Volatile and major element variations in olivine hosted melt inclusions along the Payenia backarc volcanic province, Argentina

BRANDT, F. E*[1], HOLM, P. M[1] AND HANSTEEN, T. H.[2]

[1]Department of Geosciences and Natural Resource Management, University of Copenhagen, Øster Voldgade 10, Copenahagen 1350, Denmark (*correspondence : feb@ign.ku.dk).

[2]GEOMAR Helmholtz-Zentrum für Ozeanforschung, 24148 Kiel, Germany

We present volatile (H_2O, CO_2 S, F and Cl) and major element contents of olivine hosted melt inclusions from primitive tephras along the Quaternary backarc volcanic province, Payenia, of the Andean Transitional to Northern Southern Volcanic Zone (T–NSVZ; 33°S–38°S). Pre-eruptive chlorine contents in melt inclusions extend to higher concentrations in the northern backarc than those observed for arc related olivine hosted melt inclusion of the SVZ [1]. Sulfur contents in melt inclusions from the Payenia backarc overlap with SVZ arc values, and comparatively high S and Cl contents also cover high-K_2O melt inclusions. Especially differences in K_2O reflect either source enrichment or the degree of mantle melting consistent with the calc-alkaline to alkaline transition in composition of the melt inclusions between the volcanic arc and backarc. Whereas sulfur and florine contents in melt inclusions of the backarc can be modelled by partial melting of a primitive mantle, the high chlorine contents must derive from addition of subduction related fluids to the mantle. In turn, the Cl/K_2O ratio increases northwards along the backarc, reflecting an inreased fluid-derived signal by subduction of seawater-altered oceanic crust. Mantle wedge melting in the northern backarc is enhanced by fluids but the fluid signature gradually declines sourthwards.

Post-entrapment olivine crystallisation corrected Cl/K_2O and S/K_2O ratios define positive correlations with host olivine fosterite content ($Fo_{89–80}$) that cannot be explained by olivine fractionation, degassing and/or degree of mantle source melting. The correlation is instead evidence for source differences of these elements and Mg#. The variously enriched mantle sources feeding the backarc volcanism may not only be different chemically, but also mineralogically. This is supported by correlations between Mn/Fe in the host olivine and Cl/K_2O, S/K_2O and Mn/Fe ratios in the melt inclusions.

[1] Wehrmann et al. (2014). *Int J Earth Sci*. **103,** 1945-1962