



When did the Yangtze Block initiate provenance to the Triassic Songpan-Ganzi ocean? Evidences from rock composition and U-Pb age of the Xikang Group in the NE Tibet Plateau

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The Songpan-Ganzi terrane which is located in the northeast of the Tibet Plateau is surrounded by the Qinling orogenic belt and north China Block to the north, the Yangtze Block to the east and the Qiangtang Block to the southwest. The terrane contains huge thickness of the Triassic turbidite sediments which named Xikang Group. Major and trace elements, detrital zircons of the Late Triassic turbidite from the Songpan-Ganzi terrane were analyzed to constrain the provenance and tectonic setting. The geochemical data show that the Late Triassic turbidite contains low SiO₂ (average 51.16%), Al₂O₃ (average 9.85%), Fe₂O₃T+MgO (average 6.56%) values, and K₂O/Na₂O (average 2.71), higher SiO₂/Al₂O₃ (6.99) ratios, identical to a continental island arc setting. The turbidite have lower chemical index of alteration (50.64-76.05, average 65.85), and higher component variability index (0.9-2.34, average 1.61), indicating that the source areas underwent weak chemical weathering and the turbidite were predominantly derived from immature source region. In addition, the Late Triassic turbidite shows enrichment in light rare earth elements, flat pattern of the heavy rare earth elements and strong negative Eu anomalies (Eu/Eu* = 0.56-0.92, average 0.67). Tectonic discrimination diagrams of La-Sc-Th and Th-Sc-Zr/10 ratios indicate that the Late Triassic turbidite were deposited on continental arc combined with continental margin setting. Detrital zircons of the Late Triassic turbidites samples which were collected from the Late Triassic (Zagunao, Zhuwo and Yajiang Formations) show obvious features of magmatic origin. The main U-Pb age spectrums distribute from 222-300 Ma and 450-520 Ma, which is consistent with the age of the Paleozoic to Late Triassic granitoids in Qinling orogenic belt. The lesser age spectrums distributed from 720-850 Ma, 950-1300 Ma and 1400-2400 Ma, which was derived from the northern and western margin of the Yangtze Block. In these samples, the upper most strata Yajiang Formation contains more zircons from the Yangtze Block, which indicates that the margin of the Yangtze Block might initiate intense tectonic activation during the late Late Triassic. Combined with the geochemistry and detrital zircon ages of the Late Triassic turbidite sediments, we infer that the Songpan-Ganzi terrane was a continental arc basin which was mainly derived from the Qinling orogenic belt during the Late Triassic. The Yangtze Block was underwent intense tectonic activation with the collision between north China and south China Blocks in the late phase of the Late Triassic and supplied abundant clastic to the Yajiang Formation.