Geochronological and geochemical constaints on sequences of the Cangshuipu group and their implications for the amalgamation between the Yangtze and Cathaysian blocks

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This contribution documents a synthesis of geochronological and geochemical analytical data for the Cangshuipu Group, which is composed of the Yinzhuba volcanic agglomerates and Linjiawan conglomerates and represents an angular unconformity between the Lengjiaxi and Banxi Groups in Hunan, South China.

The Yinzhuba volcanic agglomerates are characteristic by high-Mg andesites and dacites, which are enriched in LILEs and depleted in HFSEs and the $\varepsilon_{Nd}(t)$ values ranging from -1.7 to -4.7. They are dated at 824±7 Ma and 822±28 Ma by zircon U-Pb analytical technology, representing the formation age of the Yinzhuba volcanic sequences.

The Linjiawan conglomerates are mainly composed of dacite and rhyolite, without high-Mg component. Most of the samples are dominanted by quartz and plagioclase phenocryst, moinor magnetite, with cryptocrystalline matrix, typical characteristics of felsic volcanic rocks. The youngest zircons from the conglomerates exhibit a weighted mean age of 831±27 Ma, representing the maximum depositional age of the Linjiawan conglomerates.

Integrated with other geological data, the Cangshuipu Group are composed of the the Yinzhuba volcanic agglomerates at the upper part and the Linjiawan conglomerates at the basal part. And the amalgamation of the Yangtze and Cathaysian Blocks along the Jiangnan orogen occurred at ca. 831~822 Ma as a part of an exterior accretionary orogen along the periphery of Rodinia rather than that of the Grenvillian-aged orogenic events.

Building of the Deep Gangdese Arc, South Tibet: Linking granulites, and magmatism and crustal growth in the active continental margin

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The present-day formation of continental crust is generally attributed to magmatic processes in the palte convergence margins and those within intra-plate settings. Therefore, the deep-seated magmatism and metamorphism in active continental margins can provide important clues to understand the formation of the continental crust.

The Gangdese arc along the southern Lhasa terrane is a product of the Mesozoic Andean-type orogeny derived from the northward subduction of the Neo-Tethys. In the Eastern Himalaya, owing to Late Cenozoic rapid uplift and erosion, the high-grade metamorphic Complex is well exposed. Petrological and geochronological studies reveal that the complex experienced intense Paleocene subduction-related magmatism, and almost synchronous granulite-facies metamorphism accompanied by the formation of S-type granites. The subduction-related intrusive rocks show geochemical features typical of continental magmatic arcs. Their zircons yielded the U-Pb ages of 65–56 Ma, and commonly display positive εHf(t) values of -3.0 – +11.7, indicating juvenile source. The syn-intrusion high-grade metamorphism indicates that the plutons were emplaced at the middle to lower crustal depth. The S-type granitoids are characterized by peraluminous nature and contain garnet and muscovite. Their zircons yielded the U-Pb ages of 66–55 Ma, and have distinct but negative εHf(t) values of -18.4 – -6.8. The inherited detrital zircons from the metasedimentary rocks yielded variable U-Pb ages of 2910–235 Ma. The metamorphic zircons from the metaplutonic and metasedimentary rocks yielded ages of 67 Ma–53 Ma. Phase equilibria modeling shows that the granulite-facies metamorphism and partial melting form under the conditions of 9.7–10.2 kbar and 710–810 °C. We argue that the late Mesozoic compressional orogeny resulted in the deep burial of the Mesozoic sedimentary rocks, and that the accretion and loading of voluminous asthenosphere-derived and deep-stated intrusions resulted in the extensive crustal thickening and heating to generate the granulite-facies metamorphism and S-type magmas.

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