OS9-3 (13)

A REE STUDY OF MEGACRYSTS FROM THE MONASTERY DIATREME

Hutchinson, M.T.*, Harte, B.*, Moore, R.O.**, Gurney, J.J**

*Dept. of Geology and Geophysics, University of Edinburgh, Edinburgh EH9 3JW, UK
**Dept. of Geology, University of Cape Town, Rondebosch, 7700, RSAMax-Planck-Institut für Chemie, Abteilung Kosmochemie, Saarstrasse 23, 55122 Mainz, FRG

The Monastery kimberlite source has yielded discrete nodule megacrysts with a wide range of major-minor element compositions indicative of magmatic differentiation (eg. Gurney et al., 1979). A trace element study has been commenced on pyrope-almandine garnets (Mg/(Mg+Fe) 0.79-0.68) and some coexisting pairs of clinopyroxene, garnet and forsteritic olivine from this source. Tie lines for major elements between coexisting pairs were found to be consistent with an equilibrium state.

Trace element abundances are as expected for mantle phases with all megacrysts showing depletion in Rb, K, Ba of 0.01-0.1 xC1 and chondritic values for Hf, Pb, Th and U. Furthermore, garnet REE show an enrichment towards HREE from 1 to 60 xC1 with small range in abundances (eg. Dy from 20 to 50xC1). Cpx show an opposite REE trend and olivines typically yield very low abundances of REE 0.01-0.1 xC1. There is a striking similarity between the trace element trends for both garnet and cpx and those obtained from the same phases from sheared lherzolite nodules from Thaba Putsoa and Mothae kimberlites (Shimizu, 1974). Concentrations of LREE, Ba and Sr in garnet show only a small variation across the range of major-minor element compositions, but the HREE, Y and Zr show an approximate doubling of composition in the Fe-rich garnets (Mg/Mg+Fe)>0.7), possibly reflecting melt evolution in accordance with garnet/melt partition coefficients. Fe-Mg thermometry based on Krogh (1988) indicates high temperatures of formation and the calculated cpx/grt REE partition coefficients/ are in good agreement with those expected from experimental studies of garnet/melt (Shimizu and Kushiro, 1975) and cpx/melt (Hart and Dunn, 1992). The measured partition coefficients are tabulated below.

	Mg	Sr	Y	Zr	Nb	Ce	Pr	Nd	Sm
ol/cp	2.32	0.01	0.01	0.02		0.002	0.004		0.01
ol/gt	2.29	0.91	0.002	0.004		0.03	0.05		0.01
gt/cp	1.05	0.01	7.04	9.71	0.66	0.05	0.09	0.20	1.15
	Eu	Gd	Dy	Ho	Yb	Lu	Hf	Pb	
ol/cp		0.54			0.003		0.04	0.52	
ol/gt		0.34					0.01	5.49	
gt/cp	1.03	1.59	5.62	5.13	47.6	27.6	3.73	0.10	