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Evolution of the Qimantagh magmatic arcs: constraints from U-Pb zircon ages and implications for subduction of Proto- and Paleo-Tethyan Oceans

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The Qimantagh along the northwestern margin of Eastern Kunlun Mountains at the northern margin of the Tibetan plateau is one of the less well studied regions of Central Asia/Western China because of its remote location. The Qimantagh is located between the Cenozoic Qaidam basin in the north and intramontane Kumukuli basin in the south. Although available data are scarce, many geologists considered that Qimantagh Mts. to represent a Paleozoic magmatic arc because of the abundance of various types of granitoids. In this study, we present new LA-ICP-MS U-Pb zircon ages from granitoids from the Qimantagh and recent sands collected in the northern slope of Qimantagh. Seven samples of granitoids, diorites, granites and gneissic granites gave a variety of ages: (1) four samples from Wotoushan have weighted average ages of 485 $\pm$ 12 Ma, 439.0 $\pm$ 5.9 Ma, 424.0 $\pm$ 3.5 Ma and 269.6 $\pm$ 6.2 Ma; (2) the weighted average ages of two samples in Shuangshixia are 455.0 $\pm$ 8.4 Ma and 428.0 $\pm$10 Ma; (3) the sample from Naitoushan shows the weighted average age of 446.0 $\pm$ 3.6 Ma. Zircons of three samples of recent river sands draining the Qimantagh to the Qaidam basin yield a wide age range of 1557 to 211 Ma. Early Paleozoic and the Late Paleozoic to Triassic age populations dominate and some Precambrian grains are subordinate. From west to east, the sample from the Xigou presents two age peaks of 472 and 276 Ma; the sample from the Qiekelikegou presents two age peaks of 414 and 283 Ma; the sample collected from Zhonggou is characterized by the peak ages of 413 and 219 Ma. Comparing these detrital ages with each other, the three samples yield two distinct age populations of 472–413 Ma and 300–250 Ma. On the base of our new zircon ages from recent wadi sand and granitoids, combined with previous geochemical and age data, we suggest that two stages of tectonic evolution existed in Qimantagh areas. From 500 to 400 Ma, Qimantagh areas mainly underwent the northward subduction of the Proto-Tethys Ocean (500–450 Ma) and back-arc extension (450–400 Ma). In the Permian, due to the northward subduction of Paleo-Tethys Ocean, the future Qimantagh area was characterized by an active continental margin setting, maybe by back-arc extension.