U-Pb-Hf isotopes of detrital zircons from Neoproterozoic to Early Paleozoic sedimentary rocks in the northern margin of the Yangtze Block and its geological significance

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Abstract

The formation of the Mian-Lue oceanic basin has restricted the understanding of tectonic evolution of the Qinling Orogenic Belt, which recorded the collision of North China and South China. Two different viewpoints were suggested to interpret the timing of the Mian-Lue ocean: Neoproterozoic and Late Paleozoic to Early Mesozoic, respectively. However, the Neoproterozoic to Early Paleozoic sedimentary strata on both sides of the Mian-Lue suture were ignored so far. In this study, we presents new detrital zircon U-Pb dating of the Late Neoproterozoic to Early Paleozoic sedimentary rocks in the northern margin of the Yangtze block to constrain the evolution of the Paleo-oceanic Basins in the South Qinling Orogenic Belt. The detrital zircons of Sinian samples have only Neoproterozoic ages, which were likely derived from the Hannan-Micangshan pluton in the northern margin of the Yangtze Block. Combined with the previous studies on the Sinian sedimentary strata in the northern margin, we suggest that this region of the Yangtze Block was in a restricted platform environment during this period. The Cambrian-Silurian samples mainly contain Neoproterozoic zircons, with a small amount of Archaean and Paleoproterozoic zircons. These zircons are mainly derived from the interior of the Yangtze Block, with a small amount from the Jiangnan Orogenic belt. The Hf isotopic data of these zircons indicate that two crustal growth events at least existed in the Yangtze Block (at ~3.1 Ga and 2.69~2.46 Ga, respectively) and one crustal growth event happened on the periphery of the Yangtze Block (1000~700 Ma). In combination with the previous studies, we suggest that the northern margin of the Yangtze block was in a depositional environment of passive continental margin, and the Mian-Lue Ocean on the northern margin of the Yangtze Block should occur after the early Silurian.

Key words: Yangtze Block, detrital zircon, Qinling Orogenic Belt, crustal growth