

Spatio-temporal Variation in Seismicity Associated with a Slow Slip Events beneath the Bungo Channel, Southwest Japan

Sou Nishimura[1]; Hitoshi Hirose[1]; Katsuhiko Shiomi[1]

[1] NIED

A transient slow crustal deformation lasting from 1996 to 1997 was found in the GEONET (e.g., Tsuji et al., 1995; Miyazaki et al., 1996; 1997) GPS observation data around the Bungo Channel, southwest Japan. It is interpreted as crustal deformation due to a slow slip event on the plate interface (Hirose et al., 1999; Ozawa et al., 2001). Similar slow slip event was observed in 2003 again. These slow slip events have been revealed by the crustal deformation data, however, we may consider seismicity changes as the result of the stress changes due to the slip events. It is important to know the relationship between slow slip events and seismicity to understand the tectonics of this area and to know the state of stress field. Using the integrated hypocenter catalogue by the Japan Meteorological Agency (JMA), we investigate spatial and temporal changes in seismicity around the Bungo Channel during the 2003 slow slip event. Seismicity is evaluated by the annual number of earthquakes with magnitude more than 1.5 occurred at the 25-35 km depth range in 20×20 km² area shown in the figure. We compare the annual number of earthquakes in 2004 after the event to that in 2002 before the event, and we found remarkable temporal changes in seismic activity in the upper part of the slab beneath the Bungo Channel. In the downdip side of the slow slip area, the earthquake occurrence rate decreased by around 5 earthquakes per year, and it can be recognized as a local quiescence in seismicity. Meanwhile, in the updip side of the slow slip area, the earthquake occurrence rate increased by more than 5 earthquakes per year, and it can be recognized as a local activation of seismicity. This characteristic change in seismicity might be considered as the result of a stress release or a redistribution of stress field caused by the slow slip event in 2003.

Using the hypocenter data by the JMA, we also investigate the seismicity during the former slip event from 1996 to 1997. We compare the annual number of earthquakes in 1998 to that in 1996. In spite of the crustal deformation similar to the event in 2003, the change in seismicity during the former event differs from that of the event in 2003. Activation in seismicity in the updip side of the slow slip area can be seen and it is a common character with the event in 2003. But, quiescence in the downdip side is not clear. Besides, a tendency to quiescence in seismicity appears in the vast area in the south of the slow slip area. It suggests that stress perturbation due to two M6-class earthquakes on October and December in 1996 and their afterslips (e.g., Yagi et al., 2001) might affect on the region near the slow slip area.

/ further planning /

There is some possibility of changes in focal mechanisms during the slow slip event. We want to investigate that in the future.

