

## Research Advances

## Time of the Tengchong-Lianghe Movement in Southwest Yunnan

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The Tengchong-Lianghe movement, proposed and named by Chen et al (1991), is an important tectonic event occurred from the late stage of middle Pleistocene to the early stage of the late Pleistocene in the Tengchong Block of southwest Yunnan. It reactivated the old faults in the region, and tilted, folded and fractured the  $Q_1$  and  $Q_2$  strata, resulting in the common angular unconformity between them. In addition, this region entered into an erosion-cutting stage, with its cutting depth reaching up to tens of meters, and formed very striking high lake terraces.

This movement was evidenced by the fold deformation of thick sand and clay layers at the eastern gully of Xiashanzhai in Shanzhai basin in its north, and by an angular unconformable superimposition relationship between the overlying strata (Fig. 1). ESR dating of the upper and lower sand strata yielded  $689\pm 75$  ka and  $957\pm 53$  ka, respectively. It is therefore speculated that the angular unconformity was formed at 0.7–0.8 Ma.

Furthermore, the movement mainly resulted in the tilting strata and lake terraces in Lianghe basin at its south. Chen (1991) suggested that, the strata are the middle

Pleistocene Mamao Formation (tilted) and late Pleistocene Pingshan Formation (horizontal), which are composed of the V and IV terraces, respectively. Field investigations indicate that there are a total of 7 terraces, in which the V and VII terraces (equivalent to the IV and V platform in Chen's article respectively) are best preserved in relatively high altitude. The Ar-Ar age of the basalt covered on the VII terrace at the west Guanzhang (Fig. 2 left) was  $1.03\pm 0.34$  Ma instead of  $107\pm 36$  ka as Chen speculated. And the K-Ar ages of the basalts underlain the VII and VI terraces are  $2.87\pm 0.08$  Ma,  $2.28\pm 0.04$  Ma and  $1.43\pm 0.06$  Ma, respectively. It is thus indicated that the VII and VI terraces were formed in 2.3–1.0 Ma. In the Nangyan area (right in Fig. 2) north of Lianghe Basin, the K-Ar age of the basalt covered on the V terrace at east Xiadengma is  $0.52\pm 0.02$  Ma, and the interlayer basalt thinning out in the front margin near the Lotus Sugar Factory is  $0.73\pm 0.02$  Ma, showing that the terrace was formed prior to 0.5 Ma. Accordingly, the incision between the V and VII terraces may occur during 1.2 Ma ~ 1.0 Ma.

Integrated with the stratigraphy and geomorphology of the Shanzhai and Lianghe basins, the Tengchong-Lianghe movement contain at least two stages of 0.8–0.7 Ma and 1.2–1.0 Ma. This is basically synchronic with the two Pleistocene uplift-exhumation events occurred in Namjagbarwa area at Eastern Himalaya syntaxis (Lei, 2008), and is also consistent with the Yuanmou movement (Qian et al., 1991) and Kunlun-Huanghe movement (Cui et al., 1998). It is thus indicative of the synchronization of tectonic movement happened in the Tengchong block with

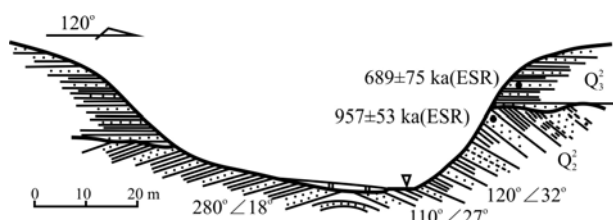


Fig. 1. Stratigraphic relationship at east gully of Xiashanzhai in Shanzhai basin (Chen et al, 1991) and ESR dating.

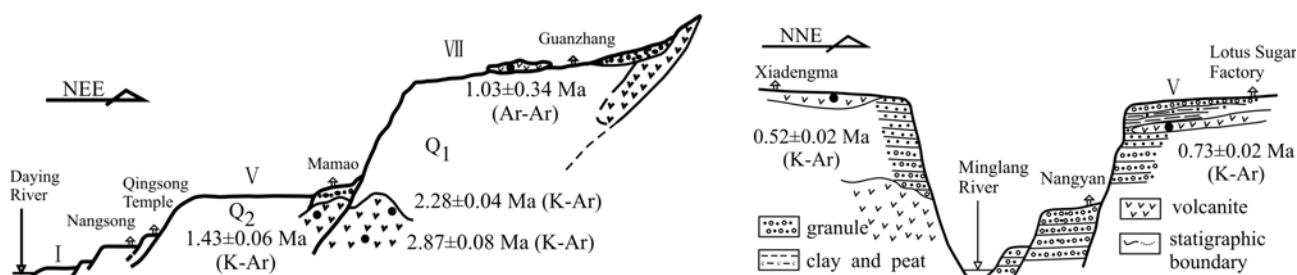


Fig. 2. Sketch map of stratum and geomorphology at Nangsong and Nangyan areas in Lianghe Basin and age results.

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that at the margin of Tibetan Plateau.

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