

The role of magma recharge in the evolution of alkaline felsic suites: The Fataga Group, Gran Canaria

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The development and collapse of a caldera at the end of the basaltic shield stage of Gran Canaria during the Miocene triggered the eruption of voluminous felsic ignimbrites and lava flows^[1]. The Fataga Group is a post-caldera volcanic sequence that covers phonolitic to trachytic compositions, whereas the underlying Mogán Group consists of rhyolitic to trachytic cooling units^[1], an unusual example of association between alkaline silica-undersaturated and -oversaturated suites. To understand the magmatic evolution of the Mogán and Fataga Groups, a detailed geological map and stratigraphic logs of a part of southern Gran Canaria were made. In this area the Fataga Group consists of welded and rheomorphic ignimbrites intercalated with lavas; 18 units in total. Alkali feldspar is the principal mineral phase throughout the sequence, biotite is restricted to the middle and upper cooling units, and haüyne and titanite appears mostly in the middle of the sequence.

Feldspar compositions show a bimodality that varies through the studied sequence. Anorthoclase grains ($Ab_{64-80}Or_{13-34}An_{0.2-10}$) with reverse zoning and resorption textures show an increase in the concentration of Ca and Ba upwards through the sequence. Sanidine crystals ($Ab_{57-60}Or_{34-41}An_{0.3}$) have no evident zonation, and Ba concentration is 1-3 orders of magnitude lower than the anorthoclase grains. Sanidine grains are richer in Rb than anorthoclases. Glass shards range from phonolitic to trachytic compositions and are characterised by mostly negative europium anomalies (Eu/Eu*) of 0.68 to 0.85. Glass shards lacking a negative Eu/Eu* anomaly have higher Ba concentrations. Biotites are Mg-rich and show resorption textures.

We propose that the main difference between Fataga and Mogán is the dominance of mafic recharge, which increases upwards from the Mogán to the Fataga Group, producing more phonolitic derivatives. Anorthoclase remelting (i.e. cumulate cannibalisation) increased through time and acted to perpetuate trachytic compositions. Sanidine grains are crystallised after the anorthoclase rims and are related to the extracted melts from the crystal mush.

[1] Troll & Carracedo (2016). Elsevier. 636