The crustal movements caused by the short-term slow slip events in the Tokai region by using dense GPS observation net data

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Tokai region has a dense GPS network due to the presumed Tokai Earthquake. Abnormal crustal movements were detected by the GPS network after 2000, and it is thought that they were caused by the slow slip and they were stopped now. The Japanese University Consortium of GPS (JUNCO) developed a dense GPS network to investigate the progress of the slow slip by using school building.

The short-term slow slip events occurred associated with deep tremors in the Aichi Prefecture in November 2004 and July 2005. The crustal movements were observed by the tiltmeter (Hirose and Obara, 2006), but they were not yet observed by GPS, because the movements are very small. We processed the GEONET and JUNCO GPS data obtained in Aichi Prefecture and Shizuoka Prefecture in order to examine the crustal movements associated with the short-term slow slip events.

We used GAMIT ver.10.21 software and the ITRF2000 framework in the processing. The data of about 120 GPS stations were processed. 17 IGS stations data surrounding Japan were also used in the processing as the fiducial points.

We calculated the mean of the coordinates of about 120 stations in Aichi and Shizuoka Prefectures and we obtained the movements of each station referring to the mean coordinates. And moreover we calculated the running means of 3, 5 and 7 days of the results. We can see the step between the positions before and the slow slip. The RMS from the mean value are less than 1 mm in summer and less than 0.5 mm in winter.

The amount of slip of the fault of the December 2004 slow slip event was calculated to be 3.2 mm which is 1.8 times larger than that by tiltmeter when other fault parameters are fixed to Hirose and Obara (2006). That of the July 2005 event was obtained to be 1.6cm which is twice larger than that by the tiltmeter.