

South China in the assembled Gondwana

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South China is one of the major East Asian continental blocks that shaped the northern Gondwana margin. The geodynamic interactions of South China with Gondwana and other Asian neighbours are thus important for understanding how the northern Gondwana margin was collaged and how it impacted the South China tectonics during the late-Neoproterozoic to early-Paleozoic. This comprehensive study started from the Ordovician–Silurian Wuyi-Yunkai orogeny in South China, investigating its magmatism, metamorphism and orogenic denudation history, further looked into the sedimentary records in the adjacent Ediacaran–Silurian Nanhua foreland basin, and finally correlated the late-Neoproterozoic to early-Paleozoic magmatic, metamorphic, sedimentary histories and orogenic events from both South China and Indian Gondwana.

The intraplate Wuyi-Yunkai orogeny in South China experienced high-grade metamorphism and felsic magmatism during 460–440 Ma, mafic magmatism at 435 Ma, and massive felsic magmatism but no metamorphism during 440–400 Ma. Geochemical and geological studies suggest that the orogeny featured a late-orogenic lithospheric delamination no late than the early-Silurian, which led to an orogenic collapse, melting of subcontinental lithospheric mantle and widespread late-orogenic granitic intrusions in the orogen.

The adjacent Nanhua foreland basin started as early as the Ediacaran, and experienced a three-stage basin evolution. Stage 1: the Ediacaran–Cambrian stage, recording the start of tectonic subsidence in the basin with turbiditic siliciclastic deposition, fed by exotic orogens outboard South China; Stage 2: the Ordovician to earliest-Silurian stage, characterized by a migrating depocenter with dominant shallow marine and deltaic siliciclastic deposition, fed by the local Wuyi–Yunkai orogen; Stage 3: the Silurian stage, showing the arrival of depocenter into the Yangtze during the orogeny waning stage with deltaic deposition in the remanent foreland basin.

Provenance analysis were conducted on the Ediacaran–Silurian siliciclastic rocks in the Nanhua foreland basin. It reveals that, the Ediacaran–Cambrian rocks exhibit a prominent age population of 1100–900 Ma, moderate populations of 850–700 Ma and 650–490 Ma, and minor populations of 2500 Ma and 2000–1300 Ma, grossly matching that of crystalline and sedimentary rocks in northern India. Zircon Hf isotopes further reveal four episodes of juvenile crustal growth in the source regions. The provenance as defined by the Ediacaran–Cambrian sedimentary rocks is distinctly different from the known tectonomagmatic record of South China, or that of western Australia or western Laurentia, but matches well with that of the coeval sedimentary rocks and granites in northern India. The Ediacaran–Cambrian sediments in South China were thus mainly sourced from northern India and adjacent orogens, and the Ordovician–Silurian sediments were derived from both locally recycled Ediacaran–Cambrian rocks and eroded Cathaysian basement within South China. The Wuyi–Yunkai late-orogenic magmatic rocks also contributed to the Silurian sedimentation in the basin.

We speculate that there was an Ediacaran–Cambrian collisional orogen (probably the “Pan-African” Bhimphedian orogen) between South China and northern India during the Gondwana assembly, shedding

sediments to the early Nanhua foreland basin. Far-field stress during the late stage of this collisional orogeny triggered the Wuyi–Yunkai orogeny in South China, and erosion of the local Wuyi–Yunkai orogen further provided detritus to the late Nanhua foreland basin. The southern Qiangtang terrane was likely located between South China and northwestern India during this collision, and received similar detritus from the Bhimphedian orogen. The Lhasa terrane, however, was attached to western Australia during the Gondwana assembly, and received sediments from the Pinjarra orogen and vast Yilgarn basement rocks.

Keywords: South China, Gondwana, Ediacaran-Cambrian, Ordovician-Silurian, Orogenic events, Sedimentary basins

