Geochemistry of olivine-hosted melt inclusions in the Baekdusan (Changbaishan) basalts: Contribution from the subducted paleo-Pacific slab to the mantle source

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Late Cenozoic intraplate basaltic rocks in northeast China exhibit oceanic island basalts (OIB)-like geochemical characteristics, and the mantle sources have a DMM-EM1 array. In order to better understand the nature of the EM1 component, we have determined major and trace element compositions of olivine-hosted melt inclusions in the Baekdusan basalts from NE China. Rehomogenized melt inclusions are compositionally picrobasalt, basanite, trachybasalt and basalt. They have higher MgO contents than those of the host rocks, indicating that the melt inclusions represent the early-formed primary melts. They show LREE-enriched patterns [$(La/Yb)_N$=7.8-30.4] with slightly positive anomalies in Eu. On a primitve mantle-normalized trace elements distribution diagram, the inclusions exhibit OIB-like LILE enrichment without HFSE depletion. However, they show significant positive anomalies in Ba, K, Pb, P and Ti. In addition, the inclusions have highly evaluated Zr/Hf ratios (39.1-54.1) compared with those of garnet lherzolite-derived melts (34.6-37.8). Also note that there is a clear positive correlation between CaO and P_2O_5. These observations suggest that the Baekdusan magmatism might be derived from asthenosphere metasomatized by small fraction of melt produced by EM1 component such as eclogite, K-hollandite and γ-$Ca_3(PO_4)_2$ from the subducted (paleo)-Pacific slab in the mantle transition zone.