Some insights into lithology of East African Rift upper mantle: Xenoliths from Bunyaruguru volcanic field

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The Western Branch of the East African Rift is a region with classic occurrences of ultra-potassic magmatism. Mantle xenoliths from the ultrapotassic volcanic rocks provide insight into the lithology of the upper mantle. The aim of this study was to investigate the mantle xenoliths from the kamafugites of Bunyaruguru volcanic field (EAR) by determining mineral compositions and estimating P-T-fO_2 conditions of their formation, as well as obtaining data on phenocrysts of lavas.

In kamafugites there are different types of xenoliths but pyroxenites prevail in this region [1,2]. The xenoliths from three craters of the Bunyaruguru volcanic field revealed the different character of metasomatic alteration, reflecting the heterogeneity of the upper mantle on kilometer scale. The most unusual finding was composite glimmerite-wehrlite xenolith from the crater Kazimiro, which contains the fresh primary high-Mg olivine with inclusions of Cr-spinel that had not been previously identified in this area. The mineral composition features allow us to consider it as relic of peridotite mantle which has undergone metasomatic alteration. Drops of carbonatite melt found in olivine Fo_{90} phenocryst of ugandite confirm the presence of a carbonatite component in the mantle source of kamafugite magmas.

The results of texture and chemical investigation of the xenolith minerals indicate the time sequence of metasomatic alteration of Bunyaruguru upper mantle: MARID metasomatism at the first stage followed by carbonate metasomatism. The evaluation of P-T conditions formation of xenolith clinopyroxene revealed the range of 20–65 kbar and 830–1040 °C. The REE abundances in perovskites from kamafugite are 2–4 times higher than similar values for xenolith. Therefore the kamafugite magma was generated from a more enriched mantle source than the source of the xenoliths.

[1] Lloyd (1981). *MinMag* **44**, 315–323. [2] Lloyd et al. (2002) *Mineral.Petrol*. **74**, 299–322.