

Neogene sedimentary evolution of the Guide Basin and its implications on uplift of the NE Tibetan Plateau, China

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The Cenozoic Guide Basin in Qinghai Province (northwestern China), an important key site in the northeastern Tibetan Plateau is tectonically controlled in framework by the two big sinistral Kunlun fault and Altyn Tagh – South Qilian (Nan Shan – Qinghai Nan Shan) faults, is filled with huge thick Cenozoic sedimentary sequence that records the important signatures on the deformation and uplift of this part of the plateau. Here we present the results of a detailed lithostratigraphical investigation of the Neogene sedimentary rocks on the northern basin and discuss the style of sedimentation during its deposition. Depend on the mammal fossils and the magnetostratigraphic dating in typical section, detailed sedimentary study has revealed nineteen lithofacies, and five sedimentary environments have been distinguished: braided river, delta, shallow and half-deep lake, fan delta and piedmont proluvial systems. Five stages of the basin evolution have been revealed since 21Ma, they are the basin downfaulted and expanded stage (20.8-13 Ma), the basin developed stage (13-7.8 Ma), the basin shrank stage (7.8-3.6 Ma), basin died out stage (3.6-2.6 Ma) and the intermontane basin and the river terrace developed stage (2.6-0 Ma). The responding relationship between the sedimentation of the Guide basin and the tectonic uplift reveals that there are six important tectonic events at least about >20.8, 13, 7.8, 3.6, 2.6 and <1.8 Ma since late Cenozoic in the north of

Tibetan plateau. But the events are extraordinary important since 7.8 Ma, they gradually induced the marginal growth faults toward basin formed, Lajishan uplifted and the basin shrank. Especially, the tectonic event about 3.6 Ma made the surrounding mountains uplifted on a large scale. The intense tectonic event about <1.8 Ma induced the Songba Gorge formed through the process that the retrogressive erosion of Yellow River dissected the east mountains of the Guide basin, the palaeo-lake of the Guide Basin was cut through, the lake water was drained and the lake disappeared, and the Yellow River appeared in the Guide Basin. In the period of <1.8-0 Ma, the gradual uplifts of the Guide Basin made the Yellow River cut down about 900 m into the Cenozoic strata and the Triassic and Precambrian basement rocks, and have formed seven Pleistocene terraces.

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