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Responses of River Terraces to the Activity Variation of the Active Faults in the Eastern Tibetan Plateau

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The Longmenshan area suffered a catastrophic Mw 7.9 earthquake in 2008 in the uplifting eastern Tibetan plateau. The thrust Guanxian-Anxian fault and oblique slipping Beichuan-Yingxiu fault ruptured about 245 km long with several meters of uplift. We implemented a detailed mapping for these two faults and related late Quaternary geology and geomorphology.

Although many work have done about the topography and the uplift of the Longmenshan thrust system (Kirby, et al., 2003; Zhang, et al. 2010; Jia, et al, 2010; Zhang, et al., 2011; Yan, et al., 2012). Their results gave a sketch of the contemporary finite uplift of the Longmenshan. Higher temporal and spatial data are needed to describe the variation of the active faults of the Longmenshan thrust system.

Eight major rivers (named Qingzhujiang, Fujiang, Pingtonghe, Jianjiang, mianyuanhe, Jinhe, Baishuihe, Baishahe and Minjiang) flow though the Guanxian-Anxian fault and the Beichuan-Yingxiu fault, and the duplexed blocks. Usually more than three levels of terrace were developed along these rivers. These terraces provide more deformation records for the evolution history. They also make it possible to analyze the along-strike variation of the Beichuan-Yingxiu fault and the Guanxian-Anxian fault by comparing different rivers.

The earthquake-introduced landslides were regarded as a kind of erosion of the uplifting Longmenshan. Corresponding depositions along rivers in Longmenshan area were controlled by the supplication of clasts as landslides developing. The river terraces may also be products of paleo-earthquakes as revealed by trenching (Ran, et al., 2011. The characteristics of river terraces in different segments of faults may reflect the variation of deformation in certain periods.

The results show that terraces in the segment to the south of Gaochuan are quite different from those to the north of Beichuan. They have different altitudes above rivers and deposition character. These data also indicate a progressive along-strike development of the Guanxian-Anxian fault and the Beichuan-Yingxiu fault.

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