

Permo–Triassic detrital records of South China and implications for the Indosinian events in East Asia

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Abstract

Provenance analyses in South China of Lower to Middle Triassic strata from the Greater Youjiang Basin along with Permian strata succession of Hainan Island, south China provide a record of the collisional assembly of the South China Craton and Indochina Block and their incorporation into Asia. Detrital zircons from Lower and Middle Triassic samples show a similar overall age spectra ranging from Archean to Triassic with major age groups at 300 – 250 Ma, 480 – 420 Ma, and 1200 – 900 Ma as well 400 – 300 Ma in one Triassic sample. Permian siltstones from Hainan Island, to the southeast of the Greater Youjiang Basin, record different age spectra with major age groups at 400 – 300 Ma and 530 – 420 Ma and subordinate components at 1200 – 900 Ma and 1900 – 1700 Ma. This age data in combination with available paleocurrent data and regional geological relations suggests that Precambrian detrital zircons were derived either directly from Precambrian basement or via reworking of early Paleozoic sedimentary rocks that overlie basement and contain Precambrian detritus. Early Paleozoic detritus were derived from early Paleozoic igneous in the craton. Devonian – Triassic detritus in Triassic strata are likely sourced from syn-sedimentary magmatic activity related to closure of Paleo–Tethys branch ocean that lay to the southwest, whereas 400 – 300 Ma detritus in Permian siltstones of Hainan

Island were likely derived from a Paleozoic magmatic arc source that extended along southeastern margin of China from Hainan Island to Japan that formed in response to subduction of Paleo–Pacific Ocean.

Detrital zircon, trace element and modal data for Permo–Triassic strata from the Greater Youjiang Basin indicate the basin evolved from a trailing edge passive margin setting to a peripheral foreland basin due to closure of the Paleo–Tethys Ocean and collisions between Indochina and South China. The timing of initiation of the foreland basin decreases from southeast to southwest across the basin probably reflecting oblique collision. In contrast, the Permian strata on Hainan Island record a provenance history distinct from the Greater Youjiang Basin, which is related to Late–Paleozoic to Mesozoic subduction of the Paleo–Pacific beneath South China.

Keywords: Greater Youjiang Basin, Hainan Island, Paleo–Tethys, Paleo–Pacific, Permian–Triassic orogeny