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### Petrological evolution and pre-eruptive conditions of a highly explosive volcano showing signs of unrest: Cerro Machin, Colombia (Master project)

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The biggest eruption of Volcan Cerro Machin (VCM) in Colombia occurred ~3600 years before present (BP). With the reactivation of the magmatic system under the volcano it is fundamental to characterize the eruptions from a petrological point of view. Pumices from its pyroclastic flows are composed of plagioclase, unzoned and reversely zoned amphiboles, olivine and biotite, which show no disequilibrium textures. Comparison with experimental work on similar rock composition and geo-thermo-barometry provides pre-eruptive temperature of  $820 \pm 20^\circ\text{C}$  and storage pressure of 2-3.5kbar at moderate oxygen fugacity (NNO+1.3 to NNO+1.6±0.2). Water content compared to experiments is about 6.6±0.5 wt%. Chemically zoned and unzoned amphiboles show an increase in Mg# in rims. The zoned group shows a decrease of REE concentration to the rim suggesting the potential supply of mafic melt in a dacitic magmatic reservoir. The second group show elevated REE content on the rim combined with high Mg#, which can be accounted for by the flushing of sulfur through the magmatic system in a last stage (Scaillet and Evans, 1999). Bulk rock compositions and petrographic assemblages from different eruptions (1200BP eruptions and actual dome) are similar to this study and are also analysed. Both eruptions have geochemical adakitic signatures and have high Sr isotopic ratio ( $^{87}\text{Sr}/^{86}\text{Sr} \sim 0.70495$ ) controlled by continental crust or a sediment signature from the slab. With all these information, it is now easier to understand the behaviour of the volcano, and its potential evolution toward a future eruption.

#### REFERENCES

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