No differences in Sr isotope ratios between ectomycorrhizal and arbuscular mycorrhizal ecosystems across a wide range of geological substrates

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In highly weathered soils, where phosphorus (P) in particular may be a limiting nutrient, theory dictates that ectomycorrhizal (ECM) ecosystems are most efficient at uptake from mineral P through weathering of Ca-phosphate minerals and recycling of organic P. The ecological significance of mineral weathering by ECM fungi however remains unclear. We studied 10 pairs of pure arbuscular (AM) and pure ECM forests on different geological substrates on the South Island of New Zealand. Sr isotope ratios of dominant canopy tree foliage (AM *Dacrydium cupressinum* and ECM *Nothofagus menziesii*) were determined and in thin sections we analysed structural interactions between mycorrhizal hyphae and mineral and/or organic soil particles. Both AM and ECM forests had similar Sr isotope ratios that varied with geological substrates, indicating both forest types obtain Sr (and Ca-phosphate) from the same sources. Fungal weathering tunnels in feldspar grains were present in thin sections from both forest types. These preliminary data suggest there are no major differences in base cation nutrient uptake between AM and ECM ecosystems. This might challenge our understanding of the respective roles of ECM and AM fungi in ecosystem nutrient cycles.

Oceanic plagiogranites as products of hydrothermal activity at slow-spreading ridges

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We studied more than 100 oceanic gabbros from Mid-Atlantic Ridge and Southwest Indian Ridge by scanning electron microscopy and found in 90% of the samples microstructures suggesting that hydrous partial melting reactions proceeded. The best proxy for the underlying reaction is plagioclase strongly enriched in anorthite which is arranged in zones along grain boundaries implying that the partial melting process was triggered by fluids percolating on grain boundaries in a ductile regime. The composition of the new An-rich plagioclase is strongly impoverished in incompatible trace element excluding a model that these An-rich zones were precipitated by late, hydrous evolved melts. In some cases it is evidenced that the water-rich fluids are seawater-derived, suggesting a model that hydrothermal activity/circulation within the deep oceanic crust may trigger hydrous partial melting resulting in the production of oceanic plagiogranites, at temperatures exceeding 850° without any crack system, a prerequisite in current models for enabling hydrothermal circulation. This is in contrast with new findings of [1] stating that zircons of many plagiogranites from slow-spreading ridges show oxygen isotopes typically for equilibrium with mantle. However, new experimental work show that water activities prevailing during the melting reaction can be regarded as extremely low implying that a potential sea water source cannot be easily detected by stable isotopes.

[1] Grimes *et al*. (2011) *Contrib. Mineral. Petrol*. **161**, 13–33.