

Crustal movements revealed by GPS data in the central Kinki district

Kunio Fujimori[1]

[1] Earth and Planetary Sci., Kyoto Univ.

A GPS array with about 1,000 stations (GEONET) is operating in Japan. The GPS data obviously show secular crustal deformation in the Japan island. When homogeneous strain was removed from observed strain field, spatial distribution of local crustal deformations can be found. Based on daily coordinate data of the GPS stations in the center part of the Kinki district, the E-W and N-S components of GPS horizontal displacements were reduced by 0.04 mm/km/year and 0.02, respectively. As a result, a fine boundary appeared in displacement vector distribution. On the northwest side of the boundary the vectors are small, and on the southeast side the vectors to the west are large. The vectors show a right lateral movement of about 3 mm/year on the boundary. A vertical movement of about 3 mm/year is seen too. Therefore, it is thought that the boundary is a creep fault with a shear zone of about 20km in width. The fault will extend from the Akashi strait to the north part of the Chubu district through the north Biwa lake. In addition, it is recognized that historical large earthquakes (M.GE.7) occurred in the fault neighborhood and that the fault crosses a lot of active faults. The existence of this creep fault will mean that a giant shear fracture is progressing slowly in the center part of the Japan island, the Kinki and Chubu districts, under the E-W compression. It is said also that the large earthquakes in Western Japan were generated before and after the great earthquakes on the Nankai trough. When the great earthquake are compared with the historical large earthquake along the creep fault at occurrence time, it seems that the cycles of the large earthquake occurrences along the creep fault were reset by every other great earthquake on the Nankai trough. It is thought that earthquakes of M7 class can be predicted if continuous observation stations for crustal deformation are arranged along the creep fault because strain changes before earthquakes were observed at the stations which were located on this creep fault.