**Br degassing mechanisms investigated by X-ray spectroscopy**

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20 years after the first reports of BrO formation in volcanic plumes and its tremendous effect on ozone [1], the mechanisms controlling Br degassing (fluid-melt partition, speciation, diffusion) are still being defined. Amongst the different technics to employ, X-ray absorption spectroscopy (XAS) provides unique opportunities to gain further information on the local environment of halogens in aqueous fluids or silicate melts but may also be used to quantify their distribution in high P-T samples.

Here, we present recent developments on the FAME/FAME UHD beamlines at ESRF that have enabled us to constrain (1) Br speciation in natural volcanic glasses containing down to 10-100ppm Br and (2) the fluid-melt partition coefficients of Br between 600 and 900 °C and 1-1.5kbar. High-energy resolution fluorescence detected (HERFD)-XAS measurements conducted on basaltic to rhyodacitic glasses reveal that Br is found in three different sites, surrounded by Na, K and Ca [2]. The results of partitioning experiments involving haplogranite melts compare well with pioneer and recent post-mortem partitioning studies [3,4,5] and define an overall trend where $D\_{Br}^{f/m}$ increases from ~ 5 to 40 with increasing SiO2 contents and decreasing P-T conditions. Together, these preliminary results pave the way towards an improved characterization of heavy halogens degassing behaviour.

**References:** [1] Bobrowki et al., 2003. Nature 423, 273-276. [2] Louvel et al., 2020. Am. Min. 105, 795-802. [3] Bureau et al., 2000. EPSL 183, 51-60. [4] Cadoux et al., 2018. EPSL 498, 450-463. [5] Cassidy et al., 2022. Am. Min. 107, 1825-1839.