

U-Th Disequilibrium Studies of Historic Potassic Alkali Basalts in NE China

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The Wudalianchi volcanic group in the northern part of the Songliao Basin includes the most potassic Cenozoic basalts in eastern China. This Quaternary volcanic group consists of 14 volcanoes and lava terraces covering an area of 800 km². The youngest potassic alkali basalts in this area resulted from eruptions in 1719-1721 AP and are the only historic eruptions of this kind in the world. They are characterized by high potassium contents (K₂O > 4.5 wt%), high K₂O/Na₂O ratios (> 1.1), low Nb/La ratios (0.5-0.8), and strong LREE enrichment. These young basalts are similar to EM1 mantle component defined by Zindler and Hart (1986), with low ²⁰⁶Pb/²⁰⁴Pb (16.6-17.1), low ¹⁴³Nd/¹⁴⁴Nd (0.5123-0.5125), and high ⁸⁷Sr/⁸⁶Sr (0.705-0.706) ratios. The high (²³⁰Th/²³⁸U) activity ratios that we obtained for these basalts, between 1.2 and 1.3, suggest that garnet-bearing mafic to ultramafic rocks (such as garnet peridotites) in the sub-continental mantle are the source of

these potassic alkali basalts. The high (²³⁰Th/²³⁸U) ratios also indicate a small melting porosity and a slow melting rate. We conclude that the EM1 source is not directly related to the recent subduction of oceanic sediments, based on the significant ²³⁰Th enrichment in the basalts from the Wudalianchi area.

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