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Recent crustal movements obtained by dense GPS network in the Tokai District

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As the slow slip event was found by the GEONET observation conducted by the Geospacial Information Authority of Japan, in the Tokai District where a huge earthquake was expected to occur in the near future, JUNCO also made another dense GPS network there. We have reported some observation results such as the difference of crustal deformation during and after slow slip event and the detection of very small movements by the short-term slow skip events in the JpGU meetings.

We re-processed all data from 2004 in a unity condition by using GAMIT software and analyzed the characteristics of the recent crustal movements in the Tokai District.

1. Not only crustal movement velocities but also dilatation velocities were changed during and after the slow slip events. We had already reported that we could obtain the place of asperities on the surface of subducting Philippine Sea Plate by the forward calculation. The similar results were obtained by the inversion method.

2. We divided the duration from the end of the Tokai slow slip event to the 2011 Tohoku earthquake into two periods and investigated the crustal movement difference between the two. Smaller southward movements were obtained in the second period comparing in the first one referring to ITRF 2008. This would show that the coupling between the Philippine Sea Plate and Amurian Plate became stronger according to the time duration after the end of Tokai slow slip event.

3. We obtained the exponential components and linear trend ones in the movements after the 2011 Tohoku Earthquake. The co-seismic movements at the Earthquake had larger difference between north part and south one in the present investigation, comparing with these components. The exponential components are thought to be the influence of after-seismic fault motions and the linear trend ones are to be visco-elastic deformation effects, and therefore we think this difference shows the areal differences that areas of the after-seismic faulting and the visco-elastic deformation are wider than the Earthquake fault.

4. We obtained the dilatation velocity distribution after the 2011 Tohoku Earthquake. We can see the dilatant area in the north part and contract one in the south part of the investigation area. Eastward movements are large in the northeastern part and they are smaller in the northwestern part, but they are almost constant in the south part because of the coupling between the subducting Philippine Sea Plate and Amurian Plate.

Keywords: GPS, Tokai District, dense, slow slip, Tohoku Earthquake