Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.36264

Variable magma dynamics across the Diego Hernández Cycle (Tenerife, Canary Islands) as revealed by banded pumices from the 322 ka Aldea eruption

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Ocean island volcanoes are represented by a wide variety of magma compositions and eruption dynamics, from dominantly basaltic to compositionally bimodal systems. The island of Tenerife (Canary Islands) is an archetype of the latter, where a central, evolved caldera system is superimposed to basaltic volcanism of the rift systems. In this context, banded pumices recording pre- and syn-eruptive magma interactions are widespread among several ignimbritic bodies belonging to the Diego Hernandez Formation (DHF), the last major volcanic cycle which culminated in caldera collapse (0.37-0.18 Ma). Here, we present a detailed geochemical study of mineral and glasses from banded pumices from the 322 ka Aldea eruption, a moderate volume (~3 km^3 DRE) DHF intra-cycle event. Mineral and glass major and trace element chemistry suggests complex dynamics with a trimodal assemblage pointing to a double mixing event preceding eruption. The most mafic glasses are tephritic-phonotephritic in composition, indicating the involvement of a deep Cpx-Krs-Pl bearing component, resembling other DHF bimodal units. The most evolved component is in turn dominated by low-Ca plagioclase, alkali feldspar and Na-rich Cpx, associated to two phonolitic glass populations. Thermobarometric estimates on zoned Na-rich pyroxenes also indicate significant heating of the phonolitic reservoir before the eruption. Notably, glass and feldspar trace element data suggest a minor contribution of feldspar cumulate melting, in contrast to 179 ka El Abrigo[1] and 271 ka Poris[2] ignimbrites, where a stronger chemical signature of mush melting is present. Overall, our results suggest a complex pre-eruptive scenario for the Aldea member and could hint to a long-term evolution of the DHF magmatic system towards a more mature, mush-bearing reservoir that eventually led to the climactic El Abrigo event.

[1] González-García *et al.* (2022). *J. Petrol.* 63(3), egac009; [2] Wolff *et al*. (2020). *Earth and Planet. Sci. Lett.* 540, 116251