Magmatism in the Tsagaandelger, East Mongolian Volcanic belt: Geochemical and Isotopic Constraints on Mesozoic Geodynamic Setting

Munkhtsetseg Oidov[1]; Hirokazu Fujimaki[2]

[1] Earth Sci. Tohoku Univ.; [2] Dept. Earth and Planetary Sci., Tohoku Uni.

Mesozoic alkaline to calc-alkaline igneous suites have been wide spread in Central and Eastern Mongolia, within Mongol-Okhotsk belt which formed by amalgamation between Siberian plate and Mongolia-North China block, after closure of Mongolia-Okhotsk ocean. The Mesozoic igneous suites passes upwards from alkaline series trachitic rocks and overlain by tuffaceous sediments. Those are intruded by calc alkaline leucocratic granite and latter covered by Late Mesozoic calc alkaline bimodal volcanic rocks.

Rb-Sr mineral isochron age dating result shows that alkaline series volcanic sequences were erupted in Early-Middle Triassic with 241 Ma, composed of trachydacite, trachyrhyolite, trachyandesite and tuff. They are characterized by relatively homogeneous high Al_2O_3 (up to 17.51%), LILE, LREE enrichment and significant Nb-Ta depletion, as well as slightly enriched Nd and weakly enriched Sr isotopic ratios (initial$^{87}Sr/^{86}Sr$=0.70481 to 0.70628 and eNd (t) = +0.74270 to +4.05583).

Obtained whole-rock Rb-Sr isochron age dating result for granitoids is 231 Ma, composed of monzogranite, granodiorite and aplite. They are high-K series calc-alkaline and I-type. Granites show enrichment in LILE and LREE with slight negative Eu anomalies and depletion in Ba, Nb, Sr, Ti and HREE, whereas strongly enriched Sr and weakly enriched Nd isotopic ratios (initial$^{87}Sr/^{86}Sr$ =0.710582˜0.002733 and eNd (t) =+0.77077 to +2.63725).

Further Cretaceous volcanic sequences are consisting of plagioclase-olivine-phyric basalt, aphiric olivine basalt, basaltic andesite and rhyolite. Those are high-K series, calc-alkaline and have lower contents of LILE and higher contents of HFS and REE, comparing with Triassic volcanic sequences. Arc fingerprints of Early Cretaceous are disappearing gradually comparing with Triassic strong depletion, might suggesting that subduction effect is gradually decreasing. They are characterized by little depleted to slightly enriched Nd and weakly enriched Sr isotopic ratios (initial $^{87}Sr/^{86}Sr$=0.710582˜0.002733 and eNd (t) =+0.77077 to +2.63725)

Geochemical characteristics and evolved affinities of volcanic rocks imply that beneath the Tsagaandelger area there existed many crustal magma reservoirs throughout the collision episodes and active continental margin settings were proposed for the origin of Triassic volcanic and plutonic rocks, and subduction associated post-collisional extension is proposed for the origin of the Cretaceous volcanic rocks. Thus, the compression regime with Triassic volcanic and plutonic rocks should be related with the westward closure of Mongol-Okhotsk Sea, amalgamation of North China-Mongolian block and Siberian plate, and the following extensional regime could be started with Cretaceous bimodal volcanism.