

Mesozoic reactivation of the Talas-Fergana Fault in the Kyrgyz Tien Shan revealed by multi-method low-temperature geochronology

Simon Nachtergaele (1), Elien De Pelsmaeker (1), Marc Jolivet (2), Stijn Glorie (3), Fedor Zhimulev (4), Vlad Batalev (5), and Johan De Grave (1)

(1) Department of Geology, Ghent University, Gent, Belgium (simon.nachtergaele@ugent.be), (2) Lab. Géosciences Rennes, Université de Rennes 1, Rennes, France, (3) Tectonics, Resources and Exploration (TraX), Department of Earth Sciences, University of Adelaide, Adelaide, Australia, (4) Sobolev Institute of Geology and Mineralogy Siberian rnych Russian Academy of Science, Novosibirsk, Russia, (5) Research Station of the Russian Academy of Sciences, Bishkek, Kyrgyzstan

The Kyrgyz Tien Shan is a mountain belt that represents a part of the vast intracontinental Central Asian Orogenic Belt (CAOB). It assembled at the end of the Paleozoic as a result of the closure of the Turkestan Ocean and consists of three main tectonic domains: the Northern, Middle and Southern Tien Shan. These blocks were displaced with an offset of over 100 km by the Talas-Fergana Fault (TFF) since they amalgamated at the end of the Paleozoic. The reactivated TFF remains in fact a dominant structural feature of the Mesozoic (and Cenozoic) Tien Shan, and kilometers of Mesozoic sediments accumulated in intracontinental basins along the TFF. New zircon (U-Th-Sm)/He (ZHe) and apatite fission track (AFT) age data obtained on crystalline basement samples close to the TFF indicate a multi-staged reactivation history during the Mesozoic. The reactivation of the Kyrgyz Tien Shan is probably a result of Mesozoic accretion events to the growing Eurasian continent. Strike-slip movement of the TFF occurred during the Late Jurassic (± 200 Ma) as a result of the collision of the Qiangtang block to the CAOB. The collision of the Lhasa block to the CAOB that occurred around 150 to 120 Ma ago reactivated the TFF again, as recorded in our data. A sedimentary hiatus in the Cretaceous east of the TFF and a continued sedimentation west of the TFF suggests that the TFF fault geometry changed and movements progressed from a dominant horizontal direction (Late Jurassic) to a more vertical one (Cretaceous). The Paleogene history of the Kyrgyz Tien Shan is a tectonic quiet period in which paleosols could form. This tectonic quiet episode is followed by a major tectonic reactivation event in the Neogene induced by the India-Eurasia collision. It is ultimately responsible for the modern topography of the Kyrgyz Tien Shan. This is confirmed by low temperature thermochronological data and the deposition of kilometers of coarse-grained Neogene sediments. Detrital AFT results obtained on Mesozoic sediments show a distinct differential pattern east and west of the TFF, with a dominant Triassic-Jurassic central AFT age east of the TFF and an early Miocene central age west of the fault. This implies that the Jurassic sediments to the west of the TFF were buried and reheated to temperatures exceeding 100°C.