ments. Samples at the extreme ends of the geotherms differ by 220°C and reflect depth differences of the order of 60 km. These results together with those of Koffiefontein and Frank Smith suggest that many megacrysts may have come from widely differing depths and environments in the mantle.

D20

SINGLE-CRYSTAL STRUCTURE REFINEMENTS OF SUPER-SILICIC CLINOPYROXENES FROM THE ZAGADOCHNAYA KIMBERLITE PIPE, YAKUTIA, USSR.

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It has often been suggested that supersilicic (cation-deficient) clinopyroxenes contain vacant sites, probably in the form of solid-solution of the CaTs end-member (Ca$_q$5Al$_{12q}$), but full structure refinements by X-ray diffraction have not previously been made. Refinements are now presented for optically-clear supersilicic clinopyroxenes from two grossularite nodules from the Zagadochnaya kimberlite pipe.

In sample Zaga/0, both refinements and electron microprobe analysis indicate inter-grain inhomogeneity but intragrain homogeneity. The refinements are compatible with vacancies in N2 and with the microprobe analysis (Jd$_{45}$Ni$_{38}$CaTs$_{3}$, Jd$_{70}$CaTs$_{10}$), but they do not prove the existence of vacancies in N2. The space group is C$_2$/c such that this is the only confirmed disordered omphacite with around 50% Jd. This clinopyroxene co-existed with garnet, kyanite and corundum, but has been partially replaced by secondary clinopyroxene (Jd$_{15}$, Jd$_{70}$, Jd$_{66}$ CaTs$_{17}$), clinoamphibole, plagioclase, quartz and zoisite. This rock thus displays the simultaneous expulsion of excess SiO$_2$ and breakdown to an amphibolite-facies paragenesis.

Sample Zaga/0 differs in containing secondary clinopyroxene in an exsolution texture. Both samples share some features in common with certain supersilicic clinopyroxenes from the Roberts Victor kimberlite pipe, S. Africa, though direct exsolution of SiO$_2$ has not been observed in these Zagadochnaya samples.

D21

ON THE CHARACTERISATION AND CREDIBILITY OF SUPER-SILICIC, STOICHIOMETRIC, AND SUBSILICIC PYROXENES

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$$X_{B\text{-}D} = 100 \left[ (\frac{S}{N}+D) \right] \% \quad \text{in the natural chemical system SANS (where S = Si + Ti, A = Al + Fe + Cr - Na - K, N = Na + 2K, and D (divalents) = Ca + Mg + Ni + Fe2 + Mn, all in cation proportions) is proposed as a useful indicator of pyroxene non-stoichiometry. The } 5 \text{ : } A \text{ : (N+D) diagram conveniently demonstrates: 1) supersilicic, stoichiometric, or subsilicic pyroxenes for which } X_{B\text{-}D} \text{ is positive, zero or negative, respectively; 2) the irrelevance of trivalent cations to pyroxene stoichiometry (since their oxides also have 4 cations (C) per 6 oxgens (O), such that } X_{B\text{-}D} \text{ isoplethes radiate from the apex; 3) that supersilicic pyroxene is most simply considered as a solid solution of stoichiometric pyroxene with SiO}_2 \text{ rather than with any A-bearing end-member; 4) the improbable existence of subsilicic pyroxene which requires } C^{+4} \text{ per } O^6 \text{; 5) the "binomineral eclogite line" between A and (N+D)2S2 upon which lie all stoichiometric pyroxenes and garnets. All theoretical superson pyroxene end-members (e.g., } 3 \text{Al}_{2} \text{O}_3 \text{, } 5 \text{Al}_{2} \text{O}_3 \text{) have no N, since in alkali pyroxene all other cation sites already have the highest-valent cation possible. However, Jd solution aids the stability of M-site vacancies, more so than Di solution, by providing more similarly-charged M-sites and a smaller volume. Exsolution of the excess Si as quartz (e.g. in Norway, Greenland and S. Africa) can create Al(iv) at lower T than if the CaTs proportion was in equilibrium with garnet. The recent suggestion of O-stability allows the not too remote possibility of new high-density supersilicic "pyroxene" end-members (e.g. } A5S0^0g=07, D5S5g=507 \text{) at high P. Supersilicic pyroxenes are thus to be expected in Na-, Ca-, Al- Si-rich systems at high P (blueschists, eclogites, experiments).}

D22

GARNET AND CXP MEGACRYSTALS FROM KASAI.

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Eastern Kasai xenot-tuff breccia kimberlite include a long set of megacrystals: garnet, cpx-ilm-anite, rutile, kyanite, corundum,zircon and baddeleyite. Neither olivine nor enstatite have been found. We are only concerned with garnet and cpx. About 200 specimen each have been sampled from Mubji Mayi and Tshibua pipes, eastern Kasai.

All the garnets from Tshibua are Cr pyropes. They tend to have relatively low Ca O contents (4.0 wt%) and CrO$_3$ values in the range 0.85-6.5 wt%. Two Cr pyropes show a particular zoning effecting only octahedral diadochic ions Al$^{3+}$ and Cr$^{3+}$. All the cpx from Tshibua are diopside. Except for one specimen the Cr$_2$O$_3$ contents are below 0.9 wt% and Al$_2$O$_3$ values below 1.60 wt%. MgO ranges between 4.90 and 2.0 wt%. Garnets and cpx from Tshibua are all ranged in the Iherzolitic suite.

Several garnet and cpx megacrysts from Mubji Mayi resemble those from Tshibua and are ranged in the Iherzolitic suite yet an important part of analysed minerals are quite different. Cpx have considerable contents of Na$_2$O and Al$_2$O$_3$ in the ranges 4.0-6.6 and 6.9-11.4 wt% respectively. Cr$_2$O$_3$ contents do not exceed 0.2 wt%. These cpx are amphibole. Some garnets belong to the pyrope-almandine-grossular serie. Both these latter minerals have been ranged in an eclogitic suite.

Using enstatite-diopside thermometers, the Iherzolitic cpx show a possible equilibration range from 950 to 1350°C. Isotopic ratios $^{87/86}Rb$ vs $^{87/85}Sr$ of cpx are quite different of kimberlithic matrix. Garnet and cpx megacrysts show a reaction rim with the kimberlithic matrix. Thus a xenocrincipal origin is proposed for garnet and cpx megacrysts.

D23

Mg-ilmenites in alkali basalts from the volcanic Hoggar area

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