



Hydrous metasomatism and melt percolation in the lithospheric mantle wedge underneath Comallo, Rio Negro Province, Argentina

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At Comallo, N. Patagonia, xenoliths are depleted sp-lherzolites, sp-harzburgites, wehrlites and clinopyroxenites. The studied samples are fine-grained with a dominant well-equilibrated equigranular texture whereas protogranular and porphyroclastic textures are rare. The rock forming minerals are olivine, ortho- and clinopyroxene and spinel. Relictic amphibole and phlogopite are present as well. The amphibole, where present, has been destabilized and shows breakdown reaction at the margin, forming second generation of ol, cpx and sp. The presence of disseminated amphibole and phlogopite, indicates that the lithospheric mantle underneath Comallo, has experienced limited modal metasomatism.

The Fo content in the lherzolites and harzburgites range from 90.8 to 92.0, and in the wherlites from 89.0 to 90.0. Clinopyroxene is diopside with 3.0 wt% Al₂O₃ in the rim and up to 4 wt% in the core. Spinel is Cr₂O₃-rich with cr#=0.426.

The majority of the clinopyroxene REE patterns show similar shapes such as concave-up LREE and MREE and low HREE abundances. The cpx REE patterns differentiate into two groups depending on the presence or not of amphibole and/or phlogopite. At both groups the absence of Sr- and the weak Zr, Hf and Ti-negative anomalies combined with the REE patterns indicate infiltration of alkali basaltic melt whereas the different REE abundances in both groups may indicate a differentiation at the distance from the percolation front. A third group has steep patterns with negative slope and slightly positive Eu anomaly that shows a progression from LREE enrichments to depleted HREE. In this group the enrichment in LREE as well as the positive Eu-anomaly combined with a negative Ti-anomaly is an evidence for carbonatitic metasomatism. Using the model of batch melting the calculated extraction of basaltic components is variable and ranges between 3 and 20%.

Calculated equilibrium temperatures at 1.5GPa pressure, which range between 850 and 920°C, are relative low for the lithospheric mantle below Comallo indicating a cold environment which, combined with the equigranular textures of the samples and the fact that spinel is frequently enclosed by olivine, suggests that recrystallization and re-equilibration took place at relatively low temperatures. The modal hydrous metasomatism represented by the occurrence of disseminated amphibole and/or phlogopite appears to be related to the downgoing subducted Pacific slab considering that Comallo is located approximately 200 km from the subduction front in the back-arc region.