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Assessing the Mesozoic paleorelief of the NE Tian Shan (China): Constraints from sedimentological marker strata.

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The Tian Shan is one of the main ranges of Central Asia Orogenic Belt. The Tertiary deformation is driven by the India-Asia collision stress field (e.g., [1], [2]). However, the deformation appears localised along inherited tectonic structures formed during the Palaeozoic - Early Mesozoic history of the range (e.g., [3]). Some of these structures have been reactivated during the early stages of the India-Asia collision which diverge from the model of northward propagation of the Tertiary deformation through time (e.g., [4]).
Our aim is to reconstruct the pre-Tertiary history of relief building in the Chinese Tian Shan. We use the sedimentary facies, depositional environments, sediment provenances and palaeocurrent directions of the exposed Mesozoic sections in the northern piedmont and inside the range. This will be used to understand the long-term reactivation pattern of the main inherited structures and to assess their influence on the localisation and propagation of the deformation.

We first established a nearly complete reference section spanning from the Upper Triassic to the Palaeogene, in the northern piedmont of the Tian shan range. This section, localised between the Ningjia and Manas rivers, west of Urumqi was previously studied by Hendrix et al. [5] and is thus well documented. We then studied two other sections, one in Wusu (100 km to the West) and one along the Toutun River (100 km to the East). Those sections, mostly covering the Jurassic and Cretaceous are used to assess potential lateral variations in the sedimentary facies and depositional environments along the actual piedmont.
Finally, we investigated the Mesozoic sections (Jurassic and Cretaceous ?) exposed within the intramontane Yili and Bayanbulak basins and compared them with the results obtained on the northern piedmont. This comparison should allow assessing the continuity or disconnection between the internal basins and the Junggar basin.
Preliminary results along the reference section show five main phases. The Upper Triassic – Lower Jurassic is marked by conglomeratic deposits indicative of the destruction of the Permian topography. During the Middle Jurassic sandstone deposits intercalated with coal indicate a quieter environment. Then, the thick (up to 400 m) conglomerates of the Upper Jurassic – Early Cretaceous Kalazha Formation may indicate either a reactivation of relief building or a strong climatic change. During Lower Cretaceous, lake deposits attest of a quiet period, followed during Upper Cretaceous by deposition of new conglomerates probably indicating renew topography. Lateral facies variations are observed along the northern piedmont throughout the whole time period. For example in the Toutun River section the Cretaceous series are only represented by lake deposits with a few conglomerate beds at the base of the series.
These main phases are also partially recognized in the intramontane basins however with some local variations in facies and occurrence. This suggests that some of these phases correspond to regional events, while others may be more local such as the formation of topographic barrier between different basins.

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[2] Avouac et al., (1993), J. Geophys. Res., 98 (B4), doi: 10.1029/92JB01963.
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