

# **Geochemical and Sr-Nd-Pb-Hf Isotopic Compositions of Late Jurassic Lamprophyre Dike Swarm from Liaodong, NE China and their Implications for Lithosphere Delamination**

Y-H. JIANG AND S-Y. JIANG

State Key Laboratory for Mineral Deposits Research,  
Department of Earth Sciences, Nanjing University,  
Nanjing, China; yhj186@hotmail.com,  
shyjiang@nju.edu.cn

Mineral chemical, element geochemical and Sr-Nd-Pb-Hf isotopic data have been determined for the late Jurassic (155±4 Ma) lamprophyre dike swarm in the Liaodong Peninsula, NE China. Geochemical data indicate that two groups of lamprophyres are distinguished, one with relatively low MgO (Mg# 0.61-0.72) and Cr (128-470 ppm) and high SiO<sub>2</sub> (52.5-57.0%) contents (group I), another with high MgO (Mg# 0.70-0.79) and Cr (347-1041 ppm) and low SiO<sub>2</sub> (44.8-52.7%) contents (group II). Group I have initial <sup>87</sup>Sr/<sup>86</sup>Sr ratios of 0.7093 to 0.7117 and ε<sub>Nd</sub>(T) values of -9.6 to -12.1, similar to local subcontinental lithospheric mantle (SCLM). Group II have lower initial <sup>87</sup>Sr/<sup>86</sup>Sr ratios (0.7073-0.7090) and higher ε<sub>Nd</sub>(T) values (-1.4 to -6.1) than the group I, showing a trend towards the composition of Cenozoic alkaline basalts in eastern China that represent within-plate magmas derived mainly from asthenosphere. In situ Hf isotopic compositions of zircons from the group I are characterized by clearly negative initial ε<sub>Hf</sub> values (-16.8 to -24.9, most < -22), which lies well below the mantle array and is also consistent with that of cratonic SCLM. Detailed elemental and isotopic data suggest that the studied lamprophyres were mainly derived by partial melting of local SCLM composed of phlogopite-bearing spinel harzburgite and lherzolite (group I), plus additional input from asthenosphere composed of phlogopite-bearing garnet lherzolite (group II). A back-arc extension (rifting) and subsequent lithosphere delamination, related to the subduction of the Palaeo-Pacific plate, is favored to explain the petrogenesis of the studied lamprophyres.

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