Geochemistry and crystallisation depths of selected lavas of the Panarea Volcanic Group, Aeolian Islands, Italy

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The Panarea Volcanic Group is comprised of a group of emergent islands and smaller islets, rising from the plateau of a submerged truncated volcanic cone in the south Tyrrhenian Sea. It is part of the Aeolian Island Arc, a series of seven islands and associated islets, together with a number of submerged volcanic edifices, which form a ring-structure around the Marsili Basin, north of the Island of Sicily. Volcanism in the arc is attributed to the Africa-Eurasia convergence zone, and is controlled locally by regional and local tectonic features.

Erupted products range in composition from basalt to rhyolite, mostly falling in the high-K calkalkaline series, with few shoshonites. The geochemical composition of lavas sampled as part of this study indicates a slightly different composition in the lavas originating from the surrounding islets, compared to Panarea itself.

Based on two pyroxene geobarometry, the depths of magma crystallisation show a polybaric distribution starting at the Moho (~22km depth) and continuing to approximately 0.8km depth with differences between the crystallisation depths of magmas originating from Panarea itself, and from the surrounding islets.

Comparisons between major and trace element ratios of the present study and others in the literature suggest while fractionation played a large role in magma evolution at the PVG, it cannot be solely responsible for magma petrogenesis in the PVG. They reinforce Panarea's status as an intermediate volcano between the central and eastern Aeolian Arc, both geographically and geochemically. Additionally, there are differences in geochemistry and crystallisation depths between the lavas originating from Panarea, and those from the surrounding islets, suggesting differences in magmatic plumbing system and magma evolution.