# Horizontal Crusatl Strain in Southwest Japan:Attempt to extract local deformation using a Kriging method

*Arata Orinaka[1], Takao Tabei[2], Masahiko Shiomi[1], Makoto Okubo[2]

1. Graduate School of Science,Kochi Univ., 2. Faculty of Science,Kochi Univ.

Crustal deformation field in southwest Japan arc is dominated by the subduction of the Philippine Sea plate (PHS). Strong coupling on the Nankai Trough plate boundary during the interseismic period has caused crustal shortening of the overriding southwest Japan in the direction of plate convergence. At the same oblique subduction of PHS against the strike of the plate boundary has formed a mobile forearc sliver moving along an inland strike-slip block boundary. The Median Tectonic Line (MTL) is the longest strike-slip fault that divides the Nankai forearc sliver from the rest of the southwest Japan arc. Moreover many active faults have been formed within the overriding plate especially in central Kyushu and Kinki districts. Thus interseismic deformation field of southwest Japan consists of "regional elastic deformation and block motion " and "local disturbance affected by active faults and geological structure". In this study we calculate horizontal crustal strain rates from displacement data to better quantify and distinguish regional and local deformations. We use a Kriging method (Mase and Takeda, 2001) known as the spatial optimal interpolation method to extract local deformation. Also we analyze strain field using a spatial smoothing processing by Shen et al. (1996) for comparison. In the latter several different values (15-35 km) are applied for the distance decay constant.

We use horizontal displacement rates derived from GEONET final coordinate time series at 569 sites from Kyushu to Kinki districts during the period of 2006-2009. Regardless of the strain analysis method, the southern part of Shikoku region has been shortened at a rate of 0.15-0.30 ppm/yr in the NW-SE direction due to the PHS convergence. The direction of the compression axis rotates counterclockwise from western Shikoku to southern Kyushu, which implies PHS convergence becomes less effective. Similarly strain rates decrease rapidly with increasing distance from the Nankai Trough. Comparing strain rate fields from two different methods, the Kriging is more sensitive to a local disturbance. However, systematic local deformation affected by active faults and geological structure are not clear though we have expected it around MTL and other tectonic lines. Spatial resolution of original GEONET data may be insufficient to extract local disturbance since its average station separation is 15-20 km. In this sense dense campaign measurements for a specific target will play an important role when it is linked to GEONET.

Keywords: Crustal deformation, Southwest Japan, Strain, Local deformation, Kriging method, GPS

 