Diffusion of water in the pumice and obsidian by Raman spectroscopy.Panum Crater (California)

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Despite the findings of previous studies, the influence of physicochemical properties of magmas on the construction and dynamic of volcanic domes is not fully understood. Particularly the volatile behaviour is a parameter of the first order that controls the eruptive dynamics. Water is the most important volatile and causes a drastic influence on the viscosity.

In the north part of Long Valley caldera (California), a perfectly preserved dome was established in 1350 AD [1]: the Panum Crater. It is composed of typical rhyolitic lavas. The least lava emissions contain a great contrast of different pumices and obsidians. Panum Crater structure and morphology represent a particular interest and a simple object of study to understand the relationship between the gas phase and its implementation through the eruption dynamic.

The goal is to measure water diffusion in the border around bubbles to understand the formation of the gas phase. We used Raman spectroscopy (T64000, Jobin Yvon, Horiba®), which allow measuring a profile in the first 30 microns around the bubbles by using Raman calibration developed by Le Losq [2].

These results show that dome forming events can be affected by two different processes: an early bubble growth event at depths that promote magma rising and a late evolution that promotes final degassing. Such process can maybe affect all dome forming events and must trigger also destabilization of the dome because of high pressure/velocity vertical gradients, when deep bubble growth events and late evolution are respectively activated and inhibited.

[1] Wood, S., 1977, *Geols. Soc. Am. Bull.* **88**, 89-95. [2] Le Losq C. *et al* 2012, *Amer Min.,* **97**, 779-791.