Light magnesium isotopic compositions of intraplate potassic basalts from Northeast China

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Significant Mg isotope variation in mantle-derived magmas is commonly a mirror of the mantle source with heterogeneous Mg isotopic compositions. Thus we can obtain important mantle source characteristics of basalts by using Mg isotopes. Existing Mg isotope research of continental basalts mostly focused on intraplate sodic basalts. For example, light Mg isotopic compositions of Cenozoic sodic basalts from eastern China have been suggested to inherit from low-δ^{26}Mg carbonated mantle source that produced by carbonate recycling. Here, we firstly report the Mg isotope data of Cenozoic intraplate potassic basalts from northeastern China. The Wudalianchi potassic basalts ($K_2O/Na_2O > 1$) and the Nuomin transitional basalts ($0.75 < K_2O/Na_2O < 1$) display low δ^{26}Mg values (–0.60‰ to –0.34‰) that correlate with major element systematics (SiO_2, MgO, $Fe_2O_3^T$, Al_2O_3, and Ca/Al) and radiogenic isotope ratios (e.g., $^{143}Nd/^{144}Nd$), suggesting that the magma formed through the mixing of two end-members. The low-δ^{26}Mg end-member is characterized by high K/U ratios, low Ce/Pb, Nb/La and Th/Th* ratios, enriched Sr-Nd isotopic compositions, and extremely unradiogenic Pb isotopic compositions. These characteristics cannot be formed by fractional crystallization, crustal contamination and mantle melting processes. What is more important is that the trace element and Sr–Nd–Pb isotopic features of the low-δ^{26}Mg end-member are obviously not consistent with the melting of low-δ^{26}Mg carbonated mantle source, which was considered to be the origin for light magnesium isotopic compositions of continental intraplate sodic basalts. Potassic basalts in this study may thus indicate the presence of an undiscovered low-δ^{26}Mg component in the mantle. Therefore, further research work should be done to learn more about the mantle Mg isotope heterogeneity that sampled by basaltic magmas.