Halogen stable isotopes ($\delta^{37}Cl$ and $\delta^{81}Br$) in volcanic systems

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Among the main volatile precursors, halogens show a unique combination of geochemical features that can be used to inimitably trace the history of magmas from their origin through their differentiation, degassing and interactions with meteoric or hydrothermal fluids. Indeed, chlorine and bromine are: the latest (i.e. shallowest) degassed from magmas, and mainly as halogenated acids (HCl, HBr); highly hydrophilic and can thus be completely trapped as chloride and bromide forms in shallow groundwaters or lakes overlying magma bodies; and unlike most other main volatiles, they are considered as conservative (i.e., chemically non reactive).

We will present a review of the knowledge on halogen stable isotopes systematics ($\delta^{37}Cl$ and $\delta^{81}Br$ that are respectively referring to deviations of $^{37}Cl/^{35}Cl$ and $^{81}Br/^{79}Br$ ratios in measured sample relative to seawater, in per mil units) and their potential as tracers of magmatic processes and interactions with hydrothermal systems. While $\delta^{37}Cl$ compositions already provided such constraints in both oceanic [1,2] and aerial settings [3], we anticipate that $\delta^{81}Br$ compositions (recently developed at IPGP) should significantly improve our understanding of volcanic systems. We will indeed present results from experiments that have been designed to evaluate isotopic variations in volcanic fluids in order to improve our understanding of the evolution of magmatic and hydrothermal activity, with possible applications toward volcano monitoring.

[1] Bonifacie *et al* (2005), *Chemical Geology* **221**, 279-288 [2] Bonifacie *et al* (2008), *Science* **319**, 1518-1521 [3] Sharp *et al* (2010), *GCA* **74**, 264-273