Petrology, geochemistry and Zircon U-Pb geochronology of turbidites from the Neoproterozoic Yanbian Group in the Yangtze Block, SW China: Implications for provenance and tectonic setting

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The Neoproterzoic Yanbian Group in the western margin of the Yangtze Block, SW China, contains a thick shaly flysch-like succession of marine deposits, including turbidites. It is composed mainly of medium- to fine-grained poorly-sorted volcaniclasitic sandstones and mudstones, representing a submarine fan depositional system. Detrital zircon dating indicates that the ages range primarily from ca. 865 to 1000 Ma with peaks near ca. 900-920 Ma, and there is only a very minor amount of older continental-derived zircons. The sandstones are immature with an average composition of $Q_{16}F_{35}L_{49}$, suggesting proximal and undissected-transitional arc sources [1]. The lithic compositon points to andesitic and felsic volcanic source rocks. These siliciclastic rocks have intermediate SiO_2 (SiO_2/Al_2O_3 typically 3-6), and variable K_2O/Na_2O ratios (generally 0.1-1 and 1-10 for sandstones and mudstones, respectively). Ferromagnesian trace elements and incompatible elements are moderate in contents, and comparable with average continental upper crust. They have REE patterns with enriched LREE (La_N/Yb_N=5.3-7.4), flat HREE, and pronounced negative Eu anomalies (Eu/Eu*=0.6-0.74), similar to the typical post-Archean shales. Geochemical evidence also indicates an arc setting and intermediate-felsic volcanic sources, supporting the view that the western margin of the Yangtze Block was a major active continental arc during Neoproterozoic time [2].

[1] Dickinson (1985) in Zuffa (ed.) *Provenance of Arenites*, pp.333-361. [2] Zhou *et al.* (2002) *Earth Planet. Sci. Lett.* **196**, 51-67.

Paleoarchean crustal remnants in the western North Qinling Orogenic Belt

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A ~4.1Ga old xenocrystic zircon has been reported from the western North Qinling Orogenic Belt. This has been the first Hadean age dated from young volcanics in the world (Wang *et al.* 2007). In addition to the oldest one, ~3.5 Ga (n=3) zircons were recognized. All the zircons with weak brightness and unclear zoning have the Th/U ratios varying from 0.29 to 0.69, representing typical igneous zircons. The $\sum$Hf(t) values for the~3.5 Ga zircons are all negative, ranging from - 0.3 to - 6.1, indicating that the zircons were derived from recycled ancient crust. Their Hf model ages of ~3.8 Ga - ~4.0 Ga suggest that their source rocks were probably extracted from the depleted mantle in the early Archean. Thus, our data provide strong evidence for the existence of crustal relics as old as ~4.0 Ga in the North Qinling Orogenic Belt.

To date, in China, the oldest rocks of 3.8Ga have been found in the Anshan area, northeast China (Song *et al.* 1996; Wan *et al.* 2005; Liu *et al.* 2007), the oldest detrital zircons of 4.1Ga also reported from both the Burang area of Tibet and the North Qinling (Duo *et al.* 2007;Wang *et al.* 2007), and the ~3.8 Ga old detrital zircons (U-Pb ages) with Hf model ages of ~4.0 Ga have been discovered in South China (Zhang *et al.* 2006). The South China, North China and Tarim Cratons together constituted the today's China tectonic foundation, while the Qinling Orogenic Belt represents a Phanerozoic amalgamation boundary between the North China Craton and the South China Craton. Therefore, all these oldest ages strongly demonstrate that China continent has a widespread Paleoarchean crustal remnants which is the oldest basement of the continent.

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