

Neoproterozoic high-Mg diorite and A-type granite intrusions in the southwestern Yangtze Block, Yanbian Terrane, South China: Petrogenesis and Geodynamic significance

Yu Zhu^{1*}, Shaocong Lai

¹ Department of Geology, Northwest University, 229 North Taibai Road, Xi'an, 710069, Shaanxi Province, China. (*correspondence: 354839918@qq.com)

Abstract: Neoproterozoic magmatism in South China have become an indispensable index for the crustal evolution of the Yangtze Block with the assembly and breakup of the supercontinent Rodinia. The ca. 869 Ma Guandaoshan high-Mg diorites have high Sr concentrations (493–581 ppm), low Y (12–16 ppm) concentrations, low HREE (eg. Yb < 1.82 ppm) and high Sr/Y ratios (35–45), indicating adakitic geochemical characteristics. Taking into account the positive and evolved zircon $\epsilon\text{Hf}(t)$ values (+9.04 to +20.63), we concluded that the Guandaoshan diorites were derived from wedge-modified slab melts and experienced a relatively low-pressure fractional crystallization of hydrous magmas related subduction. The ca. 749 Ma Panzhihua monzogranites are metaluminous high-K calc-alkaline rocks, showing the similar geochemical feature with the A₂-type granite. A synthesis of geochemistry and variable $\epsilon\text{Hf}(t)$ (-0.68 to +7.85) indicates the Panzhihua A₂-type granites were generated by juvenile lower crustal partial melting possibly originated from some granitic magma early formed by the metapelite and some metagreywacke protolith. We concluded that the ca. 869 Ma Guandaoshan diorites were stand for the initial subduction magmatism, whereas the ca. 749 Ma Panzhihua A₂-type granites were formed during the post-orogenic setting that has experienced an island-arc magmatism. These two intrusions were all formed during the evolution of the Yanbian back-arc basin, which may imply that the southwestern margin of the Yangtze Block was chronically located at a subduction zone in the Neoproterozoic.