Magmatism in the Tsagaandelger, East Mongolian volcanic belt

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Magmatism in the Tsagaandelger, East Mongolian volcanic belt: Petrological and isotopic constraints on Mesozoic geodynamic setting

The vast territory of Mongolia lies in the heart of the Central Asian Orogenic Belt, one of largest provinces of the Phanerozoic continental growth on Earth (Jahn et al., 2004). We present new petrographic, geochemical and Sr__d isotopic analyses on Mesozoic igneous rocks emplaced in Central Mongolia. The Mesozoic igneous suites, those exposed in the Tsagaandelger area, pass upwards from alkaline series trachytic rocks and overlain by tuffaceous sediments. Those are intruded by calc alkaline leucocratic granites and covered by Late Mesozoic calc alkaline bimodal volcanic rocks consisting of basalts and rhyolite.

Alkaline series volcanic sequences were erupted in Early-Middle Triassic (241 Ma) and characterized by LILE, LREE enrichment and significant Nb-Ta depletion. Rocks have weakly enriched initial 87Sr/86Sr ratios of 0.705 to 0.706 and positive eNd(t) values (0.7 to 4).

The crystallization age of intrusive rocks is 231 Ma. The majority of samples is slightly peraluminous and can be classified as granite, including monzogranite, granodiorite and aplite. Granites are characterized by near-zero eNd(t) values (0.7 to 2) and tetrad effect in their REE distribution patterns.

Further Cretaceous volcanic sequences have lower contents of LILE and higher contents of HFS and REE, comparing with Triassic volcanic sequences. The Cretaceous volcanic rocks have the initial 87Sr/86Sr ratios between 0.705 and 0.719 and near-zero eNd(t) values (-0.7 to 1.6).

Trace element geochemistry indicates that Mesozoic volcanic rocks from the studied area are arc related. The Triassic volcanic and plutonic rocks could be emplaced in active continental margin settings. Post collisional extensional regime could be started with Early Cretaceous volcanism. The mass balance calculation suggests that the all Mesozoic volcanic and plutonic rocks were derived from sources composed of more than 80% juvenile mantle-derived component. Our data confirm the earlier observations of similar isotopic characteristics, in other Paleozoic to Mesozoic granitic plutons in the Central Mongolia as well as Central Asia (Kovalenko et al. 1996, Jahn et al. 2004). Thus, our new data provide evidence for a significant production of juvenile crust, and hence growth of the continental crust, in the Phanerozoic