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Geological significance of 820-800 Ma high grade metamorphism in Northwestern margin of the Yangtze Block

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A substantial number of studies report geological records from around 800 million years ago (Ma), such as mafic igneous rocks, interpreted as evidence of Rodinia's breakup. A plume-related rifting event was proposed in the western Yangtze block based on these findings. However, recent research has identified high-grade metamorphic records in Micangshan, located at the northwestern margin of the Yangtze area, suggesting a different interpretation for the 820-800 Ma geological events.

These metamorphic records are characterized by garnet-biotite genesis (GBG), composed primarily of garnet, biotite, sillimanite, K-feldspar, plagioclase, and quartz. Accessory minerals, monazite and zircon, are often found as inclusions within garnet. Petrographic analysis reveals a clockwise pressure-temperature (P-T) path.

Using pseudosection modeling, the peak conditions were determined to be 750-780°C and 7-9 kbar (corresponding to a geothermal gradient of 25-33°C/km). Monazite and zircon U-Pb dating yields an age of approximately 820-800 Ma. These findings suggest that the Yangtze block's 820-800 Ma geological activity is indicative of a subduction process, rather than rifting. Consequently, it is proposed that the Yangtze block was located on Rodinia's periphery during this period, rather than within its interior.

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