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Mantle metasomatism (carbonatitic?) at Santiago Island (Cape Verde)

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Santiago ultramafic xenoliths preserve mineralogical and geochemical evidence for the occurrence of metasomatic processes in the mantle beneath the island. Indeed, systematic orthopyroxene substitution by clinopyroxene in former harzburgites, occurrence of hydrated minerals and calcite, as well as LREE enriched patterns, strongly suggest involvement of a low-a$_{SiO2}$ carbonatitic-like melt on such metassomatic process. This feature is supported by significant occurrence of carbonatite magmatic activity in Santiago Island.

Primitive lavas (Ni $>$ 150 ppm; Mg# $>$ 59) display geochemical patterns characteristic of metasomatized sources. The inferred high bulk D$_K$ during several melting events and the presence of strong K negative anomalies imply the presence of residual K-bearing minerals assemblages, and Ba-K-Rb systematics suggest that amphibole were the dominant K carrier. Primitive lavas characterized by the highest K negative anomalies also display significant sub-chondritic Ti/Eu ratios (down to 3630), which are negatively correlated with Sr/Sm ratios, suggesting a carbonatitic composition for the metasomatic agent. However, it should be emphasized that in opposition to the very high Zr/Hf ratios of the Santiago carbonatitic rocks (55 to 136), primitive silicate magmas are characterized by near chondritic ratios (36) and do not show any correlation between Ti/Eu and Zr/Hf values. Ti/Eu ratios correlate negatively with La/Sm ratios and Th contents implying that source enrichment processes were also responsible by lowering of the mantle solidus and consequent increasing of Ti compatibility. An interesting characteristic of Santiago Island geochemistry is that both K negative anomalies and sub-chondritic Ti/Eu ratios are absent from lavas older than $\sim$3 Ma. Santiago Island spans at least 10 Ma years of oceanic magmatic activity; main sub-

aerial volcanism started at ∼3 Ma. Thus, although carbonatites were dated from 7 to 2 Ma, the carbonatitic mantle metassomatism that was probably influential on the geochemistry of Santiago magmatism should have been a relatively recent event on the history of Santiago Island shield building processes.

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