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Creeping deformation along the Longitudinal valley fault at Yuli area in Taiwan estimated by the photogrammetric method

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The purpose of this study is to establish the deformation pattern and the distribution across the Longitudinal Valley Fault in Tongli (south of Yuli) area, based on the photographic method.

The Longitudinal Valley Fault (LVF), 150 km long and NNE-SSW striking, passes through the eastern Taiwan, and represents the obvious surface expression of the collision boundary between the Philippine Sea plate and the Eurasian continental plate. The southern of LVF segment is observed to be high speed creeping based on the creep meter and leveling survey etc. Owing to such a high deformation rate, many earthquakes have occurred along the LVF. The 1951 earthquake sequence represents a good example. It is shown that LVF has been displaced both co-seismically and inter-seismically. Murase et al. (2009, 2010, and 2011) established about 30 km leveling route from Yuli to Changbin to detect the vertical deformation across the LVF for two years. As a result, the vertical displacement is 1.7 cm in 200 m across the LVF and 2.7 cm in 1000 m, referred to the west end of our route. In addition, a synclinal deformation is detected on the hanging wall side of the fault.

We compared to the air-photographs which are taken at different age (1978 and 2007). If the creeping on the fault has continued for 30 years, the accumulation of displacement reaches about 1m, which is significantly?distinguishable by photogrammetric method. We decided and measured the GCP for the 2007 year air-photograph in the field. We oriented the 2007 air-photograph and then we apply the old-time coordinates of the triangulation point to 1978 air-photograph. We measure profiles across the fault on 1978 and 2007 air-photograph by photogrammetric system respectively. The comparing result is shown that the northern area has creeping but the southern area has undetectable creeping in Tongli. About this result, we think two possibility; one is the creeping is not uniformity along the fault, second is the photogrammetry has not enough quality. We should actually check the creeping or not. We made three new leveling survey lines in last year.

Keywords: Active fault, Photogrammetry, Creeping, Longitudinal valley fault, Taiwan, tectonic geomorphology