Deep EMI source signature inferred from geochemistry of ultrapotassic volcanic rocks in eastern CAOB: evidences of Re-Os and Li isotopes

XIN-HUA ZHOU[1]*, JI-FENG YING[1], YANG SUN[1] AND BEN-XUN SU[1]

[1]Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China
(*correspondence: xhzhou@mail.igcas.ac.cn)

It has been a long-standing debate as to whether the origin of enriched mantle end-member EMI is attributed to metasomatized ancient subcontinental lithosphere, recycled upper and lower crust, or deep mantle (transition zone and/or lower mantle) mixed with recycled ancient sediments. Previous study has shown that a suite of Pleistocene volcanic rocks from northwest part of NE China constructs a spectrum of potassic-rich to ultrapostassic in lithology, in which Ma'anshan leucitite does show the geochemical charcteristics as an end-member. Major chemistry shows its K_2O>9%, K_2O/Na_2>3. The geochemial data indicate that these rocks are highly enriched in LILE and REE, with extremely fractionated LREE/HREE ratios, and relative depletion of U, Th, Nb, Ta, Sr. The $^{87}Sr/^{86}Sr$ (~0.70558), εNd (~ -12) and very low $^{206}Pb/^{204}Pb$ (~16.34), $^{207}Pb/^{204}Pb$ (~15.27) demonstrate a typical EM I affinity, or to define as a LOMU signature, which is similar to other leucite-bearing ultrapotassic volanic rocks elsewhere in the world (Leucite Hill, Crazy Mts. and Smoky Butte). Recent Re-Os isotopic study on leucitites reveals that most $^{187}Os/^{188}Os$ ratios are higher than 0.1270, the expected value for SCLM. Meanwhile, preliminary study on Li and Mg isotops, together with $^{3}He/^{4}He$ values (Lai *et al*.,2005) indicate a clear signature of dehydration in the source region, and multiple metasomatism. Based on above geochemical observations and thermodynamic calculation (Kuritani *et al*., 2013), as proposed by Murphy *et al*.,(2002) and Rapp *et al*.,(2008), we prefer a deep mantle source for these ultrapotassic rocks, which has been isolated for 2-3 Ga and experienced multiple and destinctive mantle processes, such as ancient deep subduction, dehydration, melts/fluids metasomatism, and recycling geodynamics involved.

This work is financially supported by the National Natural Science Foundation of China (41173045).