

Title: Mantle source heterogeneity, magma generation and magmatic evolution at Terceira Island (Azoresarchipelago): Constraints from elemental and isotopic (Sr, Nd, Hf, and Pb) data

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Source: Lithos

Volume: 126 **Issue:** 3-4 **Pages:** 402-418 **DOI:** 10.1016/j.lithos.2011.07.002 **Published:** Oct 2011

Document Type: Article

Language: English

Abstract: This work addresses the present-day (<100 ka) mantle heterogeneity in the Azores region through the study of two active volcanic systems from Terceira Island. Our study shows that mantle heterogeneities are detectable even when "coeval" volcanic systems (Santa Barbara and Fissural) erupted less than 10 km away. These volcanic systems, respectively, reflect the influence of the Terceira and D. Joao de Castro Bank end-members defined by Beier et al (2008) for the Terceira Rift. Santa Barbara magmas are interpreted to be the result of mixing between a HIMU-type component, carried to the upper mantle by the Azores plume, and the regional depleted MORB magmas/source. Fissural lavas are characterized by higher Ba/Nb and Nb/U ratios and less radiogenic Pb-206/Pb-204, Nd-143/Nd-144 and Hf-176/Hf-177, requiring the small contribution of delaminated sub-continental lithospheric mantle residing in the upper mantle. Published noble gas data on lavas from both volcanic systems also indicate the presence of a relatively undegassed component, which is interpreted as inherited from a lower mantle reservoir sampled by the ascending Azores plume. As inferred from trace and major elements, melting began in the garnet stability field, while magma extraction occurred within the spinel zone. The intra-volcanic system's chemical heterogeneity is mainly explained by variable proportions of the above-mentioned local end-members and by crystal fractionation processes. (C) 2011 Elsevier B.V. All rights reserved.

Author Keywords: Ocean Island Basalts; Small-Scale Mantle Heterogeneity; Terceira Island; Azores

Keywords Plus: Cape-Verde Archipelago; Mid-Atlantic Ridge; Trace-element; Volcanic-Rocks; Sao-Miguel; Chemical Classification; Oceanic Lithosphere; Internal Structure; HE-3/HE-4 Ratios; Melt Segregation

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Funding:

Funding Agency	Grant Number
Fundacao para a Ciencia e a Tecnologia	
Fundo Europeu de Desenvolvimento Regional	PTDC/CTE-GIN/71838/2006-FCOMP-01-0124-FEDER-007129 PTDC/CTE-GIN/68851/2006

Publisher: Elsevier Science BV

Publisher Address: Po Box 211, AE Amsterdam, Netherlands

ISSN: 0024-4937

Citation: MADUREIRA, Pedro; MATA, João; MATTIELLI, Nadine; QUEIROZ, Gabriela; SILVA, Pedro - Mantle source heterogeneity, magma generation and magmatic evolution at Terceira Island (Azoresarchipelago): Constraints from elemental and isotopic (Sr, Nd, Hf, and Pb) data. Lithos. ISSN 0024-4937. Vol. 126, n.º 3-4 (2011) p.402-418.