HIMU component as a result of the core crystallization?

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The mantle xenoliths which judging by HREE concentrations, Al/Mg, Ca/Al, Al/Si, Mg/Si and Sr/Mg in them are identical to chondrites, and hence to a geochemically closed primitive mantle (PM), were studied. E_{Nd} and $^{87}Sr/^{86}Sr$ in these xenoliths are typical of the MORB source. These results evidence that the MORB source composition is not really identical to DM but to Bulk Silicate Earth (BSE) or, which is the same, to primitive mantle. It means that deficit of LREE in the MORB source displayed by the value E_{Nd}=+10 arose at the earliest stage of the planet evolution and is not connected with the crust or EM formation, as it was conventionally assumed, but is due to either extraction of complementary LREE into the core [1] or displays heterogeneous accretion. At the same time xenoliths of PM demonstrate U deficit in comparison with its concentration in chondrites. As the U solubility in iron melt increases under pressure above 3 GPa [2] this feature of a primitive mantle suggests partial removal of U into complementary reservoir, which is the core. Most of such uranium must have been concentrated in a liquid core.

According to proposed hypothesis during the liquid core crystallization uranium dissolved there becomes excessive and migrates into the silicate shell floor to produce a material with high U/Pb ratio, or the so-called HIMU-component. Its age displays time when active core crystallization began. On the basis of the well-known trend of the mantle volcanic rocks in the Pb-Pb systematics this age can be estimated as ~1.8 Ga.

If the hypothesis is valid all the above means that HIMU component is an isotope tracer of the D" layer material in convecting mantle. Such conclusion is in agreement with this component presence almost in all plum-basalts.

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References

[1] Bao X., Secco R. A., Gagnon J. E., Fryer B. J. (2005), AGU Joint Assemb. New Orleans, V13B-06 (abstract).

[2] Pushkarev, Yu (2005) GCA, **69**, issue 10, A397