

Active thrust faulting and paleoseismic records of the Longquanshan Fault in the interior of the Sichuan Basin, China

WANG, Maomao^{1*} ; LIN, Aiming¹ ; YAN, Bing¹

¹Department of Geophysics, Kyoto University, Japan

The Longquanshan Fault (LQSF), located in the interior of the Sichuan basin, China, defines the east boundary of the Longmen Shan fold-and-thrust belt. Previous studies have shown the geometry and kinematic of the LQSF that formed above the shallow (3-5 km) detachment within the Triassic evaporite sequences within the basin. Despite its location near the metropolitan of Chengdu, and total length of about 230 km, evidences for active faulting and paleoseismic records of the LQSF are quite unknown. Here we define the fault activity of the LQSF by integrating seismic reflection profiles, geomorphic observations, and trench survey. Analysis of seismic reflection data and focal mechanism solution show that the 1967 Ms 5.5 Renshou earthquake ruptured the back-thrust of the structural wedge system in the LQSF, causing 7 deaths and 57 injuries. By using high-resolution satellite images combined with the field observations, we mapped the active fault traces of the back-thrust of the LQSF. We excavated the trench across the ~5 m high fault scarp that formed on the alluvial fan. Based on the identification of the colluvial wedges and the uplift and folding of the paleosoil, we infer that there are at least two paleoearthquake events are recorded in the trench wall. These findings confirm the cumulative of uplift of river terraces are produced by the LQSF through repeated paleoearthquake events. Our study shows that the LQSF represents a significant seismic hazard in the center of the high densely inhabited area in the Sichuan basin.

Keywords: Active tectonics, thrust fault, paleoseismic, seismic reflection profile, trench survey, Sichuan basin