

DAI Shuang, WU Maoxian, PENG Dongxiang, ZHANG Mingzhen, ZHU Qiang and WANG Huawei, 2013. The Onset of Uplift of Northern Tibetan Plateau at 40.5 Ma. *Acta Geologica Sinica* (English Edition), 87(supp.): 206.

The Onset of Uplift of Northern Tibetan Plateau at 40.5 Ma

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The determination of the uplift timing of the Tibetan Plateau is fundamental to well understand its formation and its influence on the worldwide climate change since the India collision with Asian. In the past decades the multidisciplinary investigations shows the time that it approached the highest or present elevation is still unclear. In the northern Tibetan Plateau, this age was separately considered to being from the Late Eocene to Quaternary. In our recent investigations we found a number of small basins on the top of the western Qilian Shan Mt. (QLS), northeast of Tibetan Plateau. These basins are small, narrow and parallel to the ranges and faults striking at NW-SE. Their modern high attitude (3500 - 4900 meters above sea level) and there are a long-term hiatus between Eocene sediments and Quaternary sediments in these basins, probably provide a new insight to directly constrain the history of uplift of the Qilian Shan Mt., northern Tibetan Plateau.

The Heizang basin, a bigger and well exposed in the middle portion of North QLS, is a foreland basin and preserves 365 meters thick Eocene alluvial - fluvial - lacustrine sediments, which is angle unconformable covering Permian. The sediments comprise of the fluvial sandstone, lacustrine sandy mudstone containing gypsum layers and alluvial conglomerate. The paleocurrent directions are basically northward. The gravel clast components are sourced from mid-Proterozoic metamorphic rock, and Cambrian - Permian siliceous and volcanic rocks and the Mesozoic limestones, sandstones

and conglomerates, granites surrounding the basin.

Total 107 oriented block samples (levels) collected from the section was thermally demagnetized between 50~690°C and measured their remanent magnetization and directions on a 2G cryogenic magnetometer in a magnetically shielded room. 72 samples exhibit antipodal remanent magnetization direction and thus are employed to build up the paleomagnetic polarity column. The obtained polarity zones are reasonably correlated with the 18n.2n-16n.1r of GPTS of Cande and Kent (1995), thus yielding an age of 40.5 Ma and 34.5 Ma to the sediments of the basin.

The Heizang basin was developed by thrusting faults, this indicate the surface uplift in this region. Thus the bottom age of sediments represents that the North QLS initiate uplift at 40.5 Ma. This age is in agreement with the inference at 40.2 Ma from the foreland Hexi Corridor basin, the oldest age obtained outside the northern Tibetan Plateau, and at ca. 40 Ma from the Central Tibetan Plateau. All these suggest that the Tibetan Plateau uplifted as a whole block since ca. 40Ma. Taking into account the absence of the sediments on the top of the QLS since Oligocene, the top age of the section suggests the QLS itself uplift post 34.5 Ma. This event probably induces the formation of the scene that the ranges alternate into the basins in the northern of Tibetan Plateau.

Acknowledgement: this work was funded by the China NSF41272127.

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