Paper Number: 5306

# Heterogeneous zircon inheritance in Late Jurassic granitic plutons within the Jiuling composite batholith, South China

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We investigated the origin of Late Jurassic granitoids in the Neoproterozoic Jiuling composite batholith from central Jiangnan orogen between the Cathaysia and Yangtze Blocks in South China. Zircon U–Pb geochronology and field relationships suggest that these Mesozoic plutons can be subdivided into two sets. Set-1 granitoids (Ganfang and Guyangzhai plutons), crystallized at 144.0~147.0 Ma, mainly consist of two-mica granites and biotite granites which intrude Neoproterozoic (~820 Ma) Jiuling granitoids and contain abundant inherited zircons as individual xenoliths or zircon cores. Set-2 granitoids (Shiqiao pluton) formed at 147.2~148.3 Ma mainly consist of granodiorite, which intrude the Neoproterozoic Shuangqiaoshan sedimentary group (deposited at ca. 820-860Ma), and contain very few inherited zircons. Set-2 granitoids plot on the normal granite field, whereas set-1 rocks fall on the differentiated granite field. Set-2 granitoids show high $CaO/Na_2O$ (1.35), low Rb/Sr (0.33), Rb/Ba (0.24) ratios and high apatite Sr isotopes (0.7113~0.7170), which points to a clay-poor, psammatic origin associated with their Neoproterozoic mafic sedimentary wall rock.

Zircons in these plutons can be subdivided into two groups based on their morphology and CL characters: Group 1 zircons show bright and magmatic zonation in CL; Group 2 zircons have homogeneously dark domains (i.e. zircon rims or entire zircon grains) in CL. Detailed petrology, field geology and zircon geochemical characters indicate that these homogeneous dark zircon domains were formed in late-magmatic fluids instead of metamorphism, Pb-loss events or hydrothermal fluids.

Set-1 granitoids show low whole-rock K/Rb ratios (<150), clear tetrad effect ($TE_{1,3}$>1.1) and relatively high apparent Ti-in-zircon temperatures (>617°C), which suggest they were affected by late-magmatic fluids. Even though their whole-rock Nd and Hf isotope signatures are similar to those of the Neoproterozoic Jiuling granitoids, the major and trace element features do not support a model that partial melting of Jiuling granitoids, which is also confirmed by compositions of plagioclase, K-feldspars,

muscovite and biotite. Therefore, set-1 granitoids are derived from set-2 magma by fractionation of K-feldspar, plagioclase and accessory minerals, and partially affected by late-magmatic fluids.

Set-1 granitoids share many similarities with other Mesozoic granitoids that host the extensive W-mineralization in this area. There is also a possibility that Sn-W deposits may be explored in this area.