

Geochronologic and geochemical study of supracrustal rocks from the Maxianshan and Xinglongshan Groups in the eastern Central Qilian block: Constrains on assembly and breakup of Rodinia

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Controversy has long surrounded the reconstruction of the East Asian blocks in the Rodinia supercontinent, which was a coherent large landmass during 900-750 Ma and is now dispersed over all current major continents and microcontinents. The Central Qilian block is a Precambrian microcontinent in the early Paleozoic Qilian orogenic belt, which marks the junction of the North China, South China and Tarim cratons. In this paper, we present a systemic study of the petrology, whole-rock geochemistry, and geochronology of supracrustal rocks from the Maxianshan Group and the Xinglongshan Group in the easternmost of the block. The metasedimentary rocks from both groups overlay on a gneissic granite, which has a zircon U-Pb age of 970 ± 6 Ma with $\epsilon\text{Hf}(t)$ values of -3.5 to $+2.5$ and belongs to the arc-related I-type granite. Paragneisses from the Maxianshan Group and micaschists from the lower formation of the Xinglongshan Group have detrital zircon U-Pb ages of 2465-876 Ma that peaking at *ca.* 950 Ma. They show strongly decreasing zircon $\epsilon\text{Hf}(t)$ values of $+0.8$ to -11.3 from 1174 Ma to 876 Ma. Their protoliths constituted a sedimentary sequence with a long history of deposition during 1174-911 Ma in a continental arc-related basin. Metabasaltic tuffs from the middle formation of the Xinglongshan Group are tholeiitic with a zircon U-Pb age of 958 ± 9 Ma and indicate a back-arc setting. Sandstones from the upper formation of the Xinglongshan Group have detrital zircon ages of 2668-732 Ma that peaking at 810 Ma and 984 Ma and indicate a passive margin setting. Combining our results with existed data, we propose that the Maxianshan Group and the lower to middle parts of the Xinglongshan Group make up an early Neoproterozoic trench-arc-basin system at a continental margin during the assembly of Rodinia. A sequence of intra-oceanic subduction at 1317-1174 Ma, continued oceanic crust-continent subduction with formation of a mature continental arc and a back-arc basin at 1174-896 Ma, and continental rift at 882-824 Ma is suggested for the formation of the Central Qilian block. The spreading of the North Qilian Ocean occurred at 824-735 Ma, accompanying the breakup of Rodinia.

