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The plume pollution rift dilution effect in Iceland: a geochemical approach to identifying hybrid magma sources within Iceland.

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It is generally accepted that magma generation in Iceland involves two sources, the depleted mantle at the active rift zones (MORB), and the upwelling Icelandic plume supplying enriched OIB in the flank zones[1]. As MORB and OIB have different geochemical characteristics, case studies (e.g., the Reykjanes Ridge[2]) have been able to identify mixing between the two (i.e., hybrids products). However, the extent of MORB-OIB interaction across Iceland as a whole is still uncertain.

We utilise geochemical data from GEOROC[3] of Icelandic basalts to explore the amount of MORB-OIB interaction, using E-W transects across the different volcanic zones, to determine the extent of the OIB signature in relation to the accepted centre of the plume[4]. Our results show plume pollution—rift dilution in the volcanic products across Iceland. Within rift zone central volcanoes (e.g., Bárðarbunga), the influence of the plume is obscured by high volumes of MORB-derived magmas (*rift dilution*), giving central volcanoes close to the plume a dominantly MORB signature. In regions where either a MORB signature is lower or an OIB signature is greater, basalts display a polluted MORB (*plume pollution*) signature.

Within the northern rift zone, we identify, using trace elements and isotopic systematics, two central volcanoes that show clear mixing between the two sources: Krafla and Askja. Previous works[5].[6] have identified the mixing of MORB and OIB magmas in these centres, however, our results indicate a more extensive mixing, with hybrid compositions forming over half of deposits at Krafla, and >80% of deposits at Askja.

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