



Late Holocene paleoearthquake activity along the Juisui fault of the middle Longitudinal Valley fault, eastern Taiwan

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The Longitudinal Valley fault is the most important plate boundary fault between the Philippine Sea plate and the Eurasian continent, and is the main seismogenic fault in Taiwan. It can be subdivided into four segments according to its structural and seismic characteristics: the Linding, Juisui, Chihshang, and Lichi faults. The last damaging earthquakes at this fault occurred in 1951 ($M_s=7.1$, 25/11/1951), when the middle segment of the Juisui fault ruptured creating visible surface break that was 25 km long. The resulting shortening of the Longitudinal Valley fault warrants a closer examination of the behavior of the fault. Three trench exposures were made at the Juisui fault that reveal the occurrence of four paleoearthquakes after 640 cal yr BP. Radiocarbon dating of these paleoearthquakes shows a clustering of 1951 AD, P2 event < 260 cal yr BP, 150 < P3 event < 290-440 cal yr BP, and 500 < P4 event < 640 cal yr BP, which indicates a relatively short recurrence interval of about 170-210 years. From these data we can determine the long-term slip rate of the fault, which is estimated to be 12.5-16.0 mm/yr in terms of uplift rate and 21.6-27.7 mm/yr in terms of horizontal shortening rate after the P4 event. The latter rate is consistent with the interseismic slip rate deficit at the fault tip as calculated from the geodetic measurements. It is therefore speculated that the Juisui fault is locked at a shallow depth during the interseismic periods, which in turn intimates that the deficit during these periods is accommodated along the Juisui fault.