Os isotopic compositions of mantle xenoliths in east China: Implications for evolution of continental lithospheric mantle in China

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Geochemical and isotopic data on mantle peridotite xenoliths provide key constraints on the evolution of lithospheric mantle beneath the thick continental crust. Here we report both Re and Os abundance and Os isotopic compositions of 13 peridotite xenoliths collected from Cenozoic continental basalts which are widely distributed in eastern China.

Re and Os abundance obtained for the xenoliths range from 30 to 350 ppt and from 600 to 4750 ppt, respectively. The 187Os/188Os ratios of these samples range from 0.1140 to 0.1391. The xenoliths except for garnet lherzolites form positive correlation in 187Os/188Os vs. Al2O3 space. The Al2O3 content is one of the depletion factors for peridotite. On the basis of the Re depletion model age of the y-axis intercept in the Al2O3-187Os/188Os diagram, an initial 187Os/188Os of the xenoliths of 0.1144 was obtained, which corresponds to the Re (melt) depletion age of 2.0 Ga. Nagler and Kramers (1998) [1] proposed that most of the continental crust were formed before 2.0 Ga, which is inconsistent with melt depletion age of the underlying lithospheric mantle. This result implies that lithospheric mantle was replaeced by ascenospheric mantle ca. 2.0 Ga, as pointed out by Gao et al. (2002) [2]. However, the possibility cannot be ruled out that the continental crust served as an anchor for the later forming lithospheric mantle, suggested by Meisel et al. (2001) [3]. In this case, the continental crust and the underlying lithospheric mantle are complementary neither in chemical composition nor in age.

References

[1] Nagler T. F. and Kramers J. D. (1998) Precambrian Res. 91, 233–252.

[2] Gao S., Rudnick R.L., Carlson R.W., McDonough W.F., and Liu Y.-S. (2002) EPSL, 198, 307-322.

[3] Meisel T., Walker R.J., Irving, A., and Lorand, J-P. (2001) GCA 65, 1311-1323.