Pyroxenite diversity in the New Caledonia mantle sequence: a preliminary study

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The New Caledonia ophiolitic sequence consists of mantle rocks (harzburgites and minor lherzolites) locally overlain by mafic-ultramafic cumulates. The harzburgites are highly refractory residues which underwent fluid-assisted melting in a fore-arc setting (e.g. Secchiari et al., 2019), whereas the moderately depleted lherzolites show an abyssal-type affinity (Secchiari et al., 2016). In this study we report the first petrological data on pyroxenites associated with the peridotites. The pyroxenites were collected in the harzburgites from the central part of the island (Bogota Peninsula) and in the northern lherzolites (Poum Massif). The Bogota mylonitic harzburgites record deformation along a paleotransform fault (Prinzhofer and Nicolas, 1980; Teyssier et al., 2016). The pyroxenites (~5-15 cm thick) generally cut at variable angles the peridotite foliation but concordant layers, locally boudinaged, also occur, thus suggesting emplacement during and after HT shearing deformation (Titus et al, 2011). Pyroxenites display textures ranging from cumulitic to porphyroclastic or granoblastic-polygonal. They include orthopyroxenites (Opx+Cr-Spl ±Ol) and websterites, (Opx+Cpx ± Cr-Spl± Edenite). The pyroxenites commonly have refractory assemblages characterized by Opx and Cpx with high Mg# (91-92 and ~93, respectively), Cr-rich spinel (Cr# = 50-61) and Fo-rich olivine (91-93 mol%), whereas Cpx and Opx with higher Fe contents and negligible Cr_2O_3 occur in the amphibole-bearing rocks. The Poum lherzolites contain cm-thick concordant orthopyroxenites characterized by exsolved Opx (Mg# ~91-92), Fo-rich Ol (91-92 mol%), Spl with variable Cr# (25-52) and small amounts of Cpx. Equilibration T calculated employing conventional pyroxene geothermometers for the Bogota pyroxenites (930-1040°C) are comparable with those obtained for the enclosing harzburgites (~950°C). The Poum pyroxenite yields higher T (~1000-1100°C) in the range of those determined for the porphyroclastic assemblage of the host lherzolites (Secchiari et al., 2016).

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