# Os isotope systematics of Christmas Island basalts and their link to EM1

BRUCE F SCHAEFER[1], KAJ HOERNLE,[2] TREVOR FALLOON[3], FOLKMAR HAUFF[2] AND REINHARD WERNER[2]

[1]Earth and Planetary Sciences, Macquarie University, Sydney, NSW 2109 Australia: Bruce.Schaefer@mq.edu.au
[2]GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany
[3]Earth Sciences, University of Tasmania, Hobart, Tas 7001, Australia

Basalts from the Christmas Island Seamount Province (CHRISP) record an extreme range in EM type Sr-Nd-Pb-Hf signatures (eg Hoernle et al., 2011; Nature Geoscience 4: 883-887). Here we report Os data obtained on outcropping basalts from the aforementioned study; namely four samples from the youngest, Pliocene phase (Upper Volcanic Series, or UVS; ~4.5Ma), and four samples from the earlier, Eocene (Lower Volcanic Series, LVS; ~40-44Ma) shield buidling phase.

Os concentrations are uniformly low, however the LVS has higher values (25 – 82ppt) than the UVS (5 - 30ppt). Initial Os isotopic ratios overlap between the two groups, although the LVS are overall less radiogenic ($^{187}Os/^{188}Os_i$ = 0.1230 – 0.1496) than the UVS ($^{187}Os/^{188}Os_i$ = 0.1436 – 0.1679).

Os isotopes correlate well with Pb isotopes; the two distinct age groups defining distinct arrays projecting back to a common, slightly subchondritic Os source in $^{206}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$ and $^{208}Pb/^{204}Pb$ vs $^{187}Os/^{188}Os$ space. They also correlate well with Sr and Nd isotopes, although the UVS preserves a very narrow range of $^{87}Sr/^{86}Sr$.

Despite the low Os and Re concentrations (Re = 55 - 290ppt), the systematic variation of the Os isotopic signatures with lithophile isotopic signatures implies these are magmatic in origin and not due to contamination.

The Eocene LVS preserve distinct EM1 Sr-Nd-Pb characteristics, and the less radiogenic Os and higher abundances are consistent with a small component of ancient subcontinental lithosphere in the source. Further analyses of additional EM1 end member samples, from sites of comparable degrees of partial melting, will also be presented in order to place Christmas Island in context.