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Evolution of the Gonghe Basin, northeastern Tibet, constrained by in situ cosmogenic radionuclides

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Tibetan plateau has been growing up by the collision between Indian and Eurasian Plate and expanding its area laterally by the marginal deformation of the plateau. However, the growth mechanism has been highly debatable. Gonghe Basin at the northeastern margin of the plateau is about 3200 m above the sea level and bordered by Qinghai Nan Shan and Heka Shan on the north and south, respectively. Gonghe Basin was filled with over 500 m thick sediment transported by the Yellow River. Subsequently, the river formed many fluvial terraces while cutting it down. Understanding these processes of sedimentation and later erosion in the basin is an important key for revealing the lateral growth of the plateau. They, however, have not been understood in detail. In order to reveal these processes we applied detailed geomorphological mapping and analyses by in situ cosmogenic radionuclides (CRNs). Our geomorphological mapping by satellite images and digital elevation model show that there are seven steps of fluvial terraces from T1 to T7 and four steps of lacustrine terraces from L1 to L4 in descending order. Our field work revealed that the L1 surface, which is the top lacustrine terrace, is covered with loess of 2-3 m thick including three layers of paleo-soil. This fact indicates that the top lacustrine terrace experienced at least three inter-glatial periods. To decide abandonment ages of lacustrine and fluvial terraces by CRNs concentrations we collected some subsurface samples from L1, T2, and T3. In addition to this, crastic sediments, which fill the basin thickly, were collected at nine points per 50 m depth from the fill top surface to the bottom of the valley for estimating burial history. In this presentation, we will introduce some results of CRNs analyses and their implications in evolution of the basin.

Keywords: Tibetan Plateau, Qaidam Basin, tectonic landform, in situ cosmogenic radionuclide