# Hf and Pb Isotopic Constraints on the Origin of a Well-Studied Suite of Icelandic Picrites

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The Iceland plume is one of the best geochemically studied plume in the literature. Isotopically enriched Icelandic lavas likely contained significant recycled components in their mantle source regions [1]. Although up to four end-members have been proposed to explain the isotopic range sampled by the plume [2], principle component analysis (PCA) has shown that >99% of the variation is the result of mixing between two endmembers [3]. A suite of modern Icelandic picrites have been previously analyzed for $^{186\text{-}187}$Os, He, Nd, Sr and Tl isotopic systematics and major and trace elements [4-6]. These data show mixing between a high $^{3}$He/$^{4}$He enriched component and a low $^{3}$He/$^{4}$He depleted component in the picrite mantle source. Both components contained negligable subducted sediment [5]. In order to provide context for these end-members, we have determined the Hf and double-spike Pb isotopic compositions of these picrites. Measured $^{176}$Hf/$^{177}$Hf, $^{206}$Pb/$^{204}$Pb, $^{207}$Pb/$^{204}$Pb, $^{208}$Pb/$^{204}$Pb ratios varied between 0.28310-0.28336, 18.048-18.967, 15.432-15.572 and 37.711-38.526, respectively. $\Delta^{207}$Pb and $\Delta^{208}$Pb values are almost uniformly negative and positive, respectively, consistent with the bulk of Icelandic lavas [2]. All lithophile element isotopic systematics show broad correlation with $^{187}$Os/$^{188}$Os consistent with mixing. These correlations allow calculation of the lithophile isotopic systematics of the two mantle endmembers, which are consistent with the hybrid recycled crust-primitive mantle and depleted mantle end members proposed in [4]. This hybrid endmember shows that recycled crust is likely mixed with primordial undegassed material in the deep mantle, and that this mixture has recently been sampled by mantle plumes.

[1] Hemond *et al.*(1993) J. Geophys. Res.[2] Thirlwall *et al.* (2004) GCA [3] Peate *et al.* (2010) J. Petrol. [4] Brandon *et al.* (2007) [5] Nielsen *et al.* (2007) EPSL [6] Debaille *et al.* (2009) GCA