

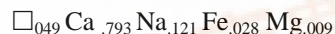
**EVIDENCE FOR SUPERSILICIC PYROXENE IN AN UHP KYANITE ECLOGITE, WESTERN GNEISS**

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Kyanite eclogite 1066b from Fjærtoft, containing the assemblage garnet-kyanite-omphacite-phengite-zoisite-coesite (polycrystalline quartz), is exposed in the same tectonic unit as microdiamond-bearing kyanite-garnet gneiss. The kyanite eclogite yields estimates of metamorphic conditions of 34-39 kbar and 820 °C that were reached at 407 ± 2 Ma [1, 2]. Omphacite in the matrix surrounding garnet shows evidence for the former presence of a Ca-Eskola component ( $\square_{.5} \text{Ca}_{.5} \text{AlSi}_2\text{O}_6$ ) in the form of quartz hornblende rods. The rods are less than 100 µm and each is a mixture of quartz and hornblende.

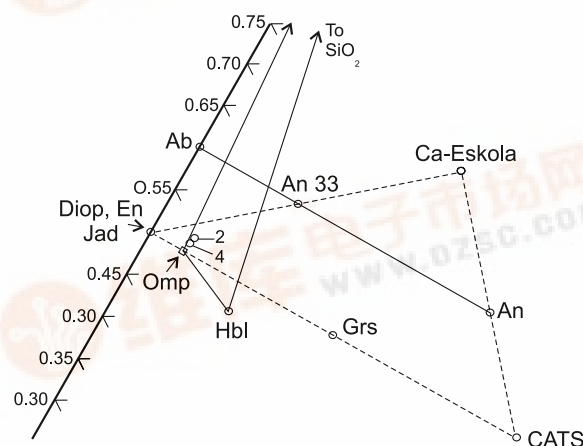
The composition of the original pyroxene was estimated by determining modes of quartz and hornblende in pyroxene using the program NIHimage on two backscattered electron images with electron microprobe analyses were recomputed to oxygen proportions. Percent modes used to calculate the original pyroxene are 4.643 (6.178) hornblende, 3.071 (5.085) quartz, and 92.286 (88.737) pyroxene for image 4 and (2). For the calculation, the present omphacitic pyroxene and hornblende compositions were used with  $\text{Fe}^{3+}$  corrections based on stoichiometric relationships. The presence of hornblende suggests water may have been present in the original pyroxene.

The calculated supersilicic pyroxene,



indicate about 10% of a vacancy Ca-Eskola component. The exact chemographic relations are illustrated in Fig.1 a cation plot of S (Si), A (Al +  $\text{Fe}^{3+}$  + Cr + 2Ti - Na - K), and NCFM (Ca + Mg +  $\text{Fe}^{2+}$  + Mn + 2Na + 2K - Ti). Here the calculated vacancy pyroxene plots within the triangle omphacite-hornblende- $\text{SiO}_2$ , significantly away from the line for stoichiometric pyroxene. The tie line quartz-hornblende is far toward the Al side compared to the pyroxene analyses, cutting the tie line omphacite-Ca-Eskola component. The image 2 and 4 analyses lie on a trend from omphacite toward higher Si, almost parallel to the Si-NCFM edge of the triangle and pointing toward a "plagioclase" composition of about An 18. However, this trend intersects a theoretical limit, the Ca-Eskola - jadeite tieline, beyond which further Si-Vacancy substitution would require Si in VI coordination.

On this basis our Fjærtoft pyroxene on this trend is 47% toward this theoretical limit than to stoichiometric pyroxene.



**Fig. 1.** Plot of S, A, NCFM showing calculated vacancy pyroxene for images 4 and 2.

A survey of available samples in the region indicates numerous occurrences of quartz rods in omphacite but none with hornblende. This suggests the potential importance of this phenomenon for identifying former UHP localities in the region where the Ca-Eskola component was first described (Eskola, 1921). This potential was realized by Smith (1984) and has become important in the UHP terranes of Dabie Mountains and Kokchetav, Kazakhstan (Liou, 1998). An exploration also needs to be made on the effect of the excess silica component for the common development of secondary pyroxene-plagioclase symplectite in the same region commonly even in the same crystals.

**References:**

- Eskola, 1921, *Skiffer Norsk Venskaps-Akademia Oslo*, 118p. Liou, J.G., Zhang, R.Y., Rumble, D., 1998, *Reviews in Mineralogy*, 37, 33-96. Smith, 1984, *Nature*, 1984, 310, 641-644. Terry, M. P., Robinson, Peter, Hamilton, M.A., and Jercinovic, M. J., 2000, *American Mineralogist*, 85, 1651-1664. Terry, M. P. Robinson, Peter, and Ravna, E. J. K., 2000, *American Mineralogist*, 85, 1637-1650.

