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Intracontinental left-lateral strike-slip faulting and transpressional mountain building in the Beishan-Gobi Altai corridor, Central Asia

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In regions north of Tibet, active deformation associated with the Indo-Eurasia collision is diffusely distributed within large areas of NW China, Mongolia and S and SE Siberia. These regions are dominated by intraplate strike-slip and transpressional reactivation of Palaeozoic terrane collages. Because of relatively low historical seismicity, the Beishan region immediately north of Tibet is generally regarded as tectonically uninteresting from a neotectonic standpoint. However, our preliminary work in the region coupled with satellite image analysis indicates that the region is cut by at least five major sinistral strike-slip fault systems that are potentially active and which parallel the Altyn Tagh fault which bounds northern Tibet directly to the south. These fault systems generate localised uplifts within the Beishan and show typical geomorphological characteristics of active intracontinental deforming belts such as sharply defined mountain fronts, Quaternary alluvial fan complexes and tilted peneplain remnants. Specifically, the Yushi Shan and Mazong Shan are Late Cenozoic restraining bends that show clear evidence for Quaternary thrusting and uplift. The Dunhuang Block and neighbouring ranges in the Tibetan foreland are bound by thrust and strike-slip faults that cut Quaternary fanglomerates.

Directly north of the Beishan, modern mountain building processes in the Gobi Altai typically involve re-activation of NW-striking basement structures in thrust mode and development of linking E-W left-lateral strike-slip faults which crosscut basement structures within an overall left-lateral transpressional regime. Re-straining bends, other transpressional ridges and thrusted basement blocks are the main range type, but are discontinuously distributed and separated by internally drained basins filling with modern alluvial deposits. Unlike a contractional thrust belt, there is no orogenic foreland or hinterland, and thrusts are both NE and SW directed with no evidence for a basal decollement. Modern reactivation of the Gobi Altai crust and the kinematics of Quaternary faults are fundamentally controlled by Palaeozoic basement structural trends, the location of rigid Precambrian blocks, orientation of SHmax and possible thermal weakening of the lower crust due to an extensive history of Mesozoic-Cenozoic basaltic volcanism in the region, and the presence of thermally elevated asthenosphere under the Hangay Dome to the north.

Because the Gobi Altai is an actively developing youthful mountain range in an arid region with low erosion rates, it provides an excellent opportunity to study the way a continental interior reactivates due to a distant continental collision. In addition, it offers important insights into how other more advanced intracontinental transpressional orogens may have developed during earlier stages of their evolution.