A combined mineral and melt inclusion study of the Nea Kameni dacites

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Since the voluminous 3.6 ka Minoan eruption, the Santorini volcano has been periodically erupting small volumes of dacitic magma. This study examines mineral and melt inclusions geochemistry of lavas spanning from 1573 to 1950 from Santorini volcano. Unlike the larger explosive events which commonly contain clasts of multiple compositions, the eruptions of Nea Kameni have been compositionally monotonous in bulk terms. The Kameni dacites do however contain two populations of feldspar, one An_{38-65} interpreted as crystallising from the dacitic liquid and a second An_{86-94} interpreted as xenocrystic. The two populations are distinct in terms of $^{87}Sr/^{86}Sr$ as determined via LA-ICPMS with the higher anorthite plagioclase having higher $^{87}Sr/^{86}Sr$. The larger dataset provided by LA-ICPMS (albeit with reduced precision) indicates that plagioclase grains within the Kameni dacites are isotopically more variable than existing data for the preceding explosive volcanism. Further differences are observed in the trace element compositions of the plagioclase grains, with the higher-anorthite population having systematically lower Sr and Ba abundances than the lower-anorthite plagioclase. The mafic and silicic plagioclase compositions appear to have remained approximately constant throughout the last 500 years of volcanism on the Kameni islands. Groundmass glass compositions are rhyolitic (SiO_2 73.5-73.8 wt.%) and melt inclusion compositions hosted within plagioclase exhibit two compositional populations which are related to the host composition. High anorthite plagioclase contains less evolved melt inclusions (SiO_2 51.2-58.1 wt.%) whereas the lower anorthite plagioclase contains melt inclusions more similar to the groundmass glass (SiO_2 63.6-71.4 wt.%). Water contents of the dacitic inclusions as determined via SIMS are slightly less than predicted via plagioclase-melt hygrometry (4-5 wt.%) but consistent with previous estimations.