Olivine-hosted melt inclusions from the Andean back arc (34º-38ºS)

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We report major, trace and volatile (H_2O, CO_2, F, S, Cl) element contents of olivine-hosted melt inclusions from Quaternary basaltic tephras from the Andean Southern Volcanic Zone intra-back arc region (34-38ºS). This area is characterized by more than 800 monogenetic cones erupting alkalic basalts ranging in composition from ocean-island to volcanic-front type basalts. We selected tephras erupted at different distances from the trench: ~350 km (Loncopué) ~ 390 km (Diamante) and ~ 500 Km (Auca Mahuida). Once corrected for post-entrapment crystallization, most inclusions are alkali basalts, ranging from basanite in Diamante to sub-alkali basalts in Loncopué. The Mg# and Ni contents of Loncopué olivines are consistent with those crystallized from peridotite-derived magmas. In contrast, those from Diamante and Auca Mahuida are too enriched in Ni, suggesting different processes or magma sources. The Fe^{3+}/Fe^{tot} of the melt inclusions, estimated from olivine-melt V partitioning, ranges from 0.15-0.2 for Auca Mahuida to 0.22-0.35 for Diamante and Loncopué. The difference in fO_2 is consistent with Diamante and Loncopué inclusions having a strong arc trace element signature and high volatile contents and Auca Mahuida inclusions having an intraplate-like signature and volatile contents. Based on the new geochemical information, we suggest that the inclusions from Loncopué represent melts from the mantle wedge with a decreased slab-flux compared to lavas from the volcanic front. In contrast, Diamante and Auca Mahuida inclusions represent melts from the subcontinental mantle lithosphere carrying mafic components. These components were derived from an asthenospheric mantle that was modified by a slab-flux that decreases from the west, beneath Diamante, until absent in the east, under Auca Mahuida.