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Late Cenozoic Evolution of Pamir-South Tian Shan Convergence Zone: in Sight from Detrital Zircon and Sedimentary Analysis in the Wuheshalu Section

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The Pamir-South Tian Shan (STS) convergence zone in central Asia is formed in response to collision and ongoing between India and Asia in the Cenozoic. Despite its significance for intracontinental deformation and for intensifying aridification, the late Cenozoic convergence between the Pamir and South Tian Shan is still poorly understood. Here we present new detrital zircon U-Pb ages coupled with conglomerate clast counts and sedimentary data from the newly described late Cenozoic Wuheshalu Section in the convergence zone. The ca. 15-km-long Wuheshalu section successively deposits Miocene Anjuan Formation, Miocene Pakabulake Formation, Neogene Atushi Formation and Quaternary Xiyu Formation with a generally upward coarsening feature. The Miocene part is composed of mudstone-sandstone complex and conglomerate stared to deposite since Neogene. Age framework of this section and the sampling horizons are based on previous magnetostratigraphic results in the nearby Tierekesazi Section with comparable sedimentary features. Zircon roundness classification is used to recognize recycled grains. These data reveal provenance contributions from both the Pamir and the STS to the convergence area, which could be related to the regional tectonic activities in the late Cenozoic.

Detrital zircon age distribution data indicates that the sediment in the Wuheshalu Section was mainly derived from the North Pamir between ca. 19-2.6 Ma, caused by northward thrusting and propagation of the MPT and/or the PFT. Minor STS sediment appears at ca. 19 Ma and ca. 9 Ma; their proportion increases after 5.2 Ma, broadly consist with the propagation of fold-and-thrust belts in the STS foreland. This data, combined with variations of paleocurrent direction and the appearance of conglomerate, suggests that the basin became narrower and that the Kezilesu River formed and/or migrated northwardly since ca. 5.2 Ma. After 5.2 Ma, conglomerate clast sizes and sedimentary observation of Neogene Atushi Formation reveal two upward-coarsening sequence with more diverse lithologic composition, indicating more intense regional tectonic deformation in the study area. After all, we speculate that the forelands of the Pamir and the STS might have met at ca. 5.2 Ma; since then, interacting to build the convergence area.