Neoarchean subduction recorded in the northern margin of the Yangtze Craton, South China

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To constrain the accretionary history of the Yangtze Craton in the Archean, a combined study of geochronology and geochemistry was carried out for the Yudongzi Complex in the northern margin of the Yangtze Craton. The Yudongzi Complex is composed of gneissic granite, gneissic tonalite, amphibolite gneiss and magnetite quartzite. Most of the rocks are enriched in sodic with Na_2O/K_2O ratios of >2.0. The gneissic granite shows positive Eu anomalies, high (La/Yb)cn and Sr/Y ratios, low Ybcn (<3) and Y (<10ppm), resembling typical TTG. The trondhjemite has Nb/Ta ratios of 6-23 and Zr/Sm ratios of 63-181, suggesting the absence of rutile in the residue. The amphibolite and tonalite gneiss show less fractionated REE patterns. SHRIMP zircon U-Pb dating on a gneissic trondhjemite, an amphibolite and a tonalite yields crystallization ages of 2667±21 Ma, 2701±10 Ma and 2697±9 Ma, respectively. They all record the same metamorphic event at about 2.48 Ga, which is identical to the ages of the Douling TTG and diorite to the east of the Yudongzi Complex. The SHRIMP zircon O isotope analysis for a trondhjemite and an amphibolite gives $\delta^{18}O$ values of 6.2±0.3‰ and 6.3±0.4‰, respectively. The O isotope ratios are higher than normal mantle values, suggesting a contribution from the supracrustal material to the source of these rocks. The laser fluoration O isotope analysis of bulk minerals yields $\delta^{18}O$ values of 6.4-8.8‰ for zircon and 12.5-15.2‰ for quartz. The zircon Lu-Hf isotope analysis on the trondhjemite and amphibolite gives similar $\varepsilon_{Hf}(t)$ values of 0.08±0.48 and 0.07±0.63, respectively. Whole-rock $\varepsilon_{Nd}(t)$ values range from -1.5 to +1.0. These trondhjemite and tonalite are interpreted as derivation from partial melting of the subducted oceanic crust with a garnet-amphibolite residue. The 2.6-2.7 Ga A-type granitic rocks occur in the interior of the Yangtze craton, indicating the operation of plate subduction in its northern edge. The Yudongzi trondhjemite and tonalite were formed in an active plate margin and the A-type granites formed as a response to the back-arc extension. The identification of 2.65-2.7 Ga subduction provides a possible link of the Yangtze Craton to the other cratons elsewhere in the world, such as the Superior and Tanzania cratons. This is also a new clue for the reconstruction of the Neoarchean supercontinent Kenorland.