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Long-term evolution of the gas composition of Popocatepetl's plume

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Changes in the eruptive dynamics are mainly controlled by the magma gas content, and the degassing processes impacting the magma viscosity and ascending speed. The progressive exsolution of the gas species, their release at different depths, their mutual interaction and the eventual assimilation of crustal rocks are reflected in the volcanic plume composition changes. Combining long-term ground-based FTIR and UV remote measurements of the Popocatepetl's plume, seismic data and visual monitoring, we explore the relationship between the gas composition changes in the volcanic plume and the transition between extrusive and passive degassing regimes.

SO₂, HCl, HF, BrO, SiF₄ and CO₂ are simultaneously measured in the volcanic plume since 2013 from the Alzomoni observatory, located 12 km north of the crater. We capture several phases of lava dome growth, different types of explosions and passive degassing periods. The evolution of the gas species ratios through these events allows deciphering the degassing processes.