Magmatic sulphide composition at La Fossa active volcano (Italy)

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Due to the strong affinity of chalcophile and siderophile elements (PGE, Au, Cu, Ag) for the sulphide phase, magmatic sulphide saturation, and particularly the timing of its occurrence with respect to magma differentiation and fluid exsolution, exerts a primary control on the evolution of fertile magmatic-hydrothermal systems [1, 2]. We investigate the composition of minerals, melt and sulphide inclusions (SIs) in the products of La Fossa volcano (Vulcano Island, Italy), with the aim to gain insights into the behavior of ore-forming metals during magmatic evolution of an active arc volcano. The well-studied magmatic evolution of La Fossa provides a rare opportunity to study potentially mineralizing processes beneath arc volcanoes. At La Fossa, magmatic sulphide saturation occurred late in the magma evolution, at the trachytic stage [3]. Interestingly, SIs found in trachytic pumices consist of homogeneous pyrrhotite, while SIs found in trachytic lavas are much more Cu-rich and consist of chalcopyrite-bornite exsolution textures, formed during slow cooling of the sulphide melt. The composition of Cu-rich SIs varies along the line between bornite, liquid and ISS at 900°C (Fig. 1), suggesting that the original sulphide composition represents a mixture of these three phases.

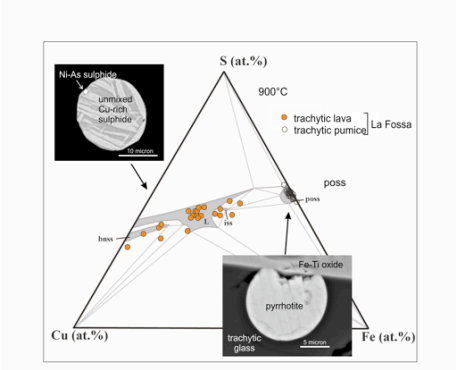

Figure 1: Composition of sulfide blebs in the Cu-Fe-S system at 900°C.

[1] Chang & Audetat (2018) *J. Petrol* **59**, 1869-1898. [2] Hao *et al.* (2017) *GCA* **216**, 372-392. [3] Fulignati *et al.* (2018) *JVGR* **358**, 45-57.