

Meimechite lavas and Alaskan-type plutons: ultramafic superplume magmatism in Jurassic subduction zones of East Asia

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Meimechite is a highly olivine-phyric TiO₂-rich ultramafic volcanic rock first reported from north-central Siberia. It occurs in close association with enormous flood basalt, Ni, Cu and PGE-bearing zoned mafic-ultramafic plutons analogous to the so-called Alaskan-type ones, diamond-bearing kimberlite and carbonatite, representing a large-scale mantle plume magmatism taken place at the Permo-Triassic boundary time.

The Alaskan-type zoned ultramafic complexes and ultramafic lavas, sills and dikes of Jurassic age occur in the Jurassic accretionary complex (Samarka-Nadanhada zone) of Russian Primorye and adjacent Northeast China (Heilongjiang Province). The Alaskan-type complexes include ilmenite-rich pyroxenite and gabbro, and are sometimes associated with nepheline-bearing rocks and carbonatites. These complexes intruded into the Jurassic chert-shale-sandstone sequences, to which they gave a distinct contact metamorphism. The ultramafic volcanic rocks include massive lava, pillow lava, agglomerate and tuff. They are dominated by picrite, but also include meimechite, a TiO₂-rich ultramafic volcanic rock. The meimechite-picrite association is also known from Japan and Sakhalin such as in the central Hokkaido-Sakhalin belt (Jurassic) and Mikabu belt (Jurassic) as well as Mino belt (Permian) and Mineoka belt (Paleogene), although Alaskan-type complexes are not known in these belts. All these ultramafic volcanic rocks in Far East Russia, Northeast China and Japan are distinctly lower in TiO₂/Al₂O₃, Nb/Y and Nb/Zr ratios than the meimechite series in northern Siberia, but are clearly higher in these ratios than the Japanese in-situ island arc picrites, and closely resemble picritic rocks in oceanic islands, especially those with HIMU signatures. Occurrence of the Jurassic ultramafic magmatism over the 2,000 km-wide area of the East Asian margin, the vast development of Jurassic accretionary complexes in the same area, and the very short time interval between the ultramafic magmatism and the accretion suggest a superplume activity in or near the subduction zones. The Permian, Jurassic and Paleogene 'oceanic meimechites' among Japanese accretionary complexes suggests repeated superplume events through Phanerozoic.

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