Formation of Precambrian crust in the Cathaysia Block, South China

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LAM-ICPMS U-Pb dating and LAM-MC-ICPMS Lu-Hf isotope analyses were carried out on zircons from the basement metamorphic rocks in the Cathaysia Block, South China. Coupled with geochemical analyses, these results indicate that Precambrian crusts of the northeast and southwest Cathaysia Block have different compositions and formation histories.

The basement of the Wuyishan terrane, northeast Cathaysia, consists mainly of Paleoproterozoic and Neoproterozoic rocks. Zircon U-Pb dating indicates that magmatism in the terrane mainly occurred in Paleoproterozoic (~1.86 Ga), Neoarchean (~2.5 Ga) and Neoproterozoic (0.83-0.70Ga). Integration of zircon U-Pb ages with their Hf isotopic compositions suggests five important episodes of juvenile crust generation (3.5 Ga, 2.8 Ga, 2.6-2.4 Ga, 1.85 Ga and 0.83-0.70 Ga) in the terrane. Strong Paleoproterozoic (1.86 Ga) magmatism in northern Wuyishan and Neoproterozoic (0.83-0.70 Ga) magmatism in southern Wuyishan both principally involve the remelting of old crust with a little input of juvenile materials.

In contrast, the basement of the Nanling-Yunkai terrane, southwest Cathaysia, comprises dominantly Neoproterozoic sedimentary rocks. U-Pb ages of detrital zircons from these sediments indicate that they contain a great number of Neoarchean and Grenvillian materials with moderate Mesoproterozoic and rare Paleo- to Meso-Archean and Neoproterozoic ones. Integrated with Hf-isotopic analyses of zircons, it is suggested that the growth of juvenile crust in the Nanling-Yunkai terrane probably occurred at ~3.6 Ga, 2.6~2.5 Ga, ~1.6 and 0.8-0.7 Ga. Mesoarchaean (3.3~3.0 Ga) and early Neoproterozoic (1.0~0.9 Ga) magmatism mainly involved the recycling of old crust, with a little juvenile crust generation, especially in the Yunkai domain. Minor ~4.1 Ga crust may remain in the Nanling-Yunkai terrane.

The boundary between two terranes extends through southern Jiangxi and southern Fujian provinces with NWW-SEE direction, which has also been supported by the geophysical, petrologic and geochemical data.

The adakite and mineralization of the Shaxi porphyry copper-gold deposit

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Introduction

Adakites are intermediate to felsic igneous rocks, andesitic to rhyolitic in composition (basaltic members are lacking). Yangtze valley is one of the most important metallogenic region in Jurassic-Cretaceous period in east China, where more than 200 polymetallic Cu–Fe–Au, Mo, Zn, Pb, Ag deposits resident [1–4]. Among them, the Shaxi porphyry Cu-Au deposit was one of the importance discoveries of the Cu-Au exploration in the middle-lower Reaches of River in China in 1970's. Its geochemical studies are extensive investigated. However, the genesis are still unknown.

Methods and Results

Data of REE and trace elements calculated from Shaxi, Anqing, Chuxian, Tongling and Luzong Cu-Au deposits are collected and calculated [5–9], trying tocompare geochemical processing of these famous Cu-Au mineralization in Anhui. We fund the close link between adakite and the regional Cu-Au mineralization. Due to the western subduction of the Pacific plate in the early Cretaceous, this process released large ion lithophile element (LILE)-rich fluids rise up into the mantle wedge, inducing both its metasomatism and partial melting trigger a large mount of Cu-Au and fluids materials to the crust environment and melting the subduction plate formed the adakitic assemblage and Shaxi porphyry Cu-Au deposit.

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