



Magnetostratigraphy of the Yili Basin indicates Late Cenozoic activity of the Tianshan Mountain, northwestern China

Liu Xiaoyan^{1,2,3}, Yuan Sihua^{2,3}, Jin Chunsheng⁴, Bai Xiangdong^{2,3}, Jiang Jiyi^{2,3}, Zhao Zhenghong⁵, and Li Ying⁵

¹China University of Geosciences Beijing, Beijing, 100083, P. R. China (xiaoyanliu818@126.com)

²College of Earth Science, Institute of Disaster Prevention, Hebei Sanhe, 065201, Hebei, P. R. China

³Hebei Key Laboratory of Earthquake Dynamics, Sanhe 065201, Hebei, P. R. China

⁴Institute of Geology and Geophysics, Chinese Academy of Science, Beijing, 100029, P. R. China

⁵Xi'an Institute of Geology and Mineral Resources, Xi'an, 710054, Shanxi, P. R. China

The Yili basin, sandwiched in the Northern and Southern Tianshan Mountain, is an ideal area to study the eroded histories at the Northern Tianshan Mountain during the late Cenozoic. Massive works have been done on tectonic deformation and uplift in this region. However, due to the lack of biostratigraphic data and effective dating marks, the uplifting time limit of the Tianshan Mountain are still argued by many researchers. In order to constrain the uplift history in the west Tianshan Mountain and provide the late Cenozoic time scale, we carried out a series of studies in the Chinese Yili Basin, fortunately, we acquired a drilling core with a depth of 500 m in the Quaternary depocenter in this basin, which provides the basis for the relevant studies. These results offered basic geological data for protecting against and mitigating earthquake disasters.

A magnetic stratigraphic study was carried out on the drilling core, combined with three OSL dating data from a natural section adjacent to the drilling hole, an effective time scale was established. There are three main results as follows: (1) The polarity sequences shows 5 normal and 5 reverse polarity zones which can be readily correlated with the Geomagnetic Polarity Time Scale (GPTS2012), dating the core from 3.11Ma to 12Ka. (2) The B/M boundary of magnetic strata in the 500m core in western Yili basin is located in the core 80m and M/G line is located in the core 400m. (3) The sedimentation rate in the western Yili Basin increased rapidly at two periods, ~1.17 to 1.07Ma and ~2.13 to 1.77Ma.

According to the regional reference data, the peak deposition rate in the range of ~ 2.13 to 1.77Ma is closely related to the Xiyu movement in Northwest China, as a corollary, the sedimentation rate should decrease with the end of Xiyu Movement after ~1.77Ma. Another obvious lithofacies change from ~1.17 to 1.07Ma illustrates there should be a tectonic event in the Tianshan region. This Middle Pleistocene uplift can also be evidenced by the age of volcanism in the Qaidam Basin (northeastern Tibetan Plateau), the existence of thick conglomerate deposits surrounding the uplifted plateau, and the increased sedimentation rate of lacustrine deposits in the between ~1.1

and ~0.9Ma ago, followed by the loess and marine records.