

Provenance of the Late Triassic Langjiexue Group south of the Yarlung-Tsangpo Suture Zone, southeastern Tibet

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The Upper Triassic flysch sequence of the Langjiexue Group in the Shannan area, southeastern Tibet, which was thrust northwards over the Yarlung-Tsangpo Suture Zone (YTSZ) by the Great Counter Thrust (GCT), was conventionally attributed to the typical Tethyan Himalayan Sequence (THS) and interpreted to be genetically related to the Indian origin. Recent results, mainly from analyses of detrital zircon age spectrums and Hf isotope signatures of the Triassic rocks in the southern Tibet, challenged this opinion and considered the Triassic sequences as a relatively independent tectonic unit from the THS. Our data, including detrital mode analysis, heavy mineral assemblage study, whole rock geochemistry and detrital zircon geochronology, provide new evidence to constrain the provenance of the Langjiexue Group. Domination of quartz grains and acid volcanic lithic fragments indicate recycled orogeny provenance. Stable heavy mineral assemblages with the majority of zircon and rutile reflect acid magmatic and continental metamorphic sources. Characteristic geochemical indicators (Al_2O_3/TiO_2 , Cr/V-Y/Ni, Co/Th-La/Sc, $Eu/Eu^+ - Th/Sc$, LREE enrichment, Th-Sc-Zr/10, Th-Co-Zr/10) point to felsic igneous sources in the tectonic setting of continental island arc or active continental margin. Three major age clusters from the detrital zircons were identified: 1150-850 Ma, 750-480 Ma and 300-200 Ma, among which the Neoproterozoic to Late Cambrian signal is the most remarkable exhibiting the Gondwana affinity for the Langjiexue Group. The youngest age peak is inconsistent with sources from any surrounding terranes, including the South Qiangtang, Lhasa terrane, Tethyan Himalayan Sequence (THS), Higher Himalayan Sequence (HHS), NW-W Australia and Banda Arc. We propose the Tasmanides, including the New England Orogen (300-230 Ma), along the eastern Australian margin as the supplier of magmatic materials for the Langjiexue Group. The age peak of 300-200 Ma of the Langjiexue Group can be correlated well with the widespread magmatism in the age ranging between the Late Paleozoic to Early Mesozoic from the Bird's Head (New Guinea) in the north to New Zealand in the south, which results from subduction of the Paleo-Pacific ocean beneath the eastern Australia. We conceive of such long-distance drainage system in the Late Triassic as similar to modern Yarlung-Tsangpo-Brahmaputra and Amazon rivers, which transport detritus from mountain chains to sedimentary basins for thousands of kilometers.

Keywords: Langjiexue Group, Late Triassic, Southeastern Tibet, Provenance