New zircon dating and Hf-isotope constraints on Neoproterozoic rifting and Triassic subduction of the Neoarchean Yangtze basement

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The Dabie orogen, central China is a Triassic continental subduction-collision belt [1-2], which comprises several fault-bounded lithotectonic units with varying metamorphic grades and evolutional histories [1, 3-4]. One of the units is the Susong complex zone (SZ) with a relatively low-grade metamorphism, located in the southernmost part of the orogen. The SZ is mainly composed of mica-quartz schist, granitic gneiss, marble, graphite schist and phosphate rock series with subordinate meta-basalt/garnet amphibolite, meta-gabbro, rodingite and meta-serpentinite.

This study performed zircon SHRIMP U-Pb dating and Hf isotope analyses on granitic gneisses from the SZ. The results reveal that the precursor ages of the gneisses can be divided into two groups, i.e. the Neoarchean (2.5–2.7 Ga) and Neoproterozoic (770–830 Ma), and that they both underwent ~750 Ma thermal and ~220 Ma subduction-related peak epidote amphibolite-facies metamorphism. Furthermore, the Neoproterozoic protoliths of the gneisses were derived from remelting of the Neoarchean basement rocks with ~2.0 Ga metamorphic overprinting during the Neoproterozoic continental rifting. In view of the agreement of the Neoproterozoic emplacement timing of the granitic gneisses with the protolith ages of the Dabie UHP meta-igneous rocks, combined with their metamorphic processes and related data and regional setting, the Susong granitic gneisses are further documented to be the metamorphic basement and the last portion of the Triassic subduction of the Yangtze Block, and underwent epidote amphibolite-facies with local HP eclogite-facies metamorphism, and later detached and exhumed at shallow depths. Nevertheless, because of overthrust, tectonic stack and erosion during collision and orogenesis, the deeply subducted rocks may have been mixed into the SZ.

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