The role of pyroxenite sources in the origin of the Payenia volcanic province, Argentina: insights from trace elements in olivine

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We present microprobe and laser ablation ICP-MS data with 19 different major and trace elements measured on twelwe basaltic samples from the southern Payenia volcanic province, Argentina. The basalts have been erupted in a backarc setting of the Andean Southern Volcanic Zone but have been shown to have an EM1 OIB-type trace element and isotopic composition [1, 2]. The average compositions of the ten most forsterite (Fo)-rich grains in each sample range from Fo_{80} to Fo_{88} and the Fo contents display good correlations with the trace element contents. As the Fo decreases, the Zn, Co, Mn, Y, Ga, Mo, Li, P, Zn/Fe and Ni/(Mg/Fe) increases while Ni, Cr, Cu, Ca/Fe and Mn/Fe decreases. Ca, Al, Ti, Sc and V remain relatively constant. In plots of Ni/(Mg/Fe) and Ca/Fe vs. Mn/Fe the olivine averages follow the trends found by Sobolev et al. [3] and range from compositions close to MORB olivines to compositions in equilibrium with pure pyroxenite melts.

The four olivine averages with lowest Fo contents have presumably experienced olivine, Cr-spinel and minor amounts of clinopyroxene (cpx) fractionation, whereas the remaining eight were probably in equilibrium with melts that had only fractionated olivine and Cr-spinel. Although cpx fractionation may have lowered the Ca/Fe and Mn/Fe in the four lowest Fo samples, it cannot have generated the full spectrum of compositions found. For example, the increase in P along the trend would require ~65% fractionation which is highly unlikely. Also, the positive correlation between Zn/Fe and Ni/(Mg/Fe) is inconsistent with fractionation of both cpx and olivine. Therefore the changing trace element compositions and the associated decrease in Fo contents are interpreted to reflect an increasing amount of pyroxenite or eclogite melt in the primary melts.

[1] Søager *et al* (2013) *Chem. Geol.* **349-350**, 36-53. [2] Søager & Holm (2013) *Chem. Geol.* **360-361**, 204-219. [3] Sobolev *et al* (2007) *Science* **316**, 412-417.