

Tectonic geomorphology and surface exposure dating of the Kumkol basin in the north-eastern margin of the Tibetan Plateau

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The Tibetan Plateau has been growing due to the collision of the Indian plate against the Eurasian plate. The plateau is now expanding laterally by invading stable continental plates surrounding it. However the growth mechanism is still a debate, especially in the northeastern margin, which is the boundary between the Kunlun Range and Qaidam basin. The Kumkol basin, which is bounded by the East Kunlun, Altyn Tagh and Qiman Tagh Ranges, has been uplifted rapidly and now being morphologically incorporated into the Tibetan Plateau. In the central part of Kumkol basin, there is a nearly E-W trending huge Kumkol Anticlinorium, which is over 40 km wide. The large-scale Kumkol Anticlinorium is likely to be a crustal-scale structure and give an important clue to understanding the growth mechanism of the Tibetan Plateau.

Our preliminary investigations based on the analysis of remote sensing data suggested that the Kumkol Anticlinorium is formed as a set of fault-propagation folds that developed near the up-dip edges of north dipping crustal-scale thrust faults. Uplifted and deformed fluvial terraces (Kaxaklik terraces) develop along the Kaxaklik He (= River), which comes from the Kunlun range and crosses the Kumkol Anticlinorium from the south to the north. It was inferred that the highest terraces were formed in the penultimate glacial period (ca.140 ka) and their uplift rate is about 2.0 mm/yr by our climatic-geomorphological study.

Instead of climatic-geomorphologically inferred ages, we need reliable absolute ages to discuss more precise development history of the Kumkol Basin. To get some absolute ages we conducted field investigations and sampling. As there is almost no vegetation and therefore ¹⁴C samples rarely exist in this area, the surface exposure dating was applied. We could not access the core area of the Kaxaklik terraces because of bad road condition. Fortunately, we have investigated the Bazarak terraces in the eastern edge of the Kaxaklik terraces. The Bazarak terraces are formed on the Kumkol Anticlinorium and they are uplifted and tilted to the north probably caused by the north-dipping thrust fault. The highest step of the Bazarak terraces continues westward to the highest step of the Kaxaklik terraces, implying that these terraces are almost the same age. In this presentation, we report the result of the field investigation and some surface exposure ages of the Bazarak terraces.

Keywords: Tibetan Plateau, Qaidam Basin, Tectonic Geomorphology, Surface Exposure Dating, Late Quaternary