Crustal deformation at the Hanaori fault by dense GPS observation network

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The Hanaori fault is one of the major active faults that characterize the geological structure in Kinki district, Southwest Japan. Central Kinki area forms a triangular shape named as 'Kinki Triangle' by Huzita(1962). The Hanaori fault is a part of northwest border of this Triangle. The northwest side of this fault is Tamba highlands, where the seismic activity have increased after the Hyogo-ken Nanbu Earthquake (Jan.17,1995, M7.2). Strain accumulations derived from the triangulation network survey by GSI of the national network of Japan, for the last 110 years and also shorter periods to decade, revealed the strain contrast at both sides of this fault. Displacement analysis of GPS observation network by GSI for a few years suggests that a geodynamic border line between southwest and northeast Japan might run along the margin of the Triangle including this fault. Some major earthquakes occurred along this margin of the Triangle in historical days, but no evidence of occurrence of destructive earthquake has been recognized only at the southwestern half part of the Hanaori fault for about last 2000 years.

We have constructed a dense GPS network around this segment of the fault to study the details of strain accumulation in this area. The network consists of 17 newly constructed observation points and the data are analyzed with data at neighboring GSI stations and some existing station of Kyoto University. Typical span between adjacent stations is 5km. The monuments are half buried bolts on the rooftop of reinforced concrete building. Two sessions a year are carried out in most stations with Ashtech Z12 and continuous operation has been started at some stations by single frequency instruments. Before the calculation of coordinates of the GPS stations from observed data, two reference stations were selected from the surround GSI stations with criterion of low seasonal variation amplitude. Then we decided precise positions of these reference points by global analysis with IGS stations, and we calculated coordinates of the stations in our network refer to the reference points by regional analysis. The results of the calculation of the data from two frequencies instruments since 1997 show clockwise displacement refer to 'KATANO', that is southwestern out of the region, and contraction along the displacement direction.