



The lower Paleozoic granitoids from the central part of the Qilian block, NW China: An example of granitoid magmatism in a continental backarc setting

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The petrology, geochemistry, geochronology, and Sr-Nd-Hf isotopes of the backarc granitoids from the central part of the Qilian block are studied in the present work. Both S- and I-type granitoids are present. In petrographic classification, they are granite, alkali feldspar granite, felsic granite, diorite, quartz diorite, granodiorite, and albite syenite. The SHRIMP ages are 402-447 Ma for the S-type and 419-451 Ma for the I-type granitoids. They are mostly high-K calc-alkaline granitoids. The S-type granitoids are weakly to strongly peraluminous and are characterized by negative Eu anomalies ($Eu/Eu^* = 0.18-0.79$). The I-type granitoids are metaluminous to weakly peraluminous and are characterized mostly by small negative to small positive Eu anomalies ($Eu/Eu^* = 0.71-1.16$). The initial ($^{87}Sr/^{86}Sr$) values are 0.708848-0.713651 for the S-type and 0.704230-0.718108 for the I-type granitoids. The $\epsilon Nd(450 \text{ Ma})$ values are $-8.9 \sim -4.1$ and $-9.7 \sim +1.9$ for the S-type and I-type granitoids, respectively. The TDM values are 1.5-2.4 Ga for the S-type and 1.0-2.3 Ga for the I-type granitoids. For the Qilian block, the backarc granitoid magmatism took place approximately 60 million years after the onset of the southward subduction of the north Qilian oceanic lithosphere and lasted approximately 50 million years. Partial melting of the source rocks consisting of the Neoproterozoic metasedimentary rocks of the Huangyuan Group and the intruding lower Paleozoic basaltic rocks could produce the S-type granitoid magmas. Partial melting of basaltic rocks mixed with lower continental crustal materials could produce the I-type granitoid magmas. Major crustal growth occurred in the late Archean and Meso-Paleoproterozoic time for the Qilian block. The magma generation was primarily remelting of the crustal rocks with only little addition of the mantle materials after 1.0 Ga for the Qilian block.