

QUATERNARY DEFORMATION ALONG THE NORTH WUTAISHAN FAULT IN THE SHANXI RIFT SYSTEM, CHINA

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ABSTRACT

The Shanxi Rift System in northern China is a tectonically active area in an intraplate setting. This study used data from multiple scales to investigate the influence of tectonics on features ranging in size from the meso- to regional scale. The data utilized include fault kinematic indicators, stream terraces, and regional/basin-wide morphometry data. It was found that paleostream profiles created from corresponding stream terraces generally follow the modern stream profile, however, there was evidence of converging profiles in the upper reaches of the Yangyan River. Offset stream terraces found on either side of a smaller fault splaying off of the Wutaishan Fault were calculated to have fault throw/uplift rates much less than the fault throw/uplift rate of the Wutaishan Fault. Quaternary faulting rates were also calculated for the Wutaishan fault from terrace height and age data. The results of Stream Length-Gradient Index and Hypsometric Integral analyses for Strahler orders 2, 3, and 4 watersheds show that the highest morphometry index values were found near the bend of the Wutaishan fault. This suggests that there may be a correlation between higher morphometric indices and strain accumulation at a fault bend. An analysis of fault kinematic indicators found at an outcrop and a moment tensor summation of 13 earthquakes suggest that the strain accumulation for the basins in the Shanxi Rift System is locally controlled by normal faults, and that the strain accumulation for region as a whole is accommodated by a “wrenching” type of deformation (i.e., a regional, horizontal shear) in response to tectonic forces.