pyroxene, garnet, kyanite, and silica gave rise to the garnet and kyanite lamellae in the clinopyroxene. The excess silica from the reaction would have reacted with corundum to form kyanite in the observed texture.

D10
PETROLOGY OF A SUITE OF ECLOGITE INCLUSIONS FROM THE BOBBEJAAN MINE, SOUTH AFRICA. III. PARTIAL MELTING, RECRYSTALLIZATION AND P-T TRAJECTORIES

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A suite of eclogite nodules from the Bobbejaan Mine near Bellsbank, South Africa, all show partial melt textures and evidence of recrystallization at intermediate pressures. Most of the nodules are typical bimineralic eclogites that are associated with kimberlites, however some may contain primary phlogopite. Accessory phases are rutile, pyrrhotite and pentlandite. Jadeite components in unaltered clinopyroxene cores range from 15% to 40% by weight and may contain appreciable $Ca_{0.5}$ Al Si_2O_6 (to 10 wt%). Garnet cores can contain up to 75 mol% pyrope but commonly have subequal pyrope and almandine components with up to 40% grossularite.

The epitaxial recrystallization rims of the phases show very different compositions from the cores. Clinopyroxene rims show low jadeite (to 5 wt%) and higher Ca-Tschermaks components; stoichiometry calculations indicate up to 12 wt% acmite and the absence of $Ca_{0.5}$ $AlSi_2O_6$. Recrystallization phases around garnet rims are primarily orthopyroxene and spinel. The following recrystallization reactions are typical for these clinopyroxene and garnets:

(cpx) $CaAl_2Si_4O_{12} \rightarrow melt \rightarrow CaAl_2SiO_6 + 2SiO_2$

(gt) $Mg_3Al_2Si_3O_{12} \rightarrow melt \rightarrow MgAl_2O_4 + 2MgSiO_3 + SiO_2$

Pressure and temperature estimates of the crystal cores indicate that the diamondiferous eclogites equilibrate at 950° - 1100°C and 35-45 Kb. These eclogites have partially melted and recrystallized near the spinel-garnet lherzolite boundary. Aluminum content in orthopyroxene yields temperature estimates of 1250° to 1300°C while spinel chemistry (high Al/Cr) and the absence of garnet indicate pressures of 20-22 Kb during the partial melt and recrystallization episode.

D11
ORIGIN OF A SANIDINE-COESITE GROSPYDITE

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A grospydite xenolith from the Roberts Victor kimberlite pipe in South Africa presents an unusual phase assemblage of clinopyroxene, garnet, kyanite, coesite, and sanidine. The rock as previously described consists of 50% omphacitic clinopyroxene, 28% garnet (Gr_{50} Py_{28} Alm_{22}), 9% kyanite, 6% coesite, and one percent sanidine (Or_{99}). Assuming the addition of three additional compatible phases (phlogopite, enstatite, and H_2O vapor) and a simplified chemistry of the phases present a Schreinemakers thermodynamic analysis was attempted in order to estimate the pressure and temperature of equilibrium of the rock.

Four reactions involving six components are likely to have determined an invariant point for the assemblage.

(1) Kyn + 2Cpx ⇌ Cos + Gt + En
(2) 3 Cos + Phl ⇌ San + 3En + H_2O
(3) 3 Kyn + 6 Cpx + Phl ⇌ San + 3 Gt + 6 En + H_2O
(4) 6 Cos + 3 Gt + Phl ⇌ San + 3 Kyn + 6 Cpx + H_2O

Using tabulated as well as estimated thermodynamic data for the phases, the calculated values for equilibrium temperatures and pressures for the reactions yield an invariant point for the assemblage at a depth of about 104 km (32 kbars) and a temperature near 1180 K.

D12
INCLUSIONS IN THE LAKE ELLEN KIMBERLITE, NORTHERN MICHIGAN, USA

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The recently discovered Lake Ellen kimberlite indicates that bedrock sources of diamonds in glacial deposits in the Great Lakes area could lie within the northern U.S. Magnetic surveys show that the poorly exposed kimberlite is 200m in diameter and has a body 25x90m(?) adjacent to it. The kimberlite cuts Proterozoic volcanic rocks that overlie Archean basement, but is post-Ordovician on the basis of abundant Ordovician(?) dolomite inclusions. Xenocrysts and megacrysts are ilmenite (abundant, 13-15% MgO), pyrope-almandine and Cr-pyrope (up to 9.3% Cr_2O_3), Cr-diopside (up to 4.5% Cr_2O_3) olivine (Fo 91), enstatite and phlogopite. The kimberlite sampled crustal schist and granulite, during emplacement, as well as a heterogeneous upper mantle represented by disaggregated crystals or rare xenoliths of eclogites, garnet pyroxenites and garnet peridotites. Eclogites, up to 3 cm size, show granoblastic equant or tabular textures and consist of jadeitic cpx (up to 8.4% Na_2O, 15.3% Al_2O_3), pyrope-alamandine, ± rutile±kyanite±sulfide. Garnet pyroxenite contains pyrope (0.44% Cr_2O_3) + cpx (0.85% Na_2O, 0.63% Cr_2O_3) + Mg-Al spinel. Mineral compositions of rare composite xenocrysts of garnet + cpx are distinctively peridotitic, pyroxenitic or eclogitic. Temperatures (T) of equilibration are 900-1020°C for the eclogites and 785-845°C for the garnet pyroxenite using the Ellis-Green method. Kyanite-bearing eclogites must have formed at pressures greater than 18-20 kb. Using the present heat flow value of 44mW/m^2 (shield geotherm) for the time of kimberlite emplacement, the eclogite T's imply pressures of 33-44 kb (105-140km) and the garnet pyroxenite T's indicate pressures of 24-29 kb (75-90 km). Five peridotitic garnet-cpx composite xenocrysts have T's of 880-1125°C (Lindsley-Dixon, 20 kb solvus); T's of three, if on a shield geotherm, imply pressures within the diamond stability field.

D13
PETROLOGY OF THE EGLAZINES KIMBERLITE-LIKE INTRUSION

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The Eglazines pipe belongs to the Causses