C128-P005 **Room: Poster Session Hall** **Time: May 15**

Deconvolving the age and composition of mantle source components in southeastern Australia by in situ Pb isotopic analyses.

Richard Wysoczanski[1]; Monica R. Handler[1]; Greg Yaxley[2]

[1] IFREE, JAMSTEC; [2] ANU

Mantle xenoliths are one of the best representations we have of the composition of the upper mantle. An important tool for understanding mantle processes is their isotopic composition, both to place constraints on the nature of the mantle and its age. However, mantle rocks are notoriously difficult to date, and bulk analyses provide only a homogenous composition of the sample rather than providing detailed information of its constituents parts. Isotopic systems such as Sr and Nd are open to overprinting by multiple processes and, where the closure temperature of the isotopic system is below that of the ambient mantle, the radiogenic isotopic ratio is effectively reset to the eruption age. Although the Re-Os system can provide limited age information, it is susceptible to disruption of the parent-daughter ratio and can typically provide only a minimum estimate of initial partial melting of the peridotite, with no constraints on later processes. A radiogenic geochronometer that can date and trace specific events in mantle xenoliths would be a very powerful tool in understanding mantle processes and evolution.

The in situ ultra-small analyte volume Pb isotopic analyses of mantle mineral phases (clinopyroxene, amphibole, phlogopite and apatite) and glass patches by Sensitive High Resolution Ion Microprobe (SHRIMP) allows isotopic analyses of small volumes (sample size approx. 50-100 microns) of glass and mineral phases that cannot be separated and analyzed by conventional techniques. Although not as precise as conventional whole-rock methods, as analyzed phases have small (few ppm) Pb concentrations, multiple analyses can be performed on phases from each sample, and a weighted mean taken of all analyses. This increases precision and allows direct comparison of and between Pb-bearing phases within each sample.

This technique is applied here to mineral and glass phases in peridotite xenoliths from southeast Australia. The xenolith suite, which includes spinel wehrlites, lherzolites and harzburgites, is hosted by the Tertiary to Recent Newer Volcanics. The primary mantle phases have been subjected to recent metasomatism by sodic dolomitic carbonatite melts. Whole rock isotopic data suggest that the mantle source is a mixture of EMI and EMII. The in situ Pb isotopic composition of mineral and glass phases further defines a mixing line between old (1Ga) EMI mantle and a young (near-zero age) EMII component resulting from carbonatite metasomatism. These results illustrates the ability to date common Pb by in situ methods from individual mantle phases and to deconvolve individual sources where whole-rock data provides only a homogeneous isotopic composition that cannot define end-member components, particularly minor components.