 GNSS sites for the period between 2014 and 2017. We used a ratio of weight between horizontal and vertical components as 3:1. We adopted the fault geometry proposed by Loveless and Mead 2010. We used a rectangular fault to inland faults and spline surface to express plate interface in subduction areas. In addition, we applied the time dependent inversion program to 80 GNSS sites for a period between 2014 and 2017.

Result and discussion

Nationwide block fault modeling detected several SSE in southwest Japan such as Bungo, Kyushu, Tokai, Kii channel SSES. Furthermore, it indicates weakening of slip deficit rate from 2016 compared with those for 2013-2014. The analysis using detrended dataset also shows slip off the east coast of Kii-peninsula. In this area, there occurred an interplate earthquake on April 1 2016. The weakening and slip started from before and after the 2016 earthquake. It is necessary to monitor the time evolution of the interplate coupling off the east coast of Kii-peninsula.

Keywords: slow slip, Kii channel, East coast of Kii peninsula