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The Northward Expansion of the Tibetan Plateau: Topographic Evidence from the Bogda Mountains—Junggar Basin Coupling system, Northwest China

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Distinct Mountain–Basin coupling systems were formed during the expansion of the Tibetan Plateau into the surrounding low elevation regions in the north, northeast and east. In this study, we focus on the topographic features of the Bogda Mountains–Southern Junggar Basin coupling system on the north of the Tibeau Plateau, which influenced by the N-S orthogonal shortening caused by the uplift of the Tibetan Plateau and northward propagation of deformation away from the India-Asia collision zone. We mainly quantify the influence of uplift of the Tibetan Plateau on the formation of the Bogda Mountains–Junggar Basin coupling system by fluvial geomorphologic analysis based on the digital elevation model analysis and the optically stimulated luminescence (OSL) dating on the Dalongkou river terraces on the northern slope of Bogda Mountains. Together, these morphological analyses show that the high normalized steepness index (k_{sn}) and knickpoints mainly distributed in the western Bogda Mountains. The normalized steepness index (k_{sn}) gradually decreased from west to east, which indicated that the tectonic activity of the western Bogda Mountains is higher. The compiled low-temperature thermochronology data of the Bogda Mountains show a younging trend from west to east, which indicates that the western Bogda uplift started earlier than in eastern Bogda. The difference of the χ values on both sides of the Bogda Mountains is similar, which means the drainage divide of the Bogda Mountains is stable. There are five river terraces distributed on both side of the Dalongkou River. The optically stimulated luminescence (OSL) dating results show that the ages of the T2 river terrace, T3 river terrace, T4 river terrace of the Dalongkou river are 6.2±1.3 ka, 13.1±1.7 ka, and 14.2±2.5 ka, respectively. The incision rate of the Dalongkou river increases upstream from ~1.22 mm/yr close to the southern Junggar Basin, to ~2.1 mm/yr, and to ~6.33 mm/yr in front of the higher Bogda Mountains, which means that the uplift rate of the Dalongkou river increases upstream. We propose a model of upbending of central Bogda Mts. by ongoing Holocene folding, with an inflection point close to the southern boundary to the Junggar Basin. By comparing the geomorphological features of the Bogda Mountains with the North Tianshan Mountains, we conclude that the tectonic uplift intensity gradually decreased from the North Tianshan Mountains to the Bogda Mountain, as well as the gradual accelerated uplift rate of the Bogda Mountains, are influenced by the N-S orthogonal shortening caused by the uplift of the Tibetan Plateau, which is gradually decreasing

from west to east.