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A geomorphological analysis of the Kumukol Basin at the northeastern edge of the Tibetan plateau using ALOS stereoscopic

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The area of the Tibetan plateau has been expanded laterally after it had attained an equilibrium elevation. The mechanism of lateral growth may be different from region to region. Along the southern edge of the Himalayas, for example, the plate-boundary thrust fault has repeatedly jumped southward, invading stable continental lithosphere on the foreland side. In this area discrete and episodic growth has occurred. In contrast, the lateral growth in Yunnan is continuous growth in space and possibly in time (Clark and Royden, 2000). However, the growth mechanism at the northern edge of Tibetan plateau has not revealed yet.

First, in this study, using global gravity anomaly data, we compared the characteristics of plateau margins in Himalaya and Yunnan with those in the northeastern edge of the plateau. We inferred that a complex and different type of growth occurred at the northeastern edge. So we searched the tectonic relief in Qaidam basin that is located at the northeastern edge of the Tibetan plateau. We found that there is a long-wave anticlinorium in the Kumukol basin (Kumukol Anticlinorium) located in the southern margin of Qaidam basin, and that there are many anticlines, faults and terraces on the surface of this anticlinorium.

Then we analyzed these tectonic features in more detail by the use of GIS software (ArcGIS). Topography data that we mainly used is the SRTM3 DEM with 3-arc second resolution. We also analyzed satellite images with 2.5-meter resolution, which were obtained by the PRISM sensor on the ALOS (Advanced Land Observing Satellite).

It was observed that there are high, middle and low groups of terraces, which were developed across the eastern part of the Kumukol Anticlinorium. Geomorphological analysis revealed that the amounts of vertical displacement with respect to the present river floor are accumulated more in higher terraces than in lower terraces, which terraces are likely to have been developed in response to advances and retreats of alpine glaciers in the surrounding mountains. Moreover by photogeological survey we inferred that Kumukol Anticlinorium is formed by activity of north dipping fault.

Keywords: Tibetan Plateau, Lateral growth, Qaidam Basin, Tectonic landform