Nutrient uptake at the fungi-mineral interface

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This study focuses on the central role of soil fungi to acquire mineral nutrients from rocks and minerals, and thus participate in the weathering of bedrock to soil. We investigate fungal uptake of nutrient elements from minerals via direct contact and transport across the organism membrane.

Plant seedlings (*Pinus sylvestris*) in symbiosis with ectomycorhyzal fungi were grown directly on mineral surfaces in a controlled microcosm environment with regulated light, nutrients, moisture and carbon dioxide. The seedlings were grown in mixed mineral microcosms that were starved of a single essential nutrient. Initial chemical analysis of foliage and roots from microcosms starved of the major nutrients K and Mg showed lower concentrations of these elements in plant tissue compared to plants from microcosms that were not starved of these elements. However, despite systems being starved of K, an appreciably greater K concentration was observed in the shoots vs roots, suggestive of K storage in the foliage. Ca was also higher in shoots than roots. This trend is perhaps indicative of water efflux in the plants. Similarly, the essential nutrients P, Mg, Mn and Zn were higher in the foliage than in the roots,

Conversely, Fe and Al concentrations are higher in the roots than the shoots. Similar trends have been observed in the literature, suggesting low mobility of Al and Fe in plants [1]. Al, which is a non-essential element to plants, is toxic to fungi and they excrete it. The ready supply of Al to the roots system and the selective uptake to the shoots could imply that fungi may act as a filter for Al uptake by the seedlings. Fe uptake needs to be further investigated through comparison of systems with varying Fe nutrient supply.

[1] Hobbie *et al*. (2009) *Comm Soil Sci Plan* **40**, 3503–3523.

The role of North Atlantic asthenosphere in the genesis of Icelandic lavas: Evidence from Heimaey

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Recent work on Iceland has indicated minimal involvement of North Atlantic asthenosphere (NAA) in the genesis of Icelandic lavas [1, 2]. Whilst the variation in isotopic and trace element compositions of Icelandic lavas requires several distinct mantle sources, these are all suggested to be derived from the Iceland plume rather than the surrounding asthenosphere [2, 3, 4]. It follows that areas remote from the current plume position are more likely to exhibit evidence for interation with NAA. We present new high-precision isotopic and elemental data for samples from the island of Heimaey which is proposed to be the tip of the propagating Eastern Rift Zone in South East Iceland.

In contrast to the incompatible element enrichment expected in the small degree melts produced at off-rift zones, the Heimaey samples exhibit lower concentrations (up to 21%) at a given MgO% than the South Iceland central volcanoes. Despite this the Heimaey lavas still plot in the alkali field on a TAS diagram which is a consequence of enrichment in Na that is not coupled with enrichment in other incompatible elements.

Relationships between K/Nb, Na_2O/TiO_2, and radiogenic isotopes indicate mixing between an enriched component with an 'Icelandic' signature and a depleted component similar to NAA. Na_2O/TiO_2 has been shown to vary as a function of melting depth [5] and polybaric melting models for Na_2O/TiO_2 indicate that the high values seen within the Heimaey samples can be generated by mixing between <40% of an 'Icelandic' source melting in the garnet facies (~45kbar) and <72% of a North Atlantic MORB source melting in the spinel facies (~10kbar).

[1] Fitton *et al*. (1997) *EPSL* ***153***, 197–208. [2] Thirlwall *et al*. (2004) *GCA* ***68***, 361–386. [3] Chauvel & Hemond (2000) *G*^{3} **1**. [4] Kokfelt *et al*. (2006) *J.Pet*. **47**, 1705–1749. [5] Putirka (1999) *JGR* ***104****(B2)* 2817–2829