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Basaltic Plinian Eruptions: Understanding the Explosive Past of Masaya Volcano, Nicaragua

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Plinian eruptions are very large magnitude events, producing several cubic kilometres of volcanic material in a brief time, with catastrophic impacts on the local environment around the volcano and potential global climatic perturbation. Plinian eruptions are characteristically associated with fairly evolved, silica-rich magmas. However, a minority are produced by basaltic volcanism, notably Mt Etna, Italy, erupting in 122B.C. and Tarawera, New Zealand in 1886 (Coltelli et al., 1998). Masaya Volcano, a caldera in western Nicaragua has produced four Pleistocene examples of explosive basaltic Plinian events. However, the mechanisms driving basaltic Plinian eruptions are poorly understood. Subsequently, the cause of these large magnitude events at Masaya is disputed. Considering that the deposits of the Pleistocene Masaya eruptions outcrop within the capital of Nicaragua - Managua, understanding the origin of highly explosive activity at Masaya is of interest to the population in proximity to the volcano (Constantini et al., 2009).

Here we report results from a recent field campaign to Masaya, to examine the tephra deposits of the 60ka eruption producing the Fontana Lapilli and the 2.1ka Masaya Triple Layer event, both intense Plinian episodes depositing 2.9-3.8km3 of volcanic material (Constantini et al., 2009; Pérez et al., 2009). Their study provides a great opportunity to compare crystal and vesicle textures between eruptions, aiming to test diverse hypotheses on the mechanisms which could trigger these high magnitude events. Our samples were analysed using EPMA, with vesicle size distributions reconstructed to investigate the relationship between porosity and permeability. Our results will be interpreted using cutting-edge numerical modelling techniques to yield new insights into the driving processes which transform a relatively benign basaltic volcano into a Plinian system.

Coltelli, M. et al., 1998. Geology. 26(12): 1095-1098.
Constantini, L. et al., 2009. Bulletin of Volcanology. 71: 337-355.
Pérez, W. et al., 2009. Journal of Volcanology and Geothermal Research, 179: 191-205.