Crustal contamination controls the formation of the magmatic-hydrothermal El Laco system

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The intriguing magmatic-hydrothermal system at the recent El Laco andesite volcano includes large stratabound and discordant bodies of magnetite that have been interpreted as the product of the crystallization of (sub-)volcanic iron oxide-rich melts [1] [2]. Their emplacement was accompanied by the exsolution of large amounts of fluids that formed an early high temperature alkaline-calcic alteration superimposed by an steam-heated later event and that significantly modified the original mineralogy of the host andesitic rocks [3]. The mechanism of formation of these iron-oxide rich melts is unknown. We present systematic Sr-Nd geochemistry of the host andesite, the magnetite ore, and related hydrothermal alteration. These results shows that the mineralization has a well-defined crustal signature with εNd values as low as -5.4 and Sr isotope ratios up to 0.70811. These values are well above those the host andesite (εNd: -5.5 to -4.1; $^{87}Sr/^{86}Sr$: 0.70743-0.70661) that is similar to that of the nearby volcanoes. They have also crustal signatures, something that is interpreted as due to the contamination with an underlying Paleozoic basement. The significantly more crustal signatures of the ore system strongly suggests that the iron oxide metls separated from a batch of a deep more contaminated andesite that does not crop out. Our interpretation is similar to that of [3, 4] and that the ultimate reason of the formation of the iron oxide-rich melts is the crustal contamination by silica-rich or P-Fe-bearing rocks, perhaps the late Palaeozoic banded iron rocks age that currently crop out in the eastern Andes.

[1] Henriquez, F. & Martin, R.F. (1978) *Canadian Min.* **16**, 581-589. [2] Naslund, H.R. et al. (2002). In: Hydrothermal Iron Oxide Copper-Gold & Related Deposits: A Global Perspective, vol. 2. PGC Publishing, Adelaide. [3] Tornos, F. et al. (2011). In: SGA Biennial Meeting Proceedings, 443-445. [4] Mungall, K.E. et al. (2014) Goldschmidt Conference, Sacramento, 1756.