



Neoproterozoic granitic magmatism along the Ailao Shan-Red River belt: U-Pb zircon geochronology, Lu-Hf isotopes and tectonic implications

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The Neoproterozoic tectonic characteristics of the high grade metamorphic massifs along the Ailao Shan-Red River belt are debated. Controversies are on 1) whether the massifs were parts of the Yangtze block to the northeast or 2) parts of the Indochina block to the southwest and 3) the magmatic rocks represent arc magmatism or rifting linked to break-up of the Rodinia supercontinent. This study presents new and precise LA-ICP-MS U-Pb age dating and geochemical and Hf isotopic analyses of granitic intrusions along the Ailao Shan-Red River belt in an attempt to elucidate the Neoproterozoic magmatic evolution of this belt.

In general, zircon U-Pb ages of the studied granitic rocks are between 804 and 724Ma, with a weighted mean of ca. 770 Ma, thus confirming Neoproterozoic magmatism. All samples plot into the peraluminous domain, indicating a major crustal resource. In consistency with these conclusions, most of the Neoproterozoic granitoids show negative $\varepsilon_{\text{Hf}}(t)$ values near the chondrite line. A few samples possess low positive $\varepsilon_{\text{Hf}}(t)$ values, being signatures of mantle sources. It is therefore concluded that the Neoproterozoic magmatism along the ASRR belt originated from mantle sources with important contributions through anatexis of ancient lower crust. Discrimination diagrams of tectonic settings suggest continental arc magmatism.

Neoproterozoic magmatism is widely reported along the margins of the Yangtze block, especially in the northern margin. However, there are fewer reports about Neoproterozoic magmatic activity along the southern and southwestern margins. The geochronology spectrum and geochemistry of the studied Neoproterozoic granitic rocks are similar to those along the western margin of the Yangtze block. The present study, combined with previous results, suggests that oceanic subduction contributed to the generation of the arc magmatisms along the western and southwestern margin of the Yangtze plate and along the ASRR belt (as part of the southwestern margin of the Yangtze plate) from ~ 800 Ma to ~ 720 Ma.