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Geochemistry of plutonic rocks from the Central Igneous Complex of Maio (Cape Verde): constraints on heterogeneous mantle sources along the Sal-Maio ridge.

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Maio is one of the oldest islands of Cape Verde. Located in the southeastern part of the archipelago, it forms part of the N–S Sal–Boa Vista–Maio ridge, which exposes the oldest rocks of the archipelago. Maio preserves a partially exhumed Central Igneous Complex (CIC) potentially representing the plutonic roots of eroded volcanic rocks. Whole-rock and radiogenic isotope studies of the Maio CIC are scarce and have mainly been focused on the mafic intrusive units (e.g., Villaseca et al., 2025), whereas more evolved lithologies remain poorly constrained. In this contribution we present new whole rock geochemical and radiogenic (Sr-Nd-Pb) isotope data from the Maio CIC, emphasizing intermediate rocks and compare them with equivalent datasets from zoned circular plutons of the Sal intrusive complex.

The studied samples range from melagabbros to nepheline syenites sometimes displaying cumulate textures. Mafic assemblages are dominated by clinopyroxene, amphibole, biotite–phlogopite, and scarce olivine, while felsic minerals are plagioclase, alkali feldspar and nepheline.

Whole-rock major element geochemistry defines a strongly alkaline, silica-undersaturated trend. Compared to Sal, Maio rocks display a more potassic character at comparable SiO_2 or MgO contents. REE spectra show stronger LREE enrichment in Maio, whereas HREE concentrations define broadly comparable trends to those observed in Sal. Multitrace element patterns indicate a higher compositional variability among the Sal intrusions, while Maio units display more homogeneous signatures.

Whole-rock and radiogenic isotope data indicate mantle heterogeneities along the Sal–Maio ridge. Maio intrusions record K-rich magmas derived from a metasomatized, locally carbonated, phlogopite-bearing mantle source and display enriched Sr–Nd signatures consistent with the involvement of an EM1-like component within the southern Cape Verde alignment, in agreement with data recorded in later volcanic events (e.g., Gerlach et al., 1988). In contrast, Sal circular complexes define mainly more sodic trends and less radiogenic compositions closer to FOZO-like signatures, with no evidence for a significant EM1 contribution. Together, Maio and Sal represent contrasting mantle domains within the ridge, highlighting a north–south source contrast during the earliest intrusive stages of the Cape Verde magmatism.

Gerlach et al., (1998). DOI: https://doi.org/10.1016/0016-7037(88)90162-7

Villaseca et al., (2025). DOI: https://doi.org/10.1016/j.lithos.2025.107975