A snapshot of mantle metasomatism?

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A set of fibrous diamonds from the Panda kimberlite (Canada) contain coexisting fluid (H_2O-carbonate-KCl) and single-phase silicate (olivine, garnet, clinopyroxene) inclusions. These samples have preserved a snapshot of a natural mantle system at >4 GPa and >900°C. The silicate inclusions have fertile compositions (low Mg#, high CaO); however moderate to high Cr_2O_3 and Ni contents indicate that this apparent fertility is due to a secondary process - metasomatism by the concomitant fluid [1]. We present trace element data for the fluid (LA-ICP-MS) and mineral (SIMS) inclusions and investigate partitioning between, and the compositional evolution of, the fluid and mineral components. The trace element composition of the fluid is very similar to the Panda kimberlite, except for enrichments in Ba and Th, and a steeper REE pattern (La/Nd = 3 to 8). We will also investigate the possibility of a relationship between metasomatism and kimberlite petrogenesis.

Reference

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Spatial variability in the release of terrigenic He from the sediments of Lake Van (Turkey)

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Recent analytical progress let for the first time ^3H and He profiles in the pore water of lacustrine and oceanic sediments to be analyzed, which allows to determine local He fluxes. This method provides a simple and direct approach to study the He emanation on small spatial scales.

The He profiles measured in 13 sediment cores from Lake Van (Turkey) suggest that the He release from the sediments into the open water mainly occurs in the deep basin of the lake, which seems to be formed by an ancient caldera. The actual isotope signature of the terrigenic He accumulating in the open water body indicates that this He is of mantle origin ($^3He/^4He \sim 10^{-5}$). Furthermore, the He isotope ratios in the open water and in the sediment pore water suggest that there are at least two geochemical reservoirs, which both inject isotopically light, but different He into the lake.

The fact that the He found in the sediment samples has a heavier isotope signature than the source of the water body indicates that the sampled sediment cores do not carry that component that is relevant for the He emanation in Lake Van. Therefore we conclude that He that accumulates in the open water body has to emanate at sites where no cores were taken.

Our noble gas results and the ^3H measurements from the pore water of 3 additional cores show that the He emanation occurs very heterogeneously (~10 km) in the spatial domain of the tectonic active region of Lake Van.

References

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