# PRACTICAL GEOTHERMOBAROMETY ROCKS OF ECLOGITES PARAGENESIS

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Rocks of the eclogites paragenesis have a broad interval of compositions and meet in diverse geologic conditions. A major property for reference of rock of the eclogites paragenesis is the coexistence the magnesian garnet and monoclinic clinopyroxene. Selection geobarometer for eclogites is rather limited [1] and until recently conditions of their shaping determined approximately, on a stability limit of magnesian garnet, or on border of coexistence of a pair clinopyroxene - garnet, that is pressure are higher 10-18 kbar. In the present work the definition of temperatures and pressure formation of the rocks of eclogites paragenesis is attempted on the basis of original, developed on the experimental researches, the mineral geobarometer [2]. For this purpose from data available to the scientific literature the group eclogites the most close on a composition of the studied experimentally the system $CaO$-$MgO$-$Al_2O_3$-$SiO_2$ is chosen. Necessary conditions of selection in this group are comprehensive analysis of compositions clinopyroxene and garnet, and the determination of the ferric iron. In a result, in a structure of select group of analysis there were rocks of different genesis, metamorphic eclogites and eclogites from xenolithes in kimberlites.

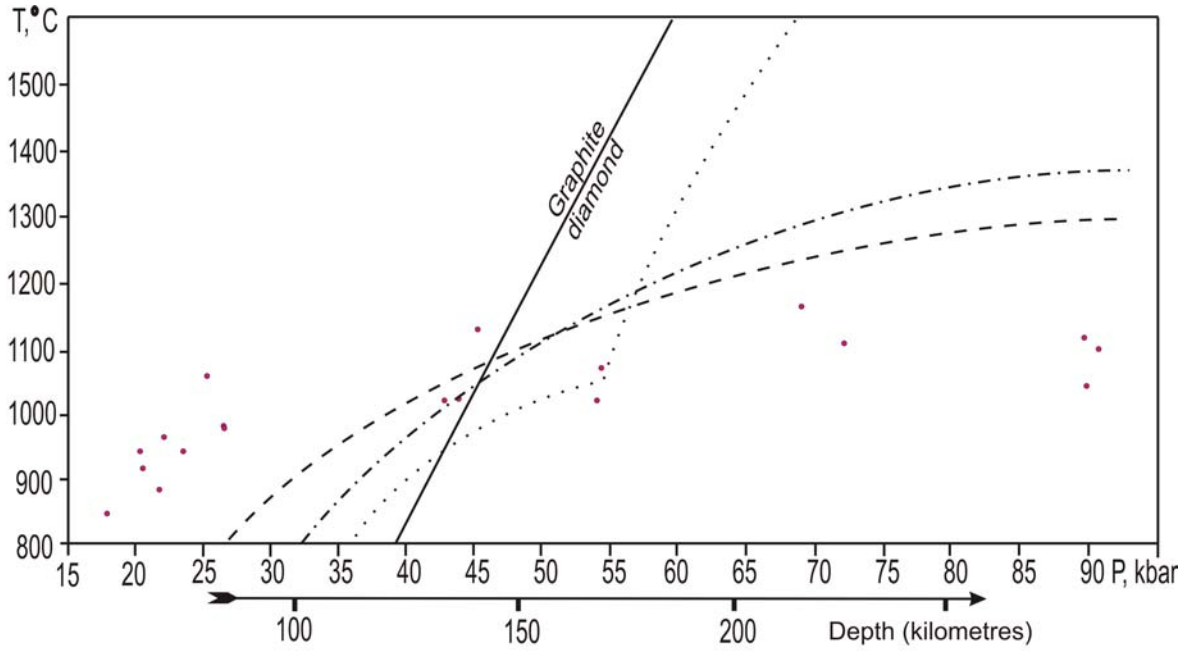


Fig.1. The solid line - graphite - diamond border indicated according of datas Kennedy, Kennedy [13].
Point line - the position of the pyroxene geotherms according dates of F.R.Boyd [14].
Dotted line - the position of the shield geotherms [15]. A dash-dot line is the position of " 40 mW*m-2 " geotherm [16].

In coordinates temperature - depth (pressure) of a condition of their formation will derivate a trend in the interval pressure 20-80 kbar and temperatures 1000-1300 $^{O}$C. Temperature the samples is increased with increase with the depth (pressure) of their formation. The obtained trend has more slanting declination, than shield geoterm and «40 mwt/m geoterm ". Low temperatures of formations for the most depth

samples eclogites indirectly confirm a capability of their formations as the cumulatioms at crystallization of a melt dry peridotite or carbonatitic peridotite.

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**References**

1. *Raheim A., Green D.H.* Experimental determination of the temperature and pressure dependence of the Fe-Mg partition coefficient for coexisting garnet and clinopyroxene - Contributions to Mineralogy and Petrology, 1974. V. 48. N 3. PP. 179-203

2. *Surkov N.V., Gartvich Ju. G., Drebushchak V.A*. Clinopyroxene geobarometer for eclogites. - Experiment in Geosciences, 2002. V. 10. N 1. PP. 9-11.

3. *Lutz B.G.* Mineral of turning into bottoms of earth crust and the upper mantle. - "Problems of Earth crust and the upper mantle". M.: Nauka, 1970. PP. 172-175. (In Russian).

4. *Lowering J.F., White J.R.* Granulitic and eclogitic inclusions from basic pipes at Delegate, Australia. - Contrib. Mineral. Petrol, 1969. V.21. PP. 9-52.

5. *O'Hara M.J., Saunders M.J., Mercy E.L.P.* Garnet-peridotite, primary ultrabasic magma and ecligite; interpretation of upper mantle processes in kimberlite. - Phys. And Chem. of the Earth, 1975. V. 9. N 11. PP. 571-604.

6. *Yoder H.S., Tilley C.T*. Origin of basalt magmas. - Journal of Petrology, 1962. V. 3. N 3. PP. 1-248.

7. *Sobolev N.V., Kuznetsova I.K., Zyuzin N.I.* The petrology of grospydite xenoliths from the Zagadochnaya kimberlite pipe in Yakutia - Journal of Petrology, 1968.V. 9. Part 2. PP. 253-280.

8. *Sobolev N.V., Kuznetsova I.K*. New data on mineralogy eclogites from kimberlites of Yakutia. – Dokl. AS of the USSR, 1965. V.163. N 2. PP. 471-474. (In Russian).

9. *Sobolev N.V., Efimova E.S., Usova L.V.* Eclogite paragenesis of diamonds kimberlite the Mir. In b.: Mantel xenolithes and a problem of the ultrabasic magmas. Ed. By V.S. Sobolev, J.R.Vasiljev, V.V. Kepezhinskas, Nauka, Novosibirsk, 1983. PP. 4-16. (In Russian).

10. *Udovkina N.G.* Eclogites of the USSR. M.: Nauka, 1985. 286 p. (In Russian).

11. Francesson E.V. Petrology of kimberlites. M.: Nedra, 1968. 200 p. (In Russian).

12. *Dalton J.A., Presnall D.C.* Carbonatitic melts along the solidus of model lherzolite in the system $CaO$-$MgO$-$Al_2O_3$-$SiO_2$-$CO_2$ from 3 to 7 GPa. - Contributions to Mineralogy and Petrology, 1998. V. 131. N 2-3. PP. 123-135.

13. *Kennedy C.S., Kennedy G.C.* The equilibrium boundary between graphite and diamond. Journal of Geophysical Research, 1976. V. 81. N 14. PP. 2467-2470.

14. *Boyd F.R.*A pyroxene geotherm. Geochimica et Cosmochimica Acta.1973. V. 37. N 12. PP. 2533-2546.

15. *Clark S.P., Ringwood A.E.* Density distribution and constitution of the mantle. Reviews of Geophysics, 1964. V. 2. N 1. PP. 35-88.

16. *Pollack H.N., Chapman D.S.* On the regional variation of heat flow, geotherms, and lithospheric thickness. Tectonophysics, 1977. V. 38. N 3-4. PP. 279-296.

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