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Noble gases isotopic signatures from Cape Verde oceanic carbonatites

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Notwithstanding their rarity on oceanic environments, carbonatites are somewhat common on the Cape Verde Archipelago, where they occur in at least 5 of the 10 islands. We present the first noble gases results ever obtained for oceanic carbonatites. They were performed by analysis of separates of apatite, a liquidus phase of the Cape Verde carbonatites, and, when not possible, of the most abundant mineral phase, calcite. Based on Sr and Nd isotopic analysis, done for some of the mineral/rock pairs, those minerals are considered in equilibrium with the whole rock.

Radiogenic and fissiogenic Xe are positively correlated with some of the analysed apatites presenting ^{129} Xe and ^{136} Xe excesses relatively to the air (^{129}Xe/^{130}Xe up to 6.94; ^{136}Xe/^{130}Xe up to 2.35). The developed trend on a ^{136}Xe/^{130}Xe vs. ^{129}Xe/^{130}Xe diagram has a similar slope to those reported for MORB or plume magmas. However the observed excesses are lower than the maximum MORB, as has been reported for some mantle plumes. Many of the ^{3}He/^{4}He apatite determinations are highly radiogenic (R/Ra close to zero) but for calcites from S. Vicente Island carbonatites (5.7 Ma), R/Ra values as high as 15.5 were obtained. Considering the similitude of values obtained for the same sample on two stages step analysis and the high ^{4}He concentration ($> 5.10^{-7}$ ccSTP/g) the unradiogenic R/Ra value cannot be explained by cosmogenic ^{3}He production. We emphasize that this value is similar to the reported by some of us for olivines from S. Vicente silicate mafic lavas. Although S. Vicente carbonatites are characterized by lead isotopic data clearly distinct from Cape Verde silicate magmas, our data shows that both types of magmas were formed from mantle

sources for which contributed a relatively undegassed component, presumably issued from the lower mantle.

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