



Miocene to Holocene deformation rates in the southern Tianshan piedmont, China

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The Tianshan is one of the largest and highest mountain belts in central Asia and it accommodates an important part of the total India/Eurasia convergence. It is therefore critical to better quantify the deformation across this range, especially across its piedmonts that presently absorb most of the shortening. The deformation across the southern Tianshan piedmont is distributed over several thrusts and folds belts including the Qiulitagh and the Yakeng anticlines, which are identified as a fault-bend-fold and a detachment fold respectively. Across these two folds, we document the shortening rate from the Mio-Pliocene to the Pleistocene using two different approaches.

First, we used a kinematic fold model based on kink band migration, in order to reproduce bed by bed the pre-growth and growth-strata of the Qiulitagh anticline. We focus our analysis on two different sections where seismic profiles and detailed surface structural data provide strong constrains on the geometry of the fold. The first section is located in the southern flank of the fold along the Kuqa River. In the bottom part of this section the depositional ages have been constrained by the magnetostratigraphic study of Sun et al. (2009), whereas the upper conglomeratic part remained undated. For this upper part, we have collected several new samples to better constrain the sediments ages using burial cosmogenic dating ($^{10}\text{Be}/^{26}\text{Al}$). The second section is located in the northern flank of the fold along the Yaha River where the depositional ages have also been constrained in detail from magnetostratigraphy (Charreau et al., 2009). Together, these two sections should provide new and high resolution ($<1\text{Myr}$) constrains on the Mio-Pliocene shortening history across the Qiulitagh anticline.

The Late Quaternary shortening history of the Yakeng anticline is constrained from a similar approach based on fold modeling and subsurface seismic data. However, here the fold is modeled using a simple formulation of the displacement field derived from sandbox experiments (Bernard et al., 2007), and we focus our analysis on the Pleistocene shortening history by modeling the geometry of folded geomorphic markers (paleo-fan), dated ($>100\text{ka}$) by cosmogenic (^{10}Be) exposure method.