

# Preservation of the water concentration in mantle xenoliths. The cases of Peylenc & Ray Pic volcanoes (FMC)

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The ability of xenoliths to preserve water lithospheric signatures remains an unsolved question for many years. We report water content in olivine and pyroxenes of peridotite xenoliths from Peylenc and Ray Pic volcanoes (French Massif central, FMC). On each site xenoliths were sampled from products of an explosive eruption (volcanic breccia and pyroclastic deposit) and an effusive eruption (frozen magma chamber and a lava flow).

In Peylenc, the xenoliths from the breccia have systematically more water than the xenoliths from the basalt quarry: ol 1-9, opx 60-95 and cpx 250-380 wt. ppm H<sub>2</sub>O versus ol <0.2, opx 20-55 and cpx 110-240 wt. ppm H<sub>2</sub>O.

In Ray Pic, water content in xenoliths from the lava flow is independent of its location in the lava: ol < 1, opx 190-270 and cpx 430-640 wt. ppm H<sub>2</sub>O. Results suggest that the cooling and solidification of the lava had no impact on water content.

The xenoliths from the pyroclastic deposit have systematically more water: ol 3-12, opx 330-460 and cpx 810-890 wt. ppm H<sub>2</sub>O. These values are either comparable with or lower than the values reported previously from the same locality (1).

The study shows that xenoliths recovered from explosive eruptions have higher water content than the ones from effusive eruptions, but also that water content can be different from one explosive event to another.

Conclusion is that water content can rapidly be reset during magma degassing prior to eruption. Degassing controls water content of xenoliths.

Among the xenoliths studied, several have spectral signatures different from others. This different spectral signature has also been reported from other volcanoes (2, 3). The coexisting of different spectral signatures, which have not been erased during degassing, are probably the only OH signatures fully preserved from depth.

<sup>1</sup> Azevedo-Vannson S., et al. *Chemical Geology* **575** 120257 (2021)

<sup>2</sup> Denis C.M.M. et al. *Lithos* **226** 256-274 (2015)

<sup>3</sup> Patkó L. et al. *Chemical Geology* **507** 23-41 (2019)