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Magma mixing as a mechanism for generating normal mantle δ18Ool in Icelandic off-rift zones.

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Laser fluorination oxygen analyses of mineral separates from the off rift zone of Snæfellsnes indicate that far from being the norm, lavas containing phenocyrsts with normal mantle δ18O are relatively rare. If the low δ18Ool signature within other Snæfellsnes lavas is the product of crustal contamination, it is possible that these normal mantle δ18Ool lavas are uncontaminated. However, these lavas have lower (230Th/238U) than the majority of the other Snæfellsnes lavas, as well as significantly higher incompatible trace element concentrations ruling them out as a suitable parent magma.

The normal mantle δ18Ool lavas seem to be confined to the Ljósufjöll central complex. Previous research has highlighted the presence of evolved lavas within the Ljósufjöll volcanic complex [1] and there is strong evidence for mixing with evolved magmas within our suite of lavas. Oxygen isotope fractionation between co-genetic minerals is temperature dependant and thus mineral-melt fractionation factors will increase with decreasing temperature and thus with increasing fractional crystallisation. By combining quantatitive fractional crystallisation models and oxygen fractionation factors, corrected to be consistent with observed values, it is possible to generate a trachyte with δ18OWR$\sim$+6.23‰ from a basalt with δ18OWR $\sim$+5.1‰Ṁodels involving mixing of this trachyte into a low δ18Ool basaltic parent show it is possible to generate the normal mantle δ18Ool Ljósufjöll lavas through this mechanism.

1. Flude et al., 2008 JGVR 169