



Linking crustal recycling and osmium isotopes

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Recycling of subducted oceanic crust is widely thought to explain much of the chemical and isotopic heterogeneity of Earth's present-day mantle [1]. Geochemical tracers of recycled subducted ocean crust have included elevated $^{187}\text{Os}/^{188}\text{Os}$ in some studies [2,3] and high Ni and low Mn contents in others [4,5]. Here we link these tracers for the first time. For Iceland we observe strong positive correlation between amount of reacted recycled oceanic crust (estimated from Mn/Fe ratios of olivine phenocrysts after [5]) and $^{187}\text{Os}/^{188}\text{Os}$ ratio of bulk rocks. This result significantly strengthens the recycling model [1,6]. Furthermore it allows us to estimate the Os isotopic composition of both the recycled crust and the mantle peridotite, thereby constraining the model ages of end-members. We show that Icelandic lavas require ancient crustal component with model ages between 0.6 and 2 Ga and peridotitic end-member close to present-day mantle.

References: [1] A. W. Hofmann, W. M. White, *Earth Planet. Sci. Lett.* 57, 421 (1982); [2] J. C. Lassiter, E. H. Hauri, *Earth and Planetary Science Letters* 164, 483 (1998); [3] A. D. Brandon et al, *Geochimica Et Cosmochimica Acta* 71, 4570 (2007); [4] A. V. Sobolev et al, *Nature* 434, 590 (2005); [5] A. V. Sobolev et al., *Science* 316, 412 (2007); [6] C. Hémond et al., *Journal of Geophysical Research-Solid Earth* 98, 15833 (1993).