volcanic province where only alkali basalts occur, usually bearing high-pressure phases (megacrysts, spinel-garnet pyroxenites of the Al-Ti-augite group, spinel-peridotites and at Eglazines also spinel-garnet pyroxenites and spinel-garnet peridotites).

Two new geothermometers, one new geobarometer and one new "oxygen fugacitimeter" are used in this study.

The pyroxenites include spinel-free pyroxenites equilibrated from 1160 to 1220 C°, spinel websterites (1000 → 1050 C°) and spinel-garnet pyroxenites. Spinel peridotites are composed of two groups. The former consists of coarse-grained peridotites equilibrated near 1000 C° ($f\ O_2 \simeq 10^{-10}$ atm.) the latter group is composed of peridotites (1200 → 1250 C°) reminding of some porphyroclastic peridotites from kimberlite xenoliths of South Africa.

The spinel-garnet peridotites plot into the lherzolite field. Thin section observations suggest that spinel is not the result of resorption (by lowering of pressure) of an earlier garnet-bearing rock. Therefore these xenoliths may be assigned to the spinel-garnet boundary. It would have equilibrated near 25 kb at a temperature of some 1230 C° ($f\ O_2 \simeq 10^{-9.5}$ atm.).

D14

PERIDOTITES FROM THE OLMANI SCORIA CONE, N. TANZANIA

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Basaltic scoria of the Olmani volcano, 10km SE of Arusha, N. Tanzania, contains blocks of dunite, harzburgite, lherzolite and diopside-rich wehrlite. The texture of most is porphyroclastic; large (>1cm) deformed olivine grains exhibit multiple planar extinction discontinuities, and there is abundant evidence for grain-boundary migration between adjacent deformed grains; subgrains are also developed. In orthopyroxenes, exsolution of opaque platelets takes place at extinction discontinuities. Large olivines are forsterite (Fo_{92-93}), but smaller re-crystallized, strain-free grains are more Fe-rich (Fo_{88}). Enstatite (En_{90-92}) is low in Al_2O_3 (1-2wt %) and Ca (0-0.4), Both enstatite and Cr-diopside ($\underline{mg}$ 0.93, up to 2.2% Na_2O, up to 3.2% Cr_2O_3) may occur in "fingerprint" intergrowths with Mg-chrome spinel (MgO 12-15%, Cr_2O_3 52-66%). Fine-grained material (?devitrified glass) associated with some cpx-chromite intergrowths is K-rich (4.7-5.7%) and very variable in composition (e.g. SiO_2 46-54%, MgO 4-19%, CaO 1-3%) and with low totals (?hydrous). In one specimen high-Na glass of variable composition (e.g.Na_2O 6.2-8.2%, K_2O 2.7-4.0, SiO_2 44.2-49.9) but apparently anhydrous (totals 98.4-101.3), has developed adjacent to cpx grains. The development of these alkali-rich basic melts from upper mantle material may be significant in models for the alkali-basalt province of N. Tanzania

D15

GARNET LHERZOLITE AND OTHER INCLUSIONS FROM A BASALT FLOW, BOW HILL, TASMANIA

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Garnet lherzolite xenoliths at Bow Hill, Tasmania are a rare occurrence from a basalt flow. Such xenoliths are known from alkali basalt (mainly breccias) in France, U.R.S.S., Mongolia, Patagonia, Japan, Hawaiian Islands and E. Australia. The Tasmanian examples occur with garnet websterite, spinel lherzolite, spinel websterite, spinel wehrlite and crustal inclusions. Statistical counts give a ratio of garnet lherzolite to spinel lherzolite of about 1 to 500 and between 60-75 % peridotites, 5-10 % pyroxenites and 20-30 % crustal rocks for the suite. Apart from cumulate spinel wehrlite, the ultramafic inclusions represent accidentally derived mantle material.

The garnet compositions ($Mg_{70-78}Fe_{13-18}Ca_{8-13}$) lie at the magnesian extreme for E. Australian basaltic and kimberlitic inclusions. They occur with Al orthopyroxene ($Mg_{83-89}Fe_{9-14}Ca_2$), Al clinopyroxene ($Mg_{52-54}Ca_{38-41}Fe_{4-9}$) ± olivine ($Mg_{90-93}$). Compositions are based on micro-probe analyses with total Fe as Fe O.

The host nepheline hawaiite belongs to a Tertiary, mafic K-rich alkaline lineage in Tasmania. The megacryst and cumulate minerals include olivine (Mg_{82}), Al clinopyroxene ($Mg_{42-46}Ca_{44-49}Fe_{9-11}$) and spinel ($Mg_{85}Fe_{35}$). Chemical mixing by addition of observed proportions of these compositions suggest that the host evolved by 20 % crystallisation of wehrlite from a primary parental basanite. Similar basanites are found in the area.

P-T estimates for the garnet lherzolite and garnet websterite from a variety of geobarometers and geothermometers range between 17-31 kb and 1130-1320°C. (Carswell and Gibbs, 1980, Nodmins programme ; Herzberg, 1978). This data indicates an origin in the mantle lying without the diamond stability zone. The lower P-T values may be the more realistic as they match experimental sub-liquidus crystallisation of wehrlite minerals from compositions related to the parental basanite (< 26 kb, 1300°C ; Arculus, 1975).

The xenolith assemblages allow a composite reconstruction of the lower crust and upper mantle under central Tasmania. The mineral compositions demonstrate the care needed to distinguish true kimberlites from basaltic occurrence, using similar indicator minerals.

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D16

PETROLOGY AND GEOCHEMISTRY OF MANTLE ECLOGITE XENOLITHS FROM COLORADO-WYOMING KIMBERLITES

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Eclogite xenoliths from Colorado-Wyoming kimberlites can be divided into two groups based essentially on absence or presence of kyanite and(or) corundum, and corresponding metaluminous or peraluminous character. Metaluminous eclogites generally are granoblastic and contain one or more of the accessory phases rutile, sanidine, graphite, quartz and sphene. Peraluminous eclogites commonly are foliated or layered and may contain accessory rutile and sanidine. Compositions of clinopyroxene and garnet overlap between the two groups; however, clinopyroxenes in peraluminous xenoliths generally are higher in jadeite and Ca-Al components, whereas garnets are higher in grossular component and lower in almandine. Equilibration temperatures, calculated from Fe-Mg partitioning between clinopyroxene and garnet, range from 794ºC to 1163ºC for an assumed pressure of