



Cenozoic structure of the Central Pamir

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A new structural map for the Central and Southern Pamir and cross-sections through the Central Pamir, focusing on the Sarez-Muzkol region of the Central Pamir, are presented. The work is based on the Soviet 1:200,000 geologic maps and fieldwork of the TIPAGE (Tien-Shan – Pamir geodynamic program) group from 1993 to 2010. The structure of the Central Pamir is dominated by Cenozoic deformation and thus related to the India-Asia collision. Only few structures of the Phanerozoic amalgamation of the Pamir were not reactivated. The Cenozoic structural development of the Central Pamir can be simplified into three phases:

(1) Between initial collision of India and Asia and <20 Ma, northward movement of a large nappe, here called the Akbaital-Muzkol thrust sheet (AMTS), led to strong north-south shortening; the AMTS has a minimum displacement of 35km. Its stratigraphic thickness is about 7 km but its internal structure and thus the true thickness is weakly constrained by the available data. Klippen of early Paleozoic strata of the AMTS south of the Central Pamir Muzkol and Sarez domes that lie on Carboniferous to Triassic strata of the footwall can be linked to the previously mapped Akbaitalnappe north of the domes. In the Saksasu valley of the Muskol dome, the AMTS is intruded by ~36 Ma granodiorite (U-Pb zircon).

(2) The AMTS is cut by north-south extensional faults and shear zones. Normal shear is concentrated along the northern margin of the domes and is the main cause of exhumation of the Central Pamir gneiss domes from ~30 km depth at 20-15 Ma (Ar-Ar and fission-track geo-thermochronology). Detrital U-Pb zircon ages suggest that the protoliths of the domes are Paleozoic; thus, these amphibolite-facies metasedimentary rocks are likely equivalents of the late Paleozoic to early Mesozoic strata of the footwall of the AMTS. This indicates that the upper crust thickened to ~30 km.

(3) Neogene shortening is bivergent: south-vergent backthrusting north of the Central Pamir domes opposes north-vergent thrusting in the south. Neogene deformation affects ~18 Ma (Ar-Ar geochronology) coarse fluvial and alluvial fan strata with basaltic dikes and flows south of the dome; restoration of these strata yields ~40% shortening. Total shortening by thrusting of the Central Pamir is at least 30 % in the Sarez-Muzkol area with a minimal total shortening of >70 km; internal deformation with recumbent north-vergent folding within the domes indicates much higher values.