Recycled lower continental crust: Re-Os isotopic evidence from peridotite xenoliths entrained by Mesozoic high-Mg diorites in the eastern North China Craton

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A suite of peridotite xenoliths including harzburgite, wehrlite, dunite, and orthopyroxenite entrained by the Early Cretaceous Laiwu high-Mg diorites in the eastern North China Craton (NCC) provide insight into the recycling of lower continental crust. Veined and zoned orthopyroxenes surrounding chromite, together sometimes with phlogopite, occur in spinel-harzburgite and chromite-bearing dunite. Residual olivine (Fo = 90-91) occurs in poikilitic clinopyroxene situated 1-2 mm from the wehrlite. The orthopyroxenes from orthopyroxenite veins in dunites have much higher REE abundances than primary orthopyroxenes from harzburgite, whereas poikilitic clinopyroxenes from wehrlite are characterized by strong enrichment in LREE and depletion in HREE. Different types of xenoliths all display 'U'-shaped REE patterns and have initial $^{87}Sr/^{86}Sr$ ratios of 0.7058 ~ 0.7212 and ε_{Nd} (t) values of + 0.18 ~ - 19.59. The initial $^{187}Os/^{188}Os$ ratios of harzburgites, wehrlites, and dunites range from 0.10953 to 0.11023, from 0.12661 to 0.5765, and from 0.16221 to 0.73076, respectively, and show positive correlation with Cr# in spinels. Collectively, the harzburgites appear to be residues of slightly metasomatized ancient lithospheric mantle, which is supported by their Archean Re-depletion model ages of 2.6 ~ 2.68Ga, whereas the dunites and wehrlites are products of intensive interaction of the Archean lithosphere mantle with hydrous-bearing siliceous melt derived from partial melting of delaminated ancient lower continental crust.

Zircon U-Pb dating and Geochemical study of volcanic rocks from Sunjiahe Formation of Xixiang Group in northern margin of Yangtze Plate

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The Sunjiahe Formation is distributed in Xixiang County along north margin of Yangtze Plate, Northwestern China, which is considered as part of Xixiang Group. The Sunjiahe Formation is a suit of low-metamorphosed volcano-sedimentary association, and is composed of basic, intermediate-basic and acid volcanic rocks with interbedding tuff, sediment-tuff, mudstone and siliceous rocks, the major rock types of volcanic rock are basalt, andesite, dactie and rhyolite. LA-ICPMS zircon U-Pb dating of rhyolite and basalt show us the ages of 832.9±4.9Ma and 845.0±17Ma respectively, implying rhyolites and basalts occurred at the same time in Neopeoterozoic. Based on major, trace element, and Sr-Nd isotope data, the basalts can be classified into tholeiitic magma series and have the geochemistical characteristics of crust-assimilated continental within-plate basaltic. In addition, basalts, andesites and dacites exhibit the same REE chondrite-normalized and trace element primitive mantle normalized patterns with overlapping one another, and samples plot along crystallized curve in Th-Cr diagram can be explained by crystallization from a common basic parental magma. On the other hand, the remarkable difference in REE and trace element normalized patterns of basalt, andesite, dacite and rhyolite suggests the different source. All theεNd(t) values of basalts, andesites and dacites greater than 0 and ploting in OIB region in εNd(t)—($^{87}Sr/^{86}Sr$) diagram indicate their source is similar to mantle source of OIB. Whereas, the rhyolites have the same εNd(t) values as basalts, suggesting rhyolite is generated by partial melting of juvenile basaltic curst. The age, tectonic setting and the development of continental rift intrusions in Yangtze Plate and in other areas in the world at the same time, showing the Sunjiahe formation is the product of continental riftism in Neopeoterozoic, which is the precursor of the Neopeoterozoic break-up of Rodinia supercontinent.

This study was supported by the National Natural Science Foundation of China (Grant No. 40872061 and 40773044).