Late Mesozoic continental arc in East China Sea: Constraints from detrital zircons

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The Late Mesozoic subduction of Izanagi beneath East Asia formed large-scale intraplate magmatism in SE China and subduction mélanges from SW Japan to eastern Taiwan (Müller et al., 2016; Wang et al., 2008; Wakita and Metcalfe, 2005), but the accompanying arc remains uncertain. The East China Sea (ECS) is settled between the intraplate and trench, in which previous studies have found some arc indications (Xu et al., 2017). ECS domains share a unified basement with, or are regarded as an exotic microcontinent of Cathaysia block, which is still up for debate.

Discerning delta facies and litharenite types of sediment samples support a typical proximal environment of Lishui-Jiaojiang sag, SW ECS. As its provenances, nearby Zhemin and Yandang swells provide Late Mesozoic voluminous felsic suites with minor metabasite materials. We conducted LA-ICP-MS U-Pb zircon dating and trace element analyses of proximal sandstones in the SW ECS to track a Jurassic to Cretaceous magmatic arc, which advantages over the use of a few drilled igneous rocks. Newly acquired data reveal an evolved magmatic arc in SW ECS from Jurassic to Cretaceous (200–86 Ma), which developed predominantly in episodes of 150–124 Ma and 124–102 Ma. Arc magmatism exhibits characteristics of low-T and continental zircon types, yielding high Th/U, U/Yb, Sc/Yb, and Th/Nb ratios and low Nb/Yb and Nb/Hf ratios. Trace elements U and Th in arc zircons indicate a decline in subduction fluids addition due to slab rollback and a rise in lower crustal addition owing to fluid-fluxed crustal melting from Jurassic to Cretaceous.

The swells of Yushan, Zhemin, Haijiao, and Hupijiao outline a Late Mesozoic magmatic arc in the West ECS. This magmatic arc, in conjunction with the SE China intraplate, and subduction mélanges, spatially forms a Late Mesozoic trench-arc-intraplate architecture in response to the Izanagi subduction beneath East Asia. Its identified tectonic scenarios mainly include slab strike-slip subduction (200–170 Ma), slab stagnation and intraplate foundering (170–150 Ma), slab rollback and removal of the thickened arc root (150–102 Ma), and trench retreat with arc migration (102–86 Ma). Detrital zircon data suggest that the West ECS and Cathaysia block share a unified basement that formed at ca. 2.44 Ga and ca. 1.85 Ga, which was reworked at ca. 780 Ma, ca. 442 Ma, and ca. 240 Ma. The West ECS magmatic arc evolved on this Cathaysia-type basement.

Keywords: magmatic arc; detrital zircon; Late Mesozoic; Izanagi subduction

