



The genesis and evolution of Hannuoba Basalt based on the Xiaomaping basalt profile

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Hannuoba basalt lies in the northern of North China. It erupted in Cenozoic with well outcrops and widespread ultramafic xenoliths. This study focuses on the Xiaomaping basalt profile in Hannuoba district. The profile can be distinguished for 7 layers with each bottom of the layer enriched with ultramafic xenoliths. In the Hark polt, all major elements have good correlation with the MgO content, showing the basalt from different layers having an consistent evolution. The phenocrysts in the basalt from different layers are rare and mostly within 5% with main faces as Ol, Cpx and Opx. The chemical characteristic of the basalt shows mutative features, Mg# (52.0-67.7), CaO (7.3-8.5wt. %), Ni (82-192ppm) and Cr (65-192ppm). The basalts have apparent LREE enrichment and are rich in HFSE (Nb,Ta,Zr) and in LILE (Ba, Sr). All the basalt layers do not show manifest negative Eu with $\delta\text{Eu}=1.01-1.05$. The ultramafic xenoliths are spinel-lherzolite, with weak lack of LREE. Trace element ratios, Ba / Rb and Rb / Sr, show that the source might have experienced some extent of fluid metasomatism. According to the La and La/Sm plot, the basalts are mainly controlled by the partial melting, and the great extent of fractional crystallization did not happened during the evolution process. Based on current published experimental results and theoretical petrology analysis, Hannuoba basalts formed in equilibrium with pyroxenite with clinopyroxene and garnet as the main mineral faces in the source and accounting olivine in small extent.