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Detrital zircon provenance of Silurian-Devonian and Triassic sedimentary rocks of the western Yangtze Block: Constraint for the location of South China in Gondwana supercontinent

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During Paleozoic even to early Mesozoic, South China, along with a series of Asia continental blocks, dispersed from the northern margin of Gondwana, drifting across the Tethys Ocean and accreting to the final assembly of Asia in Triassic, which also accepted sediments sourced from the adjoining segments of east Gondwana and itself successively. However, the exact location of South China within the east Gondwana and other Asia blocks is arguing and confusing. Detrital zircon U-Pb geochronology and Hf isotope data from Paleozoic sedimentary rocks and massive Triassic flysch sequences kept in the western margin of South China (Danba-Longmenshan regions) provide a record of the source from which they were derived, and thus being applied to constraining the distribution of basement block in paleogeographic reconstructions and the tectonic setting of the basin.
Two Longmenshan Devonian sediments exhibit dominant Grenvillian ages (0.9-1.1 Ga), with mid-Neoproterozoic (730-850 Ma), Pan-African (500-680 Ma) and Neoarchean (2.4-2.5 Ga) age populations, indicative of a typical Gondwana-derived affinity, which is also recorded by the Danba Silurian sample and other Paleozoic sediments (Devonian-Cambrian) in the resting South China block, including the east Yangtze block and the Cathaysia. However, the similar age patterns are not observed in the Devonian sample of Danba region, which exhibits a different age pattern with only two significant age groups of Pan-African (440-600 Ma) and Neoproterozoic (660-994 Ma) with an apparent lack of older zircon grains (>1.0 Ga). The Triassic sandstone from Songpan-Ganze covering sequences shows a distinguished zircon age distribution with prominant mid-Neoproterozoic (649-843 Ma), mid-Paleoproterozoic (1724-1951 Ma) and subordinated Permian-Triassic (236-298 Ma), Paleozoic (375-530 Ma) ages, mainly derived by melting of old crust with few input of juvenile material.
Considering provenance changes along with the temporal and variation in the west part of Yangtze block, the geochronological and Hf isotopic data presented suggest that South China was close to the Qiangtang-Greater India-Tethyan Himalaya continental margins during Silurian-Devonian, but a change of extrabasinal drainage patterns may resulted from the Asia fragments dispersed from the northern margin of East Gondwana that causing inconsistent provenance records along the western margin of South China. Moreover, as the South China drifted further away and the progressively closure of proto-Tethyan Ocean, the rising orogens (e.g. Qinling orogen) and surrounding basement rocks supply massive materials to the Songpan-Ganze basin without any significant contribution from South China block during Triassic.