



**HAL**  
open science

## Melt-rock interactions in south armorican peridotites

Geoffrey Aertgeerts, Jean-Pierre Lorand, Christophe Monnier, Carole La

► **To cite this version:**

Geoffrey Aertgeerts, Jean-Pierre Lorand, Christophe Monnier, Carole La. Melt-rock interactions in south armorican peridotites. Goldschmidt 2017, Aug 2017, Paris, France. hal-01518861

**HAL Id: hal-01518861**

**<https://brgm.hal.science/hal-01518861v1>**

Submitted on 5 May 2017

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

## Melt-rock interactions in south armorican peridotites

G. AERTGEERTS<sup>1,2</sup>, J.-P. LORAND<sup>1\*</sup>, C. MONNIER<sup>1</sup>, C. LA<sup>1</sup>

<sup>1</sup>LPG Nantes, UMR CNRS 6112, Université de Nantes, France

(\* correspondence: jean-pierre.lorand@univ-nantes.fr)

<sup>2</sup>BRGM, CDG/GSO, 45060, Orléans, France

(G.Aertgeerts@brgm.fr)

Five mantle-derived serpentinized peridotites occurrences from South Armorica (SA: Champtoceaux, Audierne, Britany, France) were studied using optical microscopy, EMP, ICP-OES, solution ICPMS and laser ablation-ICPMS. All but one Champtoceaux lherzolite occurrence are harzburgites which have experienced 12 to 25% partial melting ( $0.57 < \text{Al}_2\text{O}_3 < 1.6$  wt.%;  $\text{Sc} < 10$  ppm;  $33 < \text{Cr}^{\text{spinel}} < 67$ ,  $\text{Yb} = 1.1-0.3 \times \text{CI}^{\text{chondrites}}$ ). The lherzolites show fertile compositions ( $7 < \text{Cr}^{\text{spinel}} < 15$ ;  $\text{Al}_2\text{O}_3 = 3.0$  wt.%;  $10 < \text{Sc} < 16$  ppm,  $\text{Ni} < 2,000$  ppm;  $\text{Yb} = 1.7$ ) suggesting lower degree of partial melting (5-7%). SA peridotites show overall enrichments in highly incompatible elements (HIE, Cs, Rb, Ba, Th, U, Pb, La) coupled with variable depletion in the high-field strength elements (Nb, Ta, Zr, Hf, Ti) compared to primitive-mantle estimates.

Each occurrence bears imprints of high-temperature melt/fluid - rock interaction. The most refractory harzburgites show evidence of reactive melt percolation, i.e. U-shaped REE patterns ( $\text{La}/\text{Sm} = 4.4-6.3$ ;  $\text{Sm}/\text{Yb} = 0.55$ ). Another Champtoceaux harzburgite occurrence has been pervasively reequilibrated with mafic melts that produced coupled increase in the Fe, Ti, Zn, Cr, V and REE contents ( $83 < \text{Mg}^{\text{spinel}} < 87$ ;  $\text{La}/\text{Sm} = 1.5-2.0$ ;  $\text{Sm}/\text{Yb} = 1 - 2.6$ ). Hydrous modal metasomatism has been identified in both Champtoceaux lherzolites and Audierne harzburgites. The Champtoceaux lherzolites reacted at  $P = 1.5-2$  Gpa for  $T > 900^\circ\text{C}$  with HIE-enriched small-volume fluids that produced 10-15 vol. % of Ti-poor pargasite from clinopyroxene and spinel. The Audierne samples were pervasively refertilized by alkali-rich hydrous melts that precipitated K- and Cr-rich pargasite. Our new data identify SA peridotites as pieces of residual oceanic mantle that were processed to different extent with slab-derived melt/fluids in supra-subduction zone settings.