

Geochemistry and geochronology of post-collisional metadiorites in the North Dabie Complex Zone, China

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The North Dabie Complex Zone (NDZ), central China is a high-T ultrahigh-pressure metamorphic terrane formed by subduction of the South China Block beneath the North China Block in Triassic [1-4]. The early Cretaceous mountain-root collapse with large-scale anatexis and magmatism resulted in various magmatites widespread in the NDZ.

Metadiorites with K-feldspar augen occur within the magmatites in the NDZ. Their Zircons generally have typical core-rim structure, i.e. igneous core and metamorphic rim. Zircon SHRIMP U-Pb dating results show the ages of cores and rims are 129 ~ 133 Ma and 122 ~ 127 Ma, respectively. Whole-rock trace elements of metadiorites display LREE-enrichment and HREE-depleted patterns with slightly negative Eu anomalies. On the other hand, the rocks are enrichment in LILE and depleted in HFSE, suggestive of the genesis of crustal source. It is also supported by the low initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratios (0.7076 ~ 0.7081) and $\epsilon_{\text{Nd}}(t)$ values (-20.37 ~ -15.25), indicating that their protoliths were derived from ancient lower crust. Their initial $^{206}\text{Pb}/^{204}\text{Pb}$, $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{208}\text{Pb}/^{204}\text{Pb}$ ratios are similar to those from the NDZ eclogites, showing their petrogenic relationship with eclogites. Zircon Hf isotopes analysis shows the T_{DM2} of zircon cores and rims are 2549 ~ 3034 Ma and 2561 ~ 2911 Ma in Archean, respectively.

Therefore, the NDZ metadiorites are the products of the Triassic deep-subducted mafic lower-crustal rocks (eclogites), resulted from their partial melting during the post-orogenic collapse and asthenosphere upwelling in the early Cretaceous. As a result, the metadiorites here underwent the consequent thermal metamorphism associated with strong deformation.

This study was financially supported by the National Basic Research Program of China (2015CB856104) and the National Natural Science Foundation of China (41273036).

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