Compositional diversity in phenocrysts and glass in the Green Tuff ignimbrite, Pantelleria (Italy)

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The petrogenesis of the Green Tuff peralkaline ignimbrite, compositionally zoned from pantellerite at the base to comenditic trachyte at the top, is still not fully understood. The complexity of these types of rocks commonly occurring in an intra-plate setting results from the bimodal felsic–mafic magmatism with a relative gap in intermediate compositions (the Daly Gap, 52–62 wt.% SiO2) [1]. In previous studies, a model for the progressive tapping of a zoned magma chamber was proposed on the basis of a continuous decrease in Zr contents from ~2000 to 300 ppm with height measured on whole rocks [2]. However, the glasses show considerable compositional variation within individual samples (e.g. ~3000–990 ppm).

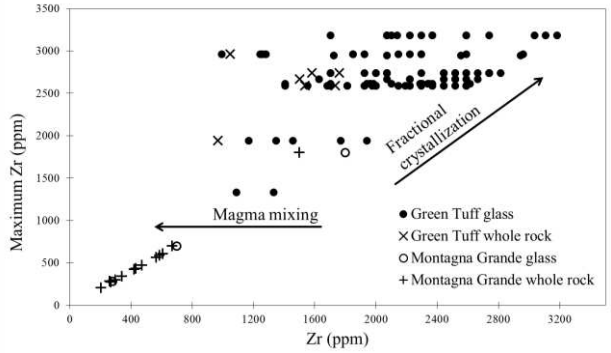

Figure 1: Maximum Zr content in glass in each sample plotted against range of Zr contents in glass and whole-rock of same rock.

Here, we report the evidence for magma mixing/mingling as processes that were partly responsible for the distribution of trace elements in the pre-eruptive magma reservoir. Variable glass within individual samples allowed us to reconstruct a degree of mixing in the pre-eruptive compositional layers. In turn, phenocrysts in trachytes indicate that intermediate composition was trapped in a feldspar accumulation layer.

[1] Avanzineli *et al.* (2014) Lithos **73**, 41–69. [2] Williams *et al.* (2014) Geology **42**, 107-110.