

An acceleration event of creeping slip detected by precise leveling survey at the central part of the Longitudinal valle

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Precise levelling surveys were conducted across the central Longitudinal Valley Fault, eastern Taiwan, to understand the deformation of the transition zone between the stable fault creep area and the locked area, which maybe correspond to an asperity. In order to investigate the surface relationship between the fault creep area and the geological condition of the transition zone, we established levelling routes in the Yuli, and Chike-san areas. The Yuli area forms the geological boundary of the Lichi Melange Formation, which is composed of chaotic mudstones containing numerous exotic blocks of various sizes and lithologies. Along the Yuli route, located on the Lichi Melange, an uplift rate of 30 mm/yr was detected during the period 2010-2013, suggesting that aseismic fault creep might be continuing with long-term stability. Along the Chike-san route, located on no Lichi Melange, a vertical deformation rate of 8 mm/yr, 40mm/yr, and 20mm/yr were detected in the period 2010-2011, 2011-2012, and 2012-2013, respectively.

The creep slip distribution was estimated by using a two-dimensional single-fault model proposed at Chike-san in the period 2012-2013. Large slip rates were estimated at 4-5 km of the fault plane. At the previous periods 2010-2011 and 2011-2012, relatively large slip rates were estimated at two parts of the fault plane-one at a depth of about 1.5 km and another at a depth of 4-5 km-. We believe that the acceleration event of creeping slip was continued at the depth of 4-5 km in the period 2012-2013. The northern limit of the stable creep area may be the Yuli area. The episodic creep event occurred in the transition zone between the stable fault creep area and the asperity area. The boundary between the stable creep area and the episodic creep area is consistent with the geological boundary of the Lichi Melange Formation.

Keywords: Taiwan, Longitudinal valley fault, precise leveling survey, aseismic creep motion