



Petrogenesis of Palaeoproterozoic Meta-rhyolite and Metadacite from Liaohe Group, Jiao-Liao-Ji Belt, North China Craton and its Geological Implication

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Abstract: The Liaohe Group of Liaodong Peninsula, located in the northern segment of the Jiao-Liao-Ji Belt, is developed mainly of deformed sedimentary and volcanic successions and felsic-mafic intrusions. Whole-rock major and trace element geochemistry, along with zircon U–Pb ages and Lu–Hf isotope data, are reported for Palaeoproterozoic meta-rhyolites and metadacites of the Liaohe Group in the northern segment of the Jiao-Liao-Ji Belt, North China Craton. These data are used to constrain the petrogenesis of the rocks and the Palaeoproterozoic tectonic evolution of the Jiao-Liao-Ji Belt. Zircons from these rocks are euhedral-subhedral, display oscillatory growth zoning, and have high Th/U ratios (0.26–1.21), implying a magmatic origin. LA-ICP-MS zircon U–Pb age data indicate that the silicic metavolcanic rocks formed during the Palaeoproterozoic (2184–2127 Ma) and comparable to the regional Palaeoproterozoic Liaoji granitoids, suggesting the two rocks are from coeval magmatism. The zircons yield $\varepsilon_{\text{Hf}}(t)$ values of –9.7 to +8.9 and T_{DM2} model ages of 2205 to 3313 Ma. Geochemically, the silicic metavolcanic rocks are metaluminous to weakly peraluminous and belong to the calc-alkaline I-type series. The rocks are characterized by enrichment in large-ion lithophile elements and depletion in high-field-strength elements (e.g., Nb, Ta, P, and Ti), and have affinities with igneous rocks that form in an active continental margin setting. The geochemical and isotopic data suggest that the rocks were derived mainly from partial melting of Meso-Neoproterozoic juvenile lower crust, with a possible contribution from older materials. The present results, combined with the regional geology, further demonstrate that an oceanic plate was subducted northward beneath the Longgang Block during the Palaeoproterozoic.

Key words: Liaohe Group, Palaeoproterozoic silicic metavolcanic rocks, Subduction-related, Jiao-Liao-Ji Belt, North China Craton

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