

Major volatiles and noble gases in pyroxenites and carbonatites of the Seblyavr massif (Kola peninsular): stepwise crushing data

BUIKIN A. I.¹, VERCHOVSKY A. B.², SOROKHTINA N. V.¹
AND KOGARKO L. N.¹

¹bouikine@mail.ru

²a.verchovsky@open.ac.uk

The Seblyavr ultramafic–alkaline–carbonatite complex is one of the largest (4×5 km) massifs intruded Archean gneisses of the Kola Shield. The massif comprises five magmatic rock series, which formed in sequence from olivinites to clinopyroxenites and ijolites-melteigites and carbonatite series. The fluid phase accompanying carbonatite magma played an active role at metasomatic contact interaction between carbonatite and magmatic rock series. The many rocks of early magmatic stages are intensively carbonatized and hydrothermally altered. To constrain the fluid sources and the fluid phase evolution during formation and alteration of Seblyavr massif rocks we have studied major volatiles and noble gases in fluid inclusions in calcite and clinopiroxene separates using stepwise crushing method.

$\delta^{13}\text{C}$ values vary in crushing steps of calcites from -6.6 to -15‰ PDB, which is lower than mantle signature (-3 ÷ -5‰), and could be explained in terms of long time low temperature isotope exchange between carbon of CO_2 and calcite. $^{40}\text{Ar}/^{36}\text{Ar}$ ratios in crushing steps of calcites vary between close to atmospheric values (296) to 3200, whereas in Cpxs from pyroxenites they increase at the last steps up to 33000, which is similar to the values of MORB glasses (Trieloff *et al.* 2003). Such a high $^{40}\text{Ar}/^{36}\text{Ar}$ ratios in ultramafic rocks of Kola Peninsula are obtained for the first time, and require an explanation. Based on He-Ne-Ar isotope systematic, Marty *et al.* (1998) have estimated Kola plum $^{40}\text{Ar}/^{36}\text{Ar}$ ratio as 5500. We have not yet obtained He and Ne isotope data for our samples, and hence cannot exclude the role of late hydrothermal fluids, which could introduce crustal argon (i.e. from Archean gneisses) into fluid inclusions in our Pxs. Nitrogen-argon systematic points to mixing between atmospheric component and another one – with high $^{40}\text{Ar}/^{36}\text{Ar}$ and very low $\text{N}/^{40}\text{Ar}$ ratios down to 1 and lower. Such a large fractionation between Ar and N could arise only as a result of addition of radiogenic Ar (but not due to diffusion into inclusions from the lattice), or multiple process of solution in water – bubbles formation, as Ar better soluble in water than nitrogen. The mean $\delta^{15}\text{N}$ values are +1 ÷ +2‰ Atm; N_2 and ^{36}Ar correlate in Px crushing steps, which points to subduction or crustal nature of nitrogen in our samples.