

Slab-derived fluid metasomatism in mantle lithosphere from Agua Poca volcano, Argentina N-Patagonia

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The Quaternary Agua Poca volcano (37°01'S - 68°07'W) is located in the West of the La Pampa Province, Northernmost of Argentine Patagonia, and is part of the extensive basaltic volcanic event of the Payenia Geological Province, related to the Andean extra back arc setting. The Agua Poca is a monogenetic pyroclastic volcano, composed of an intercalation of spatter and cinder layers and host ultramafic mantle xenoliths. The xenoliths show protogranular and protogranular to porphyritic textures, and is composed of olivine (Fo₈₉₋₉₁), clinopyroxene (En₄₇₋₅₂, Fs₂₋₅, Wo₄₅₋₄₉), orthopyroxene (En₈₉₋₉₁, Fs₈₋₁₀, Wo₁₋₂) and spinel (sp) [Mg#₇₆₋₈₀; Cr₇₋₁₂ (100Cr/(Cr+Al))].

The studied xenoliths are basically anhydrous sp-lherzolite and subordinate anhydrous sp-websterite and sp-pl-clinopyroxenite with whole rock Mg# from 88 to 91. Geothermobarometry data in clinopyroxene indicates equilibrium pressure and temperature trend between 10 to 20 kbar and 900 to 1200°C. Agua Poca mantle xenoliths are characterized by flat Sun & McDonough (1989) primitive mantle normalized HREE and MREE patterns, and depletion of LREE compared to HREE ($Ce_N/Yb_N = 0.15-0.50$), with exception of the AP10 (1.46) sample. Multi-elemental diagram shows Th, Nb, La and Ce depletion, expressive Pb enrichment and, in lesser intensity, Ba, U, Ta and Ti enrichment. Batch melting modeling, using REE fractionation, indicates up to 10% melting from a primitive mantle composition. Pb/Ce, Ba/Nb, Sr/Ce, Ta/Hf, Nb/Hf and U/Th ratios, together with REE and isotopic ($^{87}Sr/^{86}Sr = 0.700536-0.705021$) data suggest that the selective enrichment in Pb and LILE (Ba and Sr), and moderate Sr isotopic ratios could be generated by interactions of a weakly depleted mantle lithosphere with water rich fluids released from a subduction slab in the compressive tectonic setting.

Authigenic cyanide phases in mine-impacted lake sediments

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The characterization and accumulation pathway of metal-rich cyanide phases in mine-contaminated Balmer Lake (Ontario, Canada) were assessed through detailed examination of sediment mineralogy and porewater composition. The near-surface deposits in the lake consist of fine-grained calcareous tailings intermixed with natural lake sediments. The tailings contain blue to greenish Fe-dominant cyanide [$Fe^{III}_4(Fe^{II}(CN)_6)_3$] that has formed *in situ* in the tailings (Figure 1). The cyanide phases occur in wt.% amounts as discrete particles and as bedded layers. Energy Dispersion X-ray Spectroscopy (EDS) analyses indicate that the authigenic cyanide precipitates contain variable amounts of Ni, Cu, and Zn (Fig. 1). The presence of trace amounts of As in the EDS spectra is likely related to heterogeneity, which is evident from the high Si content in all of the spectral analyses. Colour variations of the cyanide phases, from blue to green, are not indicative of a specific minor-element composition. High-resolution porewater profiles and solubility considerations suggest that the formation of the cyanide complexes is controlled by both redox potential and the availability of dissolved ferrous iron (Fe^{2+}).

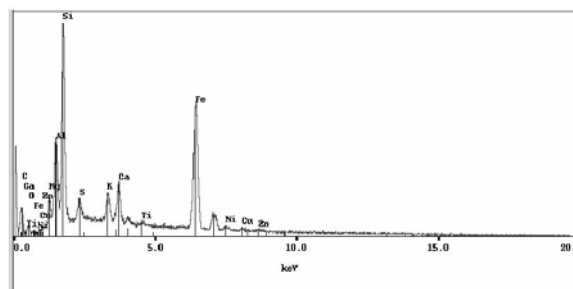
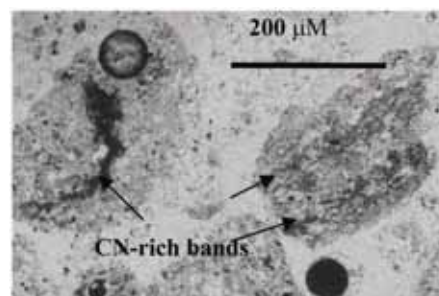


Figure 1: Sediments in transmitted light showing CN-rich bands (top). EDS spectrum (bottom).