Trindade Island Revisited: constraints based on Isotopes, $^{40}Ar/^{39}Ar$ dating, mineral and whole-rock chemistry of a metasomatized-CO_2-garnet-lherzolite mantle: the role of a shallow secondary plume.

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Ocean Island Basalts (OIBs) are usually enriched in incompatible trace elements and to get this characteristic it is necessary that the mantle experienced a previous or simultaneous melt infiltration event with volatiles (H_2O; CO_2) enriched melts and incompatible trace elements. This work is based on a data compilation and new whole-rock lithogeochemistry, argon radioisotopic dating and Sr-Nd-Pb-Hf radiogenic ratios. Although basic and/or ultrabasic nepheline normative melts can be produced by low degree of partial melting of a garnet-lherzolite source, any high-pressure experiment of anhydrous peridotite was able to produce liquids with composition such as found in many parental OIB magmas. However, the addition of 0.1 to 0.25 wt. % CO_2 to peridotite substantially modifies the liquid composition and the incipient depth of melt formation with a 1-4% partial melt of a garnet-spinel lherzolite mantle source. Isotopic ratios of Sr-Nd-Pb-Hf indicate a dominant DMM and HIMU component in the island with minor amount of EM1 mantle component. $^{40}Ar/^{39}Ar$ ages yielded values ranging from 3.2 to 0.17 Ma representing a young period of intraplate magmatic activity in the offshore South American Plate. The volcanic activity ages presented in this paper suggest that Trindade and Martin Vaz islands are contemporaneous and that they are a product of a terminal plume expression in the offshore portion of a long-lived track (*ca*. 90 Ma) with a slow shear velocity (VS) placing its origin at the Upper Mantle suggesting a shallow mantle plume rising from the asthenosphere.

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