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## Neoproterozoic tectonic evolution of South Qinling, China: evidence from zircon ages and geochemistry of the Yaolinghe volcanic rocks

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The South Qinling terrain is located at the northern margin of the Yangtze Block. Neoproterozoic volcanic-sedimentary sequences of the Yaolinghe Group play the most significant role in studying the tectono-magmatic evolution of the South Qinling.

Based on temporal and spatial geochemical variations, the Yaolinghe Group can be divided into three volcanic cycles. Basaltic lavas of cycle 1 crystallized at  $847 \pm 8$  Ma and exhibit typical island arc basalt characteristics with enrichment of LILEs (Th, U) and LREEs, depletion of HFSEs (Nb, Ta, Zr, Hf, Ti) and homogeneous initial  $^{143}\text{Nd}/^{144}\text{Nd}$  ratios ranging from 0.51162 to 0.51172 corresponding to initial  $\epsilon\text{Nd}$  values of +1.6 to +3.5. These features suggest that they were derived from a depleted mantle source during a subduction period. Volcanic rocks of cycle 2 show a complete lithological evolution from basalt through andesite to rhyolite without a significant gap of  $\text{SiO}_2$  content. They have the peak ages of 735 Ma and 770 Ma and display trace element signatures similar to arc-volcanics with positive LILE and negative HFSE anomalies. These basalts have lower initial  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios from 0.7030 to 0.7052 and higher initial  $^{143}\text{Nd}/^{144}\text{Nd}$  ratios from 0.51172 to 0.51194 with positive initial  $\epsilon\text{Nd}$  values ranging from +0.9 to +5.3, whereas intercalated felsic rocks show lower initial  $^{143}\text{Nd}/^{144}\text{Nd}$  ratios from 0.51150-0.51177 with initial  $\epsilon\text{Nd}$  values varying from -4.5 to +1.9, suggestive of metasomatic alteration of lithospheric mantle by slab-derived fluids/melts. Youngest Yaolinghe volcanic rocks and coeval mafic dikes of Cycle 3 show undepleted HFSEs (Nb, Ta, Zr, Hf) and slightly enriched LILEs (Th, U) and Ti concentrations. The latter yield SIMS U-Pb age of  $651 \pm 5$  Ma and have high initial  $^{143}\text{Nd}/^{144}\text{Nd}$  ratios ranging from 0.51251 to 0.51271 corresponding to initial  $\epsilon\text{Nd}$  values of 0.2 to 3.3, relative lower  $^{206}\text{Pb}/^{204}\text{Pb}$  (16.96-17.45) and moderate  $^{87}\text{Sr}/^{86}\text{Sr}$  (0.7043-0.7076). These late Neoproterozoic magmatism were generated in a continental rift-related setting possibly in back-arc scenario.

The geochronological and geochemical evidence from lavas of the Yaolinghe Group and coeval mafic intrusions suggest that the Panxi- Hannan- Michanshan arc system [1,2] extended to the northern South Qinling terrain and the magmatism in the northern margin of the Yangtze Block evolved from arc to rift magmatism during the Neoproterozoic [3,4].

*References:*

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