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Perspective

Geological Classifications of Pamir Terrane

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DESCRIPTION

The concept of a continuous magmatic belt stretching from the West Kunlun into the northern Pamir has been a prevalent paradigm for plate tectonic reconstructions of northern Tibet and the Pamir. The nearby, well-documented West Kunlun belt in northern Tibet and the poorly known North Pamir, however, differ significantly in their Paleozoic-early Mesozoic history, which likely explains why the two regions underwent differing Cenozoic deformation patterns. The Tibetan Plateau extends westward into the Pamir orogen. According to a popular theory, the Pamir was pushed several hundred kilometers toward the north of Tibet during the India-Asia collision when it indented into the Tajik-Tarim basin. A typical reconstruction of northern Tibet's plate tectonics subsequent accretions of crustal blocks from Gondwana led to the formation of the Pamir and Tibet during the Phanerozoic. The largest active continental collision, the India-Asia collision zone, includes the Pamir and Tibet today. The Main Pamir Thrust (MPT), located far to the north near the Pamir's longitude, has the highest contemporary strain rates. The majority of the convergence is accommodated at the southern boundary of Tibet within the Himalaya, in contrast to the east, where N-S shortening rates within northern Tibet are substantially smaller. Understanding of Pre-Cenozoic geologic evolution is important, also to understand the Cenozoic MPT and the differences between Pamir and Tibetan deformations.

The North, Central, and South Pamir terranes are the historic divisions of the Pamir. The North Pamir terrane was divided into the North Pamir Kunlun, which contains middle Paleozoic basalt, gabbro, and felsic plutons, and the North Pamir Karakul-Mazar terrane, which is made up of a wedge-shaped late Paleozoic-early Mesozoic accretionary formation that has felsic plutons intruding into it. The Chinese Gez valley is currently the most thoroughly researched locale in the North Pamir despite significant deformation and fault dissection. While the North Pamir Kunlun was associated with the South Kunlun terrane of the West Kunlun in Tibet, the Karakul-Mazar terrane was correlated with the Songpan-Ganzi-Hoh Xil complex of northern Tibet. The early Paleozoic Kudi suture divides the West Kunlun into the North and South Kunlun terranes. The Proterozoic Tarim block's edge and the North Kunlun correlate. The Kudi segment, which crosses the North and South Kunlun south of the town of Kargilik, was used to define this. However, there are few similarities between the South Kunlun Terrane of the West Kunlun and the North Pamir Kunlun.

There is an ongoing debate about how and which units of the Tibetan Plateau/West Kunlun are the along-strike equivalent of units within the Pamir plateau. The ophiolites along the Tanymas-Jinsha structure, as well as the ophiolites along the Kudi-Oytag structure, were thought to be the remains of previous suture zones associated with the closure of the Proto and Paleo-Tethys. Estimates of the Pamir orogen's relative amount of northward indentation with respect to the Tibetan Plateau are based on this perceived lateral continuity. It is believed that well-documented syn-or postcollisional early Paleozoic magmatism is connected to the closure of the Proto-Tethys along the Kudi suture zone, which occurred between 440 Ma and 405 Ma (monazite U-Pb date of biotite schist from the Saitula group)(zircon U-Pb age of the A-type North Kudi Pluton). The Central Pamir-Qiangtang block collided with Asia and underwent a Late Permian to Triassic intense magmatic phase, which culminated in the formation of the Tanymas-Jinsha suture zone between 243 Ma (zircon U-Pb age of anatectic Yuqikapa pluton) and 190 Ma (metamorphic zircon U-Pb age population in amphibolite facies metasediments from the Karakul-Mazar accretionary complex). A volcanic quiescence period between the Silurian and Triassic has been hypothesised in the NE Pamir and the West Kunlun.

However, marine cherts and oceanic mafic to intermediate volcanic rocks dating from the Upper Devonian to Bashkirian can be found in the North Pamir Kunlun. This restricted area, which is around 400 km long, extends from the Chinese Gez and Oytag (also known as Wuyitake or Aoyitake) valleys northward *via* the Tajik town of Kalai Khumb and into Afghanistan's Hindu Kush/Badakhshan region. The Kalai Khumb-Oytag Basin (KOB), a peripheral basin of the Paleo-Asian Ocean, commonly known as the Kunlun arc or the Pamir arc, was given oceanic rocks. Tonalites and trondhjemites are examples of leucocratic granitoids that are massive intrusions inside mafic volcanic rocks and are dated as Visean to Bashkirian (338-314 Ma). These structures are assumed to be the

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remains of an intraoceanic arc, which signifies the beginning of intraoceanic subduction and the closing of an ocean basin. Also invading Lower Carboniferous marine layers in NW Afghanistan are granitoids, which produce K-Ar ages between 335 Ma and 360 Ma. If the tiny presence of mafic volcaniclastic rocks and accompanying leucogranites of similar age, discovered in the Mazar tectonic mélange zone east of the town of Mazar, were included in the KOB, the basin's eastward extent would be increased.

The North Pamir arc of Tajikistan's rock groups underwent varying degrees of metamorphic overprint, from greenschist to lower amphibolite facies; higher metamorphic units may have been connected to Pennsylvanian to Permian subduction events. Furthermore, the carboniferous rocks in the Chinese Qimgan valley are overlain by a nonmetamorphic sedimentary succession of upper Permian to Eocene dates, which has no evidence of a significant post-Carboniferous collisional event that would have affected the NE Pamir. As a result, the Cenozoic thin-skinned deformation that led to the creation of the Permo-Triassic Qimgan basin occurred on a piece of Carboniferous oceanic crust that is today located in the External Pamir.