Vesicle evolution in magma conduits - implications for the processes of silicic magma ascent

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Volcanoes commonly show two active processes, namely: (i) those occurring at depth, in mid-crustal level magma storage zones that represent the initial state before eruption; and (ii) those occurring during ascent to the surface which either may alter the course of an eruption already in progress or promote its triggering. The distinction between both processes is essential to advance the knowledge on priming of a magmatic body and on how silicic magmas evolve. As such, the role of gases and fluids is decisive.

Our knowledge of how gases behave and influence the eruptive style of magmas has greatly advanced from sampling and observations of volcanic products; lab experiments; and numerical models. However the state of magmatic gases and fluids just before the critical importance of the inception of the eruptive decompression is still poorly understood and difficult to assess.

For this purpose, we present an integration of (i) direct sample observations from different depths under a volcano; (ii) microtomographic analysis (last generation of clinical TAC and micro-CT); and (iii) numerical simulations of vesicle evolution in the magma conduit by utilizing -as input- the previous observed parameters.