



Quaternary Tectonic Evolution of Western Chinese Tianshan: A Glance from Quaternary Stratigraphy and Active Faults of the Yili Basin

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The Yili Basin, located in the western part of the Tianshan orogenic Belt, northwestern China, is a Mesozoic-Cenozoic intermountainous basin developed on the basement of a pre-Mesozoic rift sequence and arc-accretionary complex. It is divided into Yining subbasin in the north and Zhaosu subbasin to in the south, they were separated by the Wusunshan (main part of Middle Tianshan in northwest of China). Much research focussed on Paleozoic orogenic processes about Yili Basin and adjacent areas, however, rarely on the Cenozoic tectonic evolution. The thick Meso-Cenozoic infill is an ideal archive for studying basin-mountain relationships during post-Paleozoic orogenic events. This contribution discusses the Quaternary tectonic evolution of basin-mountain.

Based on former geological surveys and our field work, combined with ESR (electron spin resonance) and OSL (optical stimulated luminescence) ages of outcrops and boreholes, also calibrated by magnetostratigraphy, we distinguish three Pleistocene molasse-like formations from base to top, named as Lower Pleistocene Xiyu, Middle Pleistocene Wusu and Upper Pleistocene Xinjiang Formation. The Xiyu Fm. disconformably covers the fluvial-lacustrine Paleogene-Neogene strata, and angular unconformities are exposed along the southern margin of the Northern Tianshan between Upper and Middle Pleistocene, and between Upper and Lower Pleistocene, respectively. According to OSL and ESR dating results for truncated Quaternary stratigraphy, we propose that the south (Northern Wushan Fault) and north (Hongshanzui-Huocheng Fault) boundary faults of the Yili basin are thrust faults directed toward basin center during latest Middle and Late Pleistocene, respectively.

In conclusion, we argue that the Yili basin began a new active tectonic stage since Quaternary, and the Yining and Zhaosu basin as a whole before Quaternary (potentially during Early Pleistocene), the Southern Tianshan was thrust towards the Yili basin during latest Middle Pleistocene, and the Wusunshan was compressed and uplifted along the North Wusunshan thrust fault diving the Yili basin into the Yining and the Zhaosu basins. The North Tianshan thrust towards the Yining basin during the latest Pleistocene led to the large-scale uplift along Hongshanzui-Huocheng fault. The Wusunshan promoted towards the Yining basin center along a blind thrust fault. Interestingly, as a main part of the Yining basin, The Huocheng plain also uplifted according to sedimentary record. Integration of our data with literature data allow us to propose that the final formation of the morphotectonic basin-mountain architecture of the Yili basin and adjacent areas occurred since the latest Pleistocene, and this tectonic event is attributed to the outward growth and expansion of the Tibetan Plateau.