

## VU Research Portal

### **Investigating combined arc and OIB signatures at a post-collisional subduction setting by geochemical and boron isotope analyses of melt inclusions from Vulture, Italy**

Luciani, Natascia; de Winter, Bram; Nikogosian, Igor; de Hoog, Cees-Jan; Bracco Gartner, Antoine J. J.; Davies, Gareth R.; Koornneef, Janne M.

2022

**DOI (link to publisher)**

[10.46427/gold2022.10975](https://doi.org/10.46427/gold2022.10975)

**document version**

Publisher's PDF, also known as Version of record

**document license**

Unspecified

[Link to publication in VU Research Portal](#)

**citation for published version (APA)**

Luciani, N., de Winter, B., Nikogosian, I., de Hoog, C-J., Bracco Gartner, A. J. J., Davies, G. R., & Koornneef, J. M. (2022). *Investigating combined arc and OIB signatures at a post-collisional subduction setting by geochemical and boron isotope analyses of melt inclusions from Vulture, Italy*. <https://doi.org/10.46427/gold2022.10975>

**General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

**Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

**E-mail address:**

[vuresearchportal.ub@vu.nl](mailto:vuresearchportal.ub@vu.nl)

# Investigating combined arc and OIB signatures at a post-collisional subduction setting by geochemical and boron isotope analyses of melt inclusions from Vulture, Italy

NATASCIA LUCIANI<sup>1</sup>, BRAM DE WINTER<sup>1</sup>, IGOR NIKOGOSIAN<sup>1</sup>, CEES-JAN DE HOOG<sup>2</sup>, ANTOINE J. J. BRACCO GARTNER<sup>1</sup>, GARETH R. DAVIES<sup>1</sup> AND JANNE M. KOORNNEEF<sup>1</sup>

<sup>1</sup>Vrije Universiteit Amsterdam

<sup>2</sup>The University of Edinburgh

Presenting Author: n.luciani@vu.nl

Recent post-collisional magmatism in central-southern Italy is unique as it is strongly influenced by sediment subduction but also has an intra-plate signature. The composition of the potassium-rich magmatic products covers a wide range of compositions, from subalkaline to strongly alkaline, and from mafic to felsic. The Vulture volcanic centre, located east of the main volcanic front, is considered “anomalous” compared to the other major Quaternary volcanoes, as it shows the eruption of silica-rich and carbonatite lavas, and a magma source with both arc- and OIB-type signatures.

To investigate the unique nature of this anomalous magmatism, we analysed 107 Vulture melt inclusions (MIs) trapped in high-forsterite olivine (~87-90 mol% Fo) for major and trace element composition. A subset of 27 MIs was selected for boron isotope and concentration analysis. Based on relative major and trace element enrichment we distinguish two groups of inclusions: Group 1: High CaO (10-16wt.%), TiO<sub>2</sub> (1-3 wt.%), Na<sub>2</sub>O (~ 3wt.%), MgO (4-9 wt.%; n = 80), lower HFSE/HREE and lower LILE/LREE (n = 44); Group 2: Low CaO (6-7 wt.%), TiO<sub>2</sub> (0.8-1.5 wt.%), high SiO<sub>2</sub> (45-48 wt.%), Al<sub>2</sub>O<sub>3</sub> (18-20 wt.%), K<sub>2</sub>O (5-7 wt.%; n = 27) and higher LILE/HREE and HFSE/LREE (n = 24). Group 1 MIs have more negative  $\delta^{11}\text{B}$  values ( $\delta^{11}\text{B}_{\text{av}} = -20 \text{ ‰}$ ; n = 23) and lower B concentration ( $[\text{B}]_{\text{av}} = 20 \text{ ppm}$ ; n = 23) compared to Group 2 ( $\delta^{11}\text{B}_{\text{av}} = -17 \text{ ‰}$ ;  $[\text{B}]_{\text{av}} = 36 \text{ ppm}$ ; n = 4).

The geochemical distinction between the two groups indicates the involvement of two melt sources with diverse mineralogies. Combining major and trace elements with a more negative  $\delta^{11}\text{B}$  signature of Group 1, suggests a possible additional input of marly sediments to this group.

Geophysical data confirm the presence of a slab detachment and mantle inflow under the Vulture volcanic centre, likely responsible for the OIB signature. The geochemistry of the MIs indicates that the OIB signature for this volcano is possibly derived from melts formed due to slab detachment that mix with melts from a sediment metasomatised source.