# Insights into magma evolution in Capraia Volcano (Italy) from plagioclase chemical and isotopic zonation.

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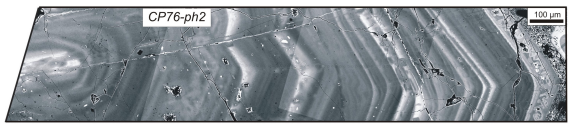
Chemical and isotopic zoning in plagioclase phenocrysts has proved to be a powerful tool to decipher petrogenesis in 'open' volcanic [1] and plutonic [2] systems. While single-grain isotopic variations constrain the nature of the melt involved in magma mixing, the promising aspect of using trace elements in plagioclase is their sensitivity to intensive parameters (P, T, $XH_2O$) during growth.

Capraia Volcano (7.2-7.6 Ma) belongs to the Tuscan Magmatic Province. Most lavas are andesitic and dacitic in composition, with a predominant high-K calc-alkaline signature. Dacites that display the best evidence of plagioclase zoning were selected for this study. The aim was to correlate the zoning patterns to elucidate the evolution of the Capraia magma chamber. Phenocrysts display complex textures (see accumulated BSE image below) consisting of growth zones separated by resorption surfaces, suggesting repeated disequilibrium conditions during crystallisation.




By taking into consideration mol% An (as a temperature proxy), Fe (as an oxygen fugacity proxy) and $Sr_{melt}$ (as a melt composition proxy), we show that the phenocrysts have shared part of their growth history and resorption events, and postulate the existence of a long-lived magma chamber periodically replenished by andesitic magmas. This model has been tested using Sr and Pb isotope data on microdrilled samples extracted from the various growth zones.

**References**

[1] Davidson J.P. & Tepley III F.J. (1997) *Science* **275**, 826-829.
[2] Gagnevin D., Daly J. S., Poli G., and Morgan D. (2005) *Journal of Petrology* **46**, 1689-1724.