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Pyroxenite- xenoliths from the silica-poor alkaline volcanic rocks in the Toro-Ankole region of western Uganda

K.Link (1), E.Barifaijo (2), J.Tiberindwa (2), S.F.Foley (1)

(1) Dept. Geosciences, University of Mainz, Germany.

(2) Dept. Geology, Makarere University, Kampala, Uganda.

Xenoliths in the extremely high potassic eruptives of the Western Rift of the East African Rift System (EARS) from the Toro- Ankole- Field in Uganda mainly consist of clinopyroxene, phlogopite, titanite, perovskite, apatite and titanomagnetite in differing proportions. Typically, they lack orthopyroxene and olivine. Compared to the normal peridotitic mantle the clinopyroxenite nodules are on average strongly enriched in Ti, Al, Fe, Ca, K, P, Rb, Ba, Sr, Nb, La, Ce, Zr, F, Cl and H_2O. (Lloyd et al, 1987). Their genesis and connection to their host lavas is still a matter of debate.

The unusual kamafugitic host lavas (potassic olivine melilitites, olivine- pyroxene kalsilitites, olivine- kalsilite leucitites and potassic nephelinites) are themselves strongly enriched in K, Ca, CO_2, Sr and other trace elements. Besides this, they are also characterized by very primitive signatures that express themselves in high Mg#, high Cr and Ni as well as low Al, Si, Pb and low $^{87}Sr/^{86}Sr$ which do not vary with Mg#. Altogether, isotopes and trace elements of the lava show that more than one mineral assemblage must have been involved as sources and that major crustal assimilation processes did not occur. Regarding Nd, Hf and Os isotopes the lavas indicate a mixing trend between metasomatic influenced peridotitic and possibly picritic pyroxenite as sources (Rosenthal et al., 2008). The latter could result from crystal accumulation from prior alkaline basaltic melts on the walls of channels within the mantle lithosphere (Foley, 1992). During melt generation the involvement of pyroxenites dominated over the peridotite according to the Os vs. Ni and Mg ratios of the

lava.

In earlier studies the pyroxenite nodules are considered either as xenoliths from the highly pervasive metasomatised peridotite mantle (Lloyd et al., 1987) or they are discussed to be distinct paragenesis occurring as veins within the peridotitic mantle (Irving, 1980). In both cases the xenoliths would represent mantle material that was at least partly involved as sources for the kamafugite melts. A third alternative could be that they represent cumulates of the exposed lavas. In any case, the nodules could provide an important piece of information not only for understanding the generation of ultrapotassic lavas but also for characterizing the rift related lithosphere mantle as part of a complex initial continental rift process such as represented in the western branch of the EARS.

In this study, we will present first results of the investigation of pyroxene rich nodules which we collected during fieldwork in the Toro- Ankole volcanic fields. We will offer first hypotheses on their petrogenesis, their relation to the host lava and its consequence for the source region representing the rift related mantle. The interpretations are based on petrographic observations as well as on mineral and whole rock major and trace element analyses. We were able to distinguish between at least two different generations of mineral growth. The elder assemblage consists mainly of pale diopside-rich clinopyroxene with high Mg/Fe rations and phlogopite. The younger paragenesis is made up of green diopside-rich clinopyroxene with significantly lower Mg#, Titanite, Perovskite, high Ti Phlogopite and Apatite. It is reasonable, that they represent a Ti, Ca, Fe and trace element rich metasomatic or magmatic event which must be younger than the generation of the original diopside rich assemblage and older then the volcanics from the eruption exposing the pyroxenite nodules.

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