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Compositional Variations in the Azores Mantle Source: Insights from Lava-Hosted Xenoliths.

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The Azores islands are considered unusual examples of oceanic intraplate volcanism [1]. One reason is their geodynamic setting, with the islands seated on an expansive bathymetric high, known as the Azores Plateau, coupled with the Plateau occurring over a triple junction between plate boundaries (American, Eurasian and African plates). The Azores are also the subject of longstanding debate, centred on the origin and geochemical characteristics of the Azores mantle source [2].

The central debate forms around the contribution of volatiles versus the occurrence of a mantle plume in the source of the Azores. To investigate this, the locality of the central group of islands in the Azores (Terceira, Graciosa, São Jorge, Pico and Faial) are ideal as they are located directly over the putative mantle plume driving Azorean magmatism. The islands of Pico and Faial both have lava flows containing mafic and ultramafic xenoliths, facilitating direct observation of the petrology and geochemistry of the underlying mantle. Initial observations and mineral chemical data indicate that xenoliths from Faial and Pico are pyroxenitic to dunitic in nature, consistent with previous studies on the xenoliths from these areas [3].

Pico and Faial xenoliths contain secondary inclusion trails throughout, some containing aqueous phases. Bulk rock and mineral separates (olivines and pyroxenes) have been prepared for neutron irradiation noble gas mass spectrometry to determine halogen abundances [4, 5]. Halogens can show volatile contribution and recycled sediment [4]. Noble gases will also be measured, as isotopes have distinct mantle and MORB-like signatures [6]. Combined with the petrological observations, the noble gas and halogen ratios will be used as tracers for Azorean mantle source components. Future work will also examine xenoliths from additional islands in the Azores, to constrain heterogeneity between the islands.

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