Geological and geochemical characteristics of late Pleistocene volcanics of the central Greater Xing'an Mountains, NE China

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High precision accelerator ^{14}C dating of carbide from volcanic rocks in the central Greater Xing'an Mountains of NE China yielded a late Pleistocene ages of 41925 ± 340 a BP using a ^{14}C half-life of 5568 a BP and with dating results calculated from 1950. These volcanics consist of dense and massive olivine basalts with olivine phenocrysts and an intergranular textured matrix containing fine-grained clinopyroxene, magnetite, and tabular plagioclase. These rocks are geochemically similar to ocean island basalts (OIB), with $(La/Sm)_N>1$, with LILE, HFSE, LREE and MREE enrichments and HREE depletions when compared to MORB, and with positive Nb, negative Rb, and negligible Eu anomalies(Compare with primitive Mantle).

Mantle xenoliths from OIBs in the study area suggest that the magmas that formed these rocks ascended quickly and did not assimilate any crustal material, a hypothesis that is supported by linear correlations between SiO_2 and MgO, La, Th, and U concentrations. Highly incompatible element ratios are generally preserved during fractional crystallization and partial melting, and as such can be used to identify the tectonic setting of magmatism. OIBs have Nb/U ratios of 47 ± 10, consistent with the average value of 48.42 for the basalts in the study area, suggesting that these values can be used to identify the source of the magmas that formed the volcanic rocks in the study area.

The geological and geochemical features of the Cenozoic volcanic rocks in the study area suggest that these rocks formed from OIB-type mantle-derived intraplate basaltic magmas that quickly ascended from the mantle along a channel formed by reactivation of a deep fault in an extensional- and decompression melting-dominated tectonic regime. These magmas did not assimilate crustal material and did not fractionate plagioclase, although some fractional crystallization of olivine and clinopyroxene occurred during magma ascent.

This work was financially supported by the National Natural Science Foundation of China (Grants 41340024, 41272223).