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Petrology of suprasubductive mantle xenoliths from Estancia Sol De Mayo (Central Patagonia, Argentina)

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A new suite of mantle xenoliths from Estancia Sol de Mayo (Patagonia) has been investigated. They were entrained in alkaline lavas from the south western sector of Meseta Lago Buenos Aires. Trace element abundances of these lavas are well comparable with those of the main and post-plateau lavas from the Triple Junction Province and resemble those of OIB.
Xenoliths are spinel-bearing harzburgites and dunites, with minor lherzolites and one wehrlite. They are characterized by a coarse grained protogranular texture and devoid of modal metasomatic features and hydrated minerals. They show two texturally different clinopyroxenes. One is protogranular (cpx1), while the second surrounds, and is genetically related to, spinel (cpx2). Three different types of orthopyroxenes are also recognized: the first one is represented by large protogranular crystals with exsolution lamellae (opx1), the second one by small clean and undeformed grains without exsolution lamellae (opx2) and the last one occurs as small grains filling veins (opx3). Major element compositions of both clinopyroxenes and orthopyroxenes highlight two different trends. The first one is characterized by high $Al2O_3$ (high-Al trend) content at almost constant mg# [MgO/(MgO+FeO) mol %], while the second shows a slight increase in $Al2O_3$ (low-Al trend) content with decreasing mg#. Trace element contents of cpx are enriched in LREE and characterized by prominent to slightly negative Nb, Zr and Ti anomalies. No differences are observed between cpx1 and cpx2. The three groups of orthopyroxenes are variably depleted in LREE, with opx1 and opx2 always showing prominent to slightly negative Ti and Zr anomalies, while opx3 is characterized by a prominent positive Zr anomaly.
$Al2O_3$ in cpx is inversely correlated with LREE and LILE suggesting that a refertilization event occur within the upper mantle beneath Estancia Sol de Mayo. The most likely melt which can account for this event has a tholeiitic affinity, as supported by i) major element compositions of some clinopyroxenes falling in the high-Al trend, ii) the occurrence of secondary orthopyroxene that needs a SiO_2-saturated (or oversaturated) parental melt to crystallize and iii) the relatively low abundance in LREE and LILE with respect to $Al2O_3$.