Geochemical evolution of the Wudalianchi potassic volcanic belt, NE China

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The NNW striking Wudalianchi Cenozoic volcanic belt (WVB) in NE China is mainly composed of volcanoes in the Menlu river area, Keluo, Wudalianchi and Erkeshan. K-Ar radiometric dating suggests two episodes of volcanism in the WVB. Specifically, the Pliocene to early Pleistocene volcanism is distributed only in the northern part of WVB, whereas middle Pleistocene to Holocene volcanism occurred over the entire WVB. The first episode generated basanite with SiO2 between 44.6~45.4 wt% , MgO between 11.3~12.5wt%, K2O between 3.8~5.0 wt% and Na2O between 2.5~2.8 wt%, whereas the second episode generated phonolitic tephrite and tephriphonolite with SiO2 between 48.5~55.2 wt%, MgO between 4.0~8.5 wt%, K2O between 3.4~6.9 wt% and Na2O between 3.0~5.0 wt%. The early-stage lavas have 87Sr/86Sr between 0.704973 and 0.705435, and 143Nd/144Nd ranging from 0.512354 to 0.512439. The late-stage lavas have 87Sr/86Sr between 0.705062 and 0.705551, and 143Nd/144Nd between 0.512312 and 0.512496. Lavas from both episodes are characterized by relatively high (La/Yb)N and enrichments in large ion lithophile elements (LILEs), but low in high field strength element (HSFE) concentrations. We suggest that magma in the second episode volcanism underwent more extensive crystal fractionation and evolution than the first one, and the lithosphere mantle played increasingly more important role in the magma generation.

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