

EARLY JURASSIC VOLCANIC ROCKS FROM THE RAOHE ACCRETIONARY COMPLEX OF NE CHINA: PETROGENESIS AND TECTONIC IMPLICATIONS

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The Raohe accretionary complex is located at the boundary between the Russian Far East and Northeast China, and is an important part of the Western Pacific Ocean tectonic regime. However, owing to the lack of precise age and geochemical constraints, the tectonic setting and petrogenesis of magmatic rocks in this area have been controversial, which has led to the debate on crustal growth mechanisms and subduction accretionary processes in the Northeast China. Herein, we report newly-defined calc-alkaline andesites, dacites, rhyolites, Nb-enriched basaltic-andesites and andesites, and N-MORB type basalts and basaltic-andesites from the Raohe accretionary complex, NE China. All these volcanic rocks are collected from rocks mapped previously as the Late Triassic to Early Jurassic stratums. LA-ICP-MS zircon U-Pb dating for one andesite, one dacites and three rhyolites indicate the occurrence of magmatic events in the Early Jurassic (186-174 Ma). They have positive $\varepsilon_{Hf}(t)$ values of +3.4 to +10.6 and relatively high $(^{87}\text{Sr}/^{86}\text{Sr})_i$ values of 0.704711 to 0.710235.

The calc-alkaline andesites, dacites and rhyolites are typical arc magmas, with moderately enriched LILEs and LREEs, distinctly negative HFSEs, consistent with the chemistry of volcanic rocks from an active continental margin setting. The Nb-enriched basaltic-andesites and andesites have higher TiO_2 , Nb, and Zr contents, higher Nb/Ta (24.03-87.60), Nb/U (11.89-75.94), $(\text{Nb}/\text{Th})_{PM}$ (0.67-2.70), and $(\text{Nb}/\text{La})_{PM}$ (1.95-5.00) ratios than typical arc basalts. They are relatively enriched in Nb, Zr, Hf and Ti. They have negative $\varepsilon_{Nd}(t)$ values of -5.47 to -6.04 and relatively variable $(^{87}\text{Sr}/^{86}\text{Sr})_i$ values of 0.704648 to 0.711430, suggesting that they were possibly generated by a partial melting of mantle wedge peridotites metasomatized by slab-derived adakitic melts and minor fluids. The N-MORB type basalts and basaltic-andesites have comparatively low TiO_2 concentrations (1.18-1.42 wt.%), show almost flat REE patterns with depleted LREEs [$(\text{La}/\text{Sm})_N = 0.38-0.39$, $(\text{La}/\text{Yb})_N = 0.31-0.38$], thus probably represent the depleted lava coming from partial melting of spinel peridotite. The occurrence of calc-alkaline andesites, dacites and rhyolites, Nb-enriched basaltic-andesites and andesites, and N-MORB type basalts and basaltic-andesites have been described from many modern arcs featuring subduction of oceanic slab. Therefore, we propose that the similar mechanism may have played an important role in the production of the Early Jurassic volcanic rocks from the Raohe accretionary complex in NE China and thus it marks the beginning of the circum-Pacific tectonic regime, including the initial stage of subduction of the Paleo-Pacific plate.