

Title: Constraints on the structure of Maio Island (Cape Verde) by a three-dimensional gravity model: imaging partially exhumed magma chambers

Author(s): Represas, Patricia^{1,5}; Catalão, Joao^{1,2}; Montesinos, Fuensanta G.³; Madeira, Jose^{1,2}; Mata, João^{2,4}; Antunes, Carlos^{1,2}; **Moreira, Mario**^{1,6}

Source: Geophysical Journal International

Volume: 190 **Issue:** 2 **Pages:** 931-940

DOI: 10.1111/j.1365-246X.2012.05536.x **Published:** Aug 2012

Document Type: Article

Language: English

Abstract: We propose a 3-D gravity model for the volcanic structure of the island of Maio (Cape Verde archipelago) with the objective of solving some open questions concerning the geometry and depth of the intrusive Central Igneous Complex. A gravity survey was made covering almost the entire surface of the island. The gravity data was inverted through a non-linear 3-D approach which provided a model constructed in a random growth process. The residual Bouguer gravity field shows a single positive anomaly presenting an elliptic shape with a NWSE trending long axis. This Bouguer gravity anomaly is slightly off-centred with the island but its outline is concordant with the surface exposure of the Central Igneous Complex. The gravimetric modelling shows a high-density volume whose centre of mass is about 4500 m deep. With increasing depth, and despite the restricted gravimetric resolution, the horizontal sections of the model suggest the presence of two distinct bodies, whose relative position accounts for the elongated shape of the high positive Bouguer gravity anomaly. These bodies are interpreted as magma chambers whose coeval volcanic counterparts are no longer preserved. The orientation defined by the two bodies is similar to that of other structures known in the southern group of the Cape Verde islands, thus suggesting a possible structural control constraining the location of the plutonic intrusions.

Author Keywords: Inverse Theory; Gravity Anomalies and Earth Structure; Oceanic Hotspots and Intraplate Volcanism; Crustal Structure; Africa; Atlantic Ocean

KeyWords Plus: Lithospheric Flexure; Isotropic Signatures; Satellite Altimetry; Canary-Islands; Mantle Plumes; Sal Island; Noble-Gas; Archipelago; Anomalies; Evolution

Reprint Address: Represas, P (reprint author), Dom Luiz Inst IDL, Lisbon, Portugal.

Addresses:

1. Dom Luiz Inst IDL, Lisbon, Portugal
2. Univ Lisbon, Fac Sci, P-1699 Lisbon, Portugal
3. Univ Complutense Madrid, E-28040 Madrid, Spain
4. Univ Lisbon CeGUL, Geol Ctr, Lisbon, Portugal
5. Natl Lab Energy & Geol LNEG, Amadora, Portugal

6. Lisbon Super Engn Inst ISEL, Lisbon, Portugal

E-mail Address: prepresas@fc.ul.pt

Funding:

Funding Agency	Grant Number
Fundacao para a Ciencia e Tecnologia, Portugal	PTDC/CTE-GIN/64330/2006
IDL	Pest-OE/CTE/LA0019/2011
CeGUL	Pest-OE/CTE/UI0263/2011

Publisher: Wiley-Blackwell

Publisher Address: 111 River St, Hoboken 07030-5774, NJ USA

ISSN: 0956-540X

Citation: Represas P, Catalão J, Montesinos F G, Madeira J, Mata J, Antunes C, Moreira M. Constraints on the structure of Maio Island (Cape Verde) by a three-dimensional gravity model: imaging partially exhumed magma chambers. *Geophysical Journal International*. 2012; 2 (190): 931-940.