

Precambrian of Eastern Kunlun Mountains, Western China

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The Kunlun Mountains represent the northern margin of the Tibetan Plateau. The eastern part, Eastern Kunlun Mountains, is also the southern boundary of the Qaidam Basin. The Eastern Kunlun Mountains are divided into three tectonic belts. The northern belt mainly consists of Paleozoic sequences. The middle belt is dominated by Precambrian basement and various granites. The southern belt consists of Proterozoic-Mesozoic sequences. The Precambrian rocks of Eastern Kunlun Mountains are mainly distributed in middle and southern belts and are dominated by Paleoproterozoic-Neoproterozoic rocks that contain four type rock assemblages.

1. TTG-granulite: These rocks are only scattered in the middle belt and consist mainly of tonalitic gneisses and minor amphibolite, mafic granulite and biotite (hornblende) gneiss, which were derived from early crustal rocks by metamorphism. A general metamorphic mineral assemblage in the rocks is orthopyroxene + clinopyroxene + hornblende + plagioclase + quartz.

2. Al-rich gneiss-marble: The middle belt is dominated by this rock assemblage that consists of various gneisses, schists and marble. Their protoliths are sandstones and pelitic rocks interlayered with magnesium-rich carbonates. Studies show that the rocks have suffered amphibolite-granulite grade metamorphism with a decreasing pressure and increasing temperature P-T path. Zircons from granitic gneisses yielded a U-Pb age of 1624 +/- 22 Ma and a Pb-Pb apparent age of 1955 +/- 6 Ma.

3. Granitic gneiss: The Precambrian metamorphic rocks in the area are dominated by these granitic gneisses that represent middle to lower grade metamorphosed TTG

rocks. The mineral constitution of the rocks is biotite, garnet, plagioclase, quartz, microcline and newly grown muscovite. The granitic gneisses are generally foliated and often contain amphibolite and marble inclusions. The Al-rich gneiss-marble was intruded by granitic gneisses that yielded a U-Pb isochronal age of zircon ranging from 864 Ma to 878 Ma.

4. Clastic-carbonate rocks: These rocks, distributed in middle and southern belts, comprise dolomite, silicic and pelitic limestones with lower grade metamorphism of greenschist facies. In the middle belt these rocks are associated with pillow lavas. Stromatolites are often found in dolomites and limestones, which suggest that the age of these rocks should be late Middle Proterozoic-Neoproterozoic.

The constitution of Precambrian rocks in Eastern Kunlun reflects the crustal evolution of middle-late Proterozoic. The Eastern Kunlun area was set in a relatively stable continental margin environment in Paleoproterozoic-Middle Proterozoic time (1900-1000 Ma). The Paleoproterozoic crystalline basement was covered by clastic-carbonate sediments that suggest a shallow sea-continental shelf environment. In late middle Proterozoic there happened a strong continent-ocean convergent event with low-pressure, high-temperature metamorphism and partial melting. The protracted convergent event resulted in the formation of many granite intrusions in the early Neoproterozoic. The Eastern Kunlun area became a stable continental margin again in the middle and late Neoproterozoic and a Phanerozoic sedimentary cycle began subsequently.

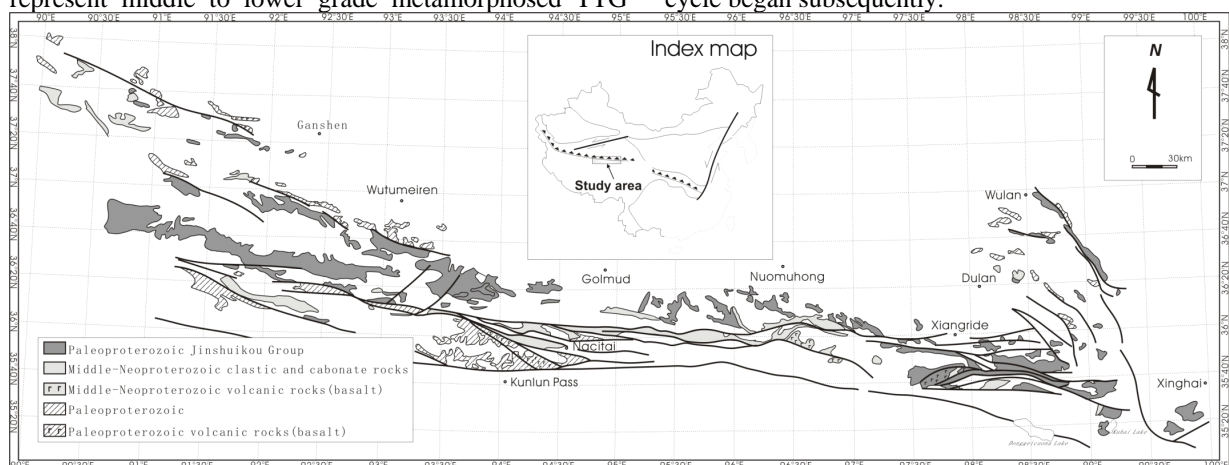


Figure 1. Geological sketch map of Precambrian in Eastern Kunlun.