Geophysical Research Abstracts
Vol. 16, EGU2014-307, 2014
EGU General Assembly 2014

Tectonically emplaced ultra-depleted lithospheric mantle records garnet, spinel and plagioclase facies events

Thomas Czertowicz, James Scott, and Mike Palin
Geology Department, University of Otago, P O Box 54, Dunedin 9016 (thomasczertowicz@gmail.com)

The poorly studied Anita Ultramafites in western New Zealand represent a several km wide slice of lithospheric mantle that was tectonically emplaced onto the Gondwana supercontinent margin. The peridotites are almost exclusively spinel facies dunite and harzburgite, although spinel-orthopyroxene symplectites indicate the former presence of Cr-garnet. Pyroxenite dikes are uncommon, and there is no sign of an ophiolitic type structure. Olivine ($\sim$Fo93) and chromite ($\sim$Cr# 70) attest to extreme degrees of melt depletion, likely under hydrous conditions. The rocks were decompressed and equilibrated at the spinel facies. The ultramafites were then refertilised by a fluid that was rich in Si, Ca, K, OH and LREE, and probably equates to a low-degree silicate melt. The occurrence of negative and positive Eu and Sr anomalies in amphibole points to the influence of plagioclase, and suggests that refertilisation occurred at a very shallow lithospheric level. An added complication is that the peridotite was metamorphosed to upper amphibolite facies in the Cretaceous after tectonic emplacement. This generated talc, tremolite and chlorite. P-T conditions from adjacent gneisses indicate that this event occurred at $\sim$ 10-12 kbar in association with crustal thickening. Thus, the peridotite may have been pushed back out of plagioclase facies conditions, partially melted, and re-equilibrated back in the spinel facies. The Anita Ultramafics therefore record a sequence of attempts to equilibrate at garnet – spinel – plagioclase - spinel facies, before final exhumation.