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Tectonic evolution of the South and Central Pamir terranes from petrologic and paleomagnetic analyses of Cretaceous-Paleogene volcanics

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The Pamir orogen formed and uplifted in response to the amalgamation of the Gondwanan terranes in the Mesozoic followed by the Cenozoic India-Asia collision. The Pamir growth is held responsible for the disappearance of a large epicontinental sea and the desertification of Central Asia. More than 400 km of convergence has been inferred in the Pamir with respect to the rest of Asia and is thought to have been accommodated by pre- and syn-collisional crustal thickening and collision-related crustal shortening, continental subduction of Asian plate beneath the Pamir and oroclinal bending of the Pamir arc. However, the timing and respective amounts of pre-collision vs. syn-collision convergence, crustal shortening and the plateau uplift history remain poorly constrained. Here we study the volcanic and tectonic evolution of the Central and Southern Pamir terranes, by analyzing geochemical and petrological features as well as paleomagnetic properties of two volcano-sedimentary sequences. The first sequence is located in the south-eastern part of the Southern Pamir and comprises intermediate to acidic subvolcanic to volcanic rocks of the Kyzylrabat Igneous Complex. They were formed during a protracted magmatic activity lasting from 112 to 92 Ma, while the Central Pamir volcanic rocks, comprising Bartang volcanic complex, are thought to have erupted during the late Cretaceous to early Paleogene. We compare petrological and geochemical features of these rocks with the Central Pamir Bartang volcanic suite that comprises mafic to intermediate volcanic rocks overlain by volcanoclastic deposits and intruded by monzonite plutons. Geochemical properties of the volcanic rocks from both sequences demonstrate the evolution from mixed - mantle and crustal arc-related to mantle derived more juvenile magmatism. This evolution can be associated with (1) the late stages development of an Andean-type margin that developed within the Karakorum and Southern Pamir during Neotethys subduction, (2) the collision of the Kohistan-Ladakh Island arc with Karakorum (assuming Kohistan-Ladakh colliding first with Asia in the Late Cretaceous), or (3) postcollisional lithospheric deformation during the India-Asia collision. Further constraints on those various options are being obtained from U/Pb and Ar/Ar dating, Sr-Nd isotopic signatures and paleomagnetism.