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Tibet's slow but actively deforming northern foreland: Active sinistral transpressional faulting and juvenile mountain growth along the potentially shaky NW Hexi and Silk Road Corridor

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Faults responsible for juvenile mountain growth in slowly deforming areas around the northern margin of Tibet pose an earthquake hazard to nearly 3 million people living in oasis towns and cities in the NW Hexi and Silk Road Corridor. Uplift and northward expansion of northernmost Tibet in the Nanjieshan and Sanweishan region near Dunhuang occurs by thrust ridge development within a regional asymmetric flower structure centered on the Altyn Tagh Fault (ATF). The southern boundary of the mechanically stiff Archaean Dunhuang Block focuses ATF displacement and limits propagation of strain into the cratonic basement, but does not eliminate it. The kinematics of deformation are similar to sinistral transpressional deformation along the ATF further west and further north within the Gobi Corridor deforming belts (Beishan, easternmost Tien Shan and Gobi Altai), where the angular relationship between SHmax and pre-existing structural discontinuities determines the kinematics of Quaternary fault displacements and the style of mountain building. The NW trending Dengdengshan thrust faults near Yumen City define the northeastern limit of the Sanweishan-Nanjieshan block. To the south, the rhomb-shaped Hongliu Block is the actively deforming belt directly east of the ATF and North Qilian Shan Thrust Fault 'triple junction'. The Block is characterized by internally folded, fault-bound compartments that are actively uplifting and topographically inverting the NW Jiuxi Basin Jurassic-Cretaceous and Neogene basin fill. Fault-fold geometries typical of sinistral transpressional deformation reveal processes of early-stage mountain growth. Alluvial sediment damming behind the block support the 'bathtub piggyback basin' infill model for northernmost Tibet plateau uplift and lateral expansion. Further east in the northern Hexi Corridor, a newly identified and tectonically active sinistral wrench belt deforms the southern Beishan block boundary and contributes to the active deformation field directly north of the Qilian Shan. We present new field and remote sensing results coupled with derived slip rates for major faults in the region that indicate that the north Tibetan foreland region is slowly deforming relative to the ATF and active faults in the Qilian Shan, but presents an under-appreciated seismic hazard in the rapidly developing Hexi and Silk Road Corridor of western China.