

Petrogeochemistry and geochronology of corundum-bearing aluminous gneisses in the Dabie Orogen, 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]. This study documents that there are corundum-bearing and associated aluminous silica-undersaturated rocks in the NDZ.

The corundum-bearing aluminous gneisses here have a migmatitic structure defined by closely spaced millimeter to centimeter sized corundum-bearing leucosomes and weakly foliated mesosomes of plagioclase and biotite. Their zircons generally have core-mantle-rim structures. Zircon U-Pb dating and CL images show Neoproterozoic ages for the inherited zircon cores, Triassic ages for the metamorphic domains and Early Cretaceous ages for the rim domains, respectively. These gneisses are rich in Al_2O_3 (24.27% ~ 28.62%) and alkali with K_2O/Na_2O ratio >1, and depleted in SiO_2 (49.85% ~ 55%). All the gneisses are enrichment in LILE, and relatively depleted in HFSE. Moreover, the gneisses show negative $\epsilon_{Nd}(t)$ values (-10~-13), significant negative P anomaly and no obvious Zr and Hf differentiation, suggestive of typical continental affinity. Based on elemental discrimination diagrams, the gneisses belong to metasedimentary rocks, similar to geochemical characteristics of aluminous pelites. In addition, the uniform $\epsilon_{Nd}(t)$ values of the gneisses show they were derived from a homogeneous crustal source.

Therefore, the corundum-bearing gneisses are aluminous metapelites which clearly experienced a multi-stage evolution history as the other rocks in the NDC. Also, corundum is the product of dehydration-melting of muscovite.

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