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The 2014 Bungo slow slip

OZAWA, Shinzaburo[1*] ; YARAI, Hiroshi[1]

[1]GSI of Japan

Introduction

The seismic activities off Shikoku Island are different from those off the Kyushu Island. M8 class earthquakes have occurred repeatedly off the Shikoku Island with time interval of about 150 years and M7 class earthquakes repeatedly occurred off the Kyushu Island with a recurrence interval of about 20 to 30 years. The Bungo channel area is flanked by Shikoku and Kyushu Islands and seems to be a transient area. In this Bungo channel area, slow slip events repeatedly occurred in 1997, 2003, 2009. Short-term slow slip events occurred in a low frequency area with a time interval of around half a year. Under this circumstance, the GNSS network in Japan detected a transient in 2014, which suggest occurrence of a slow slip event in a long-term slow slip area. In this study, we estimated interplate aseismic slip on the Philippine Sea plate by time dependent inversion.

Analytical Procedure

We adopted a fault patch based on the plate surface model estimated by Hirose et al (2008). We used 155 GPS sites in the Bungo slow slip area. We estimated a linear trend for the data for a period between January 2007 and January 2008 and removed the estimated linear trend from the original data. Misumi GNSS site is used as a reference point. We estimated time evolution of aseismic interplate slip using the above detrended data for the period between January 2014 and January 2014.

Results

The processed time series show a small transient for early 2014 and large transient from around July 2014. The time dependent analysis shows aseismic slip on the plate interface beneath the Bungo channel area. The estimated moment magnitude is around 6.3. Since the moment magnitude of previous long-term slow slips is around 7.2, the current event is very small. This kind of small size of slow slip event occurred in 2006. There are no clear explanations about the relationship between Mw7 class slow slip and M6 class slow slip in the long-term slow slip area.

Keywords: Bungo channel, Slow slip