

Surface Creep Analysis of the Fengshan Fault in SW Taiwan from GPS observations and PSInSAR

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Previous studies based on GPS observations have found that the Fengshan fault may be a major active structure with surface creep in southwestern Taiwan. However there was no historic earthquake along this fault and no solid geologic evidence to confirm whether the fault exists. Therefore, the geometry and activity of the Fengshan fault remain unclear. Whether the fault acts like stick-slip or creeping will make great impacts on the national constructions and public properties. Thus, it is necessary to evaluate the potential activities of the Fengshan fault.

We use 56 continuous GPS stations and 167 campaign mode GPS stations in the study area for the horizontal displacements and also 483 leveling points for vertical displacements. In addition, we use ascending data of the ALOS image with PS-InSAR techniques to analysis the Fengshan fault. We remove vertical signals from the line-of-sight (LOS) velocities based on leveling data. The fault parallel component has about 14.3 mm/yr differences across the fault at the northern, 12.6 mm/yr differences across the fault at the middle segment and 17.4 mm/yr differences across the fault at the southern segment, and the fault normal component has 3.5 mm/yr, 2.6 mm/yr and 3.6 mm/yr differences extension components across the each segments.

The Fengshan fault is a left-lateral strike-slip fault in about 15 mm/yr and lengthening of about 3 mm/yr. This fault is creeping in the middle and southern segments. The northern segment of the fault is probably locked in about 1.5 km width. The locations of mud volcanos in the Niasong, Kaoshung and the Wandan, Pingtung, are consistent with the fault trace of the Fengshan fault well and are proposed as the geological evidence of this fault.

Keywords: GPS, PSInSAR, Fengshan fault, Velocity profile, Creeping fault, Locked fault