

Quaternary shortening in the Southern Tian Shan, China: Resolving deformation style with structural and geomorphic tools

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The purpose of this work is to pair detailed structural and stratigraphic maps with surveys of deformed fluvial terraces to understand the style of fault related folding and possible changes in structural mechanisms through time. The field area is located at the interface between the Chinese Southern Tian Shan and the Tarim Basin. Since ~1.2 Ma, a >10 km package of terrestrial strata deformed into seven folds, each ~60 km long by ~12 km wide. In a manuscript submitted to the Journal of Structural Geology, I document evidence that this area accommodates a total shortening of ~9.2 km by detachment folding. Three water gaps with terrace flights oriented perpendicular to the structural fabric are co-located with the existing structural profiles. I will survey the terraces, tie them to the structural cross-sections, and compare results to geometric models of terrace deformation. Models of terrace deformation can be evaluated on two levels: the local geometry between the terrace treads and underlying strata, and the overall form of the deformed structures. The first differentiates between the mechanisms that create fold limbs (limb lengthening vs. limb rotation). The second level evaluates how the limb development varies across the structure, and distinguishes between detachment folding, fault-propagation folds and fault-bend folds. The results of this study will compare structural and geomorphic signals of fold development in terms of mechanisms of fold growth and variation in fault-fold style through time.