

EGU21-12484

<https://doi.org/10.5194/egusphere-egu21-12484>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Transect across the External Pamir thrust belt and Main Pamir Thrust along the Altyn Darya valley, Kyrgyzstan

Jonas Kley¹, Thomas Voigt², Edward R. Sobel³, Johannes Rembe³, and Chen Jie⁴

¹University of Göttingen, Abteilung Strukturgeologie, Geowissenschaftliches Zentrum, Göttingen, Germany

(jonas.kley@geo.uni-goettingen.de)

²Universität Jena, Inst. f. Geowissenschaften, Jena, Germany (thomas.voigt@uni-jena.de)

³Universität Potsdam, Inst. Erd- und Umweltwissenschaften, Potsdam, Germany (edsobel@gmail.com, jrembe@uni-potsdam.de)

⁴China Earthquake Administration, Institute of Geology, State Key Laboratory of Earthquake Dynamics, Beijing, China (chenjie@ies.ac.cn)

The ca. 35 km long, N-S-trending Altyn Darya valley in Kyrgyzstan exposes a nearly complete cross-section of the External Pamir thrust belt (EP), extending from the active Pamir Frontal Thrust in the north to the Main Pamir Thrust (MPT) and some distance into its hanging-wall. The EP comprises a northward imbricated stack of Carboniferous to Late Neogene rocks. From north to south, young clastics of the Alai Valley foreland basin are overthrust by an intensely folded and thrust-repeated frontal stack of Upper Cretaceous to Paleogene limestone, shale and evaporite. Lower Cretaceous red sandstones first emerge above north- and south-verging thrusts forming a triangle zone whose core comprises spectacular isoclinal folds in Upper Cretaceous strata. Towards the south, another thrust imbricate of Lower Cretaceous is overthrust by Late Triassic-Jurassic sandstones and mafic volcanics which are themselves overthrust by an internally deformed, Carboniferous to Triassic succession of, from bottom to top, greywacke and shale, limestone, volcanoclastic conglomerates, variegated sandstone-shale and pink conglomerates. The Carboniferous units in the south are truncated by the MPT which emplaces a succession of greenschist, marble and chert overlain by a km-thick sequence of metamorphosed and deformed, pillow-bearing lavas of Carboniferous age. Structural geometries and fault preference indicate that the basal detachment of the EP deepens southward very gently, stepping down from a detachment in Upper Cretaceous shale to another one near the base of the Lower Cretaceous and eventually a third one in Triassic shale. Cross-section balancing suggests minimum shortening of 75 km for units in the MPT's footwall. The displacement on the MPT is poorly constrained due to eroded hanging-wall cutoffs, but must exceed 15 km. The basal detachment cuts into basement no earlier than 100 km from the present thrust front, too far south to link up with the top of the Pamir slab.

The stratigraphic succession exposed in Altyn Darya can be readily correlated with less deformed and less metamorphosed transects in westernmost China (Qimgan and Kawuke), some 250 km to the east. A marble-greenschist sequence similar to that carried on the MPT in Altyn Darya has been identified there as a tectonic nappe of the Karakul-Mazar unit, emplaced from the south already in an Upper Triassic to Lower Jurassic (Late Cimmerian) event. If the correlation is correct,

then the MPT had a Mesozoic precursor structure extending over much of the E-W striking segment of the Northern Pamir.