

Zircon U-Pb Geochronology from the Wakhan Corridor, NE Afghanistan

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We present the first zircon U-Pb geochronologic data from the Wakhan Corridor, NE Afghanistan. The Wakhan hosts the hanging wall of the normal-sense South Pamir Shear Zone (SPSZ). The SPSZ delimits the largest of the Pamir gneiss domes, the doubly-vergent, composite Shakh dara–Alichur dome of the southwestern Pamir, Tajikistan and Afghanistan. Top-to-SSE, non-coaxial pervasive flow over the up to 4 km thick SPSZ exhumed crust from 30–40 km depth in the ~250×80 km Shakh dara dome. The top-to-NNE Alichur shear zone exposed upper crustal rocks in the ~125×25 km Alichur dome. Recent work [1,2] presented a kinematic model for doming based on geo/thermochronologic and structural data but this data were acquired primarily from the footwall of the SPSZ. That model suggests NNW–SSE extensional doming with footwall exhumation along two low-angle, normal-shear detachments, the crustal-scale SPSZ and the smaller Alichur shear zone. Multi-method geochronology constrained the exhumation history. Doming started at 21–20 Ma along top-to-N normal shear zones but the bulk of the exhumation occurred in the footwall of the SPSZ and was active until ~2 Ma with ~10 mm/yr slip along the SPSZ and with vertical exhumation rates of 1–3 mm/yr. Here, we present a geochronologic study of the hanging wall of the SPSZ in the Afghan Pamir. The samples span several kilometers across the hanging wall along the trace of the SPSZ, and cover one transect that is perpendicular to the regional strike and connects the SPSZ hanging wall with the Paleozoic–Mesozoic strata of Pakistan. Metamorphism was medium- and low-grade. Our analysis yielded Jurassic-Cretaceous and Cenozoic intrusion ages of mostly granites and leucogranite pegmatites. Inherited ages comprise Proterozoic to Ordovician zircons, tracing the typical Gondwana evolution of Qiangtang and Lhasa blocks of adjacent Tibet [3]. Studies on detrital zircons in the Wakhan shales and variegated paragneisses give hints for a stratigraphic correlation with the better studied Hindu Kush and Karakoram to the south.

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