# GEOCHEMICAL AND Sr-Nd-Pb ISOTOPE INVESTIGATION OF THE NEW CALEDONIA HARZBURGITE: UNRAVELLING THE EVOLUTION OF A SUB-ARC MANTLE SOURCE

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Exposures of arc-related mantle sections preserved in ophiolites constitute a natural laboratory for investigating subduction zone processes. The New Caledonia ophiolite consists primarily of harzburgites, locally overlain by mafic-ultramafic cumulates, and minor spinel and plagioclase lherzolites (Secchiari et al., 2016). Recent studies have shown that the harzburgites and the associated cumulates represent a crust-mantle transect formed in a nascent arc environment (Marchesi et al., 2009; Pirard et al., 2013; Secchiari et al., submitted). However, scarce geochemical data are available for the harzburgites, so that the processes recorded by this mantle section are still poorly constrained.

In order to unravel the evolution of the New Caledonia harzburgite, a comprehensive geochemical dataset (major and trace element, Sr-Nd-Pb isotopes) has been obtained on a new set of fresh samples unaffected by serpentinization.

The studied harzburgites are low-strain tectonites showing porphyroclastic textures, locally grading into promylonitic textures. They exhibit a refractory nature, as attested by the notable absence of primary clinopyroxene, very high Fo content of olivine (90.9-92.9 mol.%), high Mg# of orthopyroxene (89.8-94.2) and Cr# of spinel (39-71). Thin films of undeformed clinopyroxene with very low $Na_2O$ (0.03-0.13 wt.%) and $TiO_2$ (0.04-0.10 wt.%) contents have been also recognized in association with $Al_2O_3$- (0.88-1.53 wt.%) and CaO- (0.37-0.97 wt.%) poor secondary orthopyroxene.

The harzbugites display U-shaped REE profiles ($Gd_N/Yb_N$=0.06-0.48) with remarkably low REE concentrations (< 0.1 chondritic values), in the range of modern subduction zone peridotites. Geochemical models shows that the HREE composition of the harzburgites can be reproduced with high degrees (up to ~25%) of fractional melting of a DMM source in the spinel stability field. Extended trace element diagrams highlights depleted compositions coupled with strong positive anomalies for Pb and FME (i.e. Cs, Ba, Sr).

Nd isotopic ratios range from poorly to slightly radiogenic ($-0.8 \leq \varepsilon_{Nd_i} \leq +13.3$) and negatively correlate with Sr isotopes ($0.70257 \leq {}^{87}Sr/{}^{86}Sr \leq 0.70770$). Pb isotopes cover a wide range, trending from DMM toward enriched, sediment-like, compositions.

We interpret the geochemical signature displayed by the New Caledonia harzburgite as reflecting a highly depleted sub-arc mantle source variably modified by fluid input and/or hydrous melts percolation during Eocene subduction.

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