

Criteria of the mantle metasomatism intensity and diamond grades of kimberlites

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We proposed an assessment of the intensity of metasomatic processes in mantle sampled by kimberlites on the example of samples of pyrope compositions from kimberlites with a known diamond grade. The intensity of metasomatic dissolution was estimated on the Ti correlations, for low and high- Cr pyropes.

For the titanium content in the pyrope compositions, positive high correlation coefficients were determined for such elements as Hf, Zr, .Na typical for the processes of alkaline H₂O metasomatism. Binary diagrams makes it possible to determine the main relationship between the mineral-forming elements in the compositions of pyropes and its mineral impurities. We concluded that this metasomatism leads to the dissolution of low-chromic pyropes but diamonds still remain and may continue to grow. A higher degree of metasomatism the pyropes are characterized by a high content of titanium, for pyropes with high chromium contents. High degree of metasomatism brings to dissolution of pyropes and diamonds.

Burren kimberlite pipe Dennis, Pobeda, and Zarnitsa contains more than 14 % pyrope grains and diamond affinity according to N. V. Sobolev , 1971. Dennis and diamond bearing pipes Pobeda is burren and Zarnitsa ~0.3 crt/t

It is considered [1-5] that if the sample contains grains from diamond-bearing ecological parageneses, or creased percentage of grains from diamond-bearing parageneses according to N. V. Sobolev [1], should contain diamonds. But for pyropes containing chromium oxides, Cr pyropes with TiO₂ > 0.6 weight %, should be burren. As well even if there is high grain content o from the cluster group G10 according to the classification Dawson J. B., Stephens W. E. [2] . Grant RFBR 19-05-00788.

1. Sobolev N. V., on mineralogical criteria of diamond-bearing kimberlites // Geology and Geophysics. 1971. No. 3. - Pp. 70-80.
2. Garanin V. K., Kudryavtseva G. P., Marfunin A. S., Mikhailichenko O. A. Inclusions in diamond and dia-mond-bearing rocks. // Moscow, Moscow state University Publishing house, 1991, 240 p.
3. Dawson J. B., Stephens W. E. Statistical classification of garnets from kimberlites and xenoliths. J. Geol. 1975. Vol. 83. No. 5. P. 589-607
4. J. Gurney, R. O. Moore. Geochemical correlation between the minerals of kimberlites and diamonds of the Kalahari Craton, Journal. Geology and Geophysics, Moscow, 1994, p. 12-24
5. Ivanov A. S., a New criterion for diamond-bearing kimberlites. Proceedings of the XII all-Russian (with in-ternational participation) Fersman session. KSC RAS Apatity, p. 268 -270, 2015.



Usp - **Ulvospinel** (Fe_2TiO_4)

Il - **Ilmenite** (FeTiO_3)

MgMt - **Magnesioferrite** (MgFe_2O_4)

Mt - **Magnetite** (Fe_3O_4)

Hem - **Hematite** (Fe_2O_3)

Wu - **Wustite** (FeO)

Hz - **Herzinite** (FeAl_2O_4)

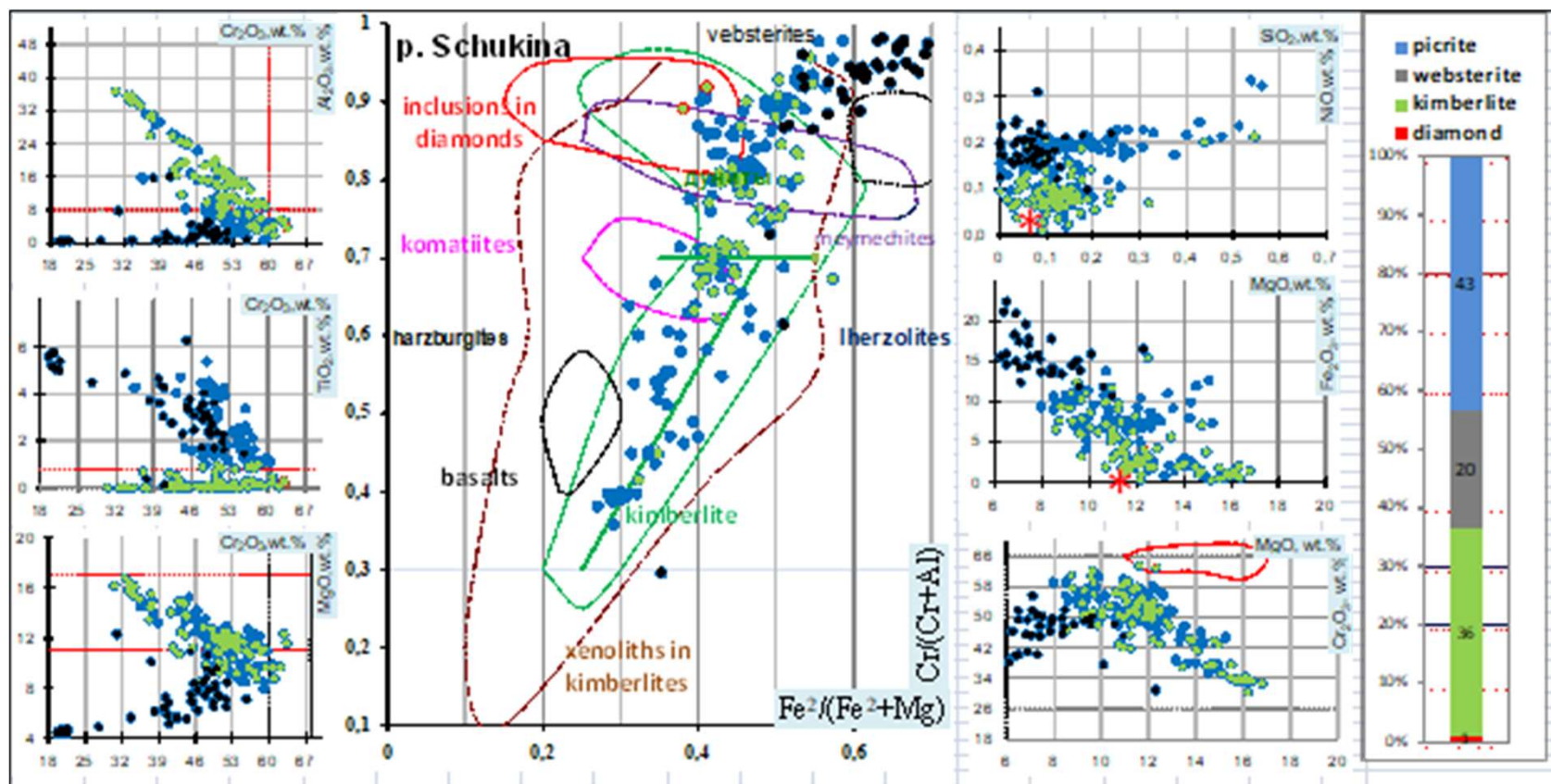
Sp - **Spinel** (MgAl_2O_4)

Ch - **Chromite** (FeCr_2O_4)

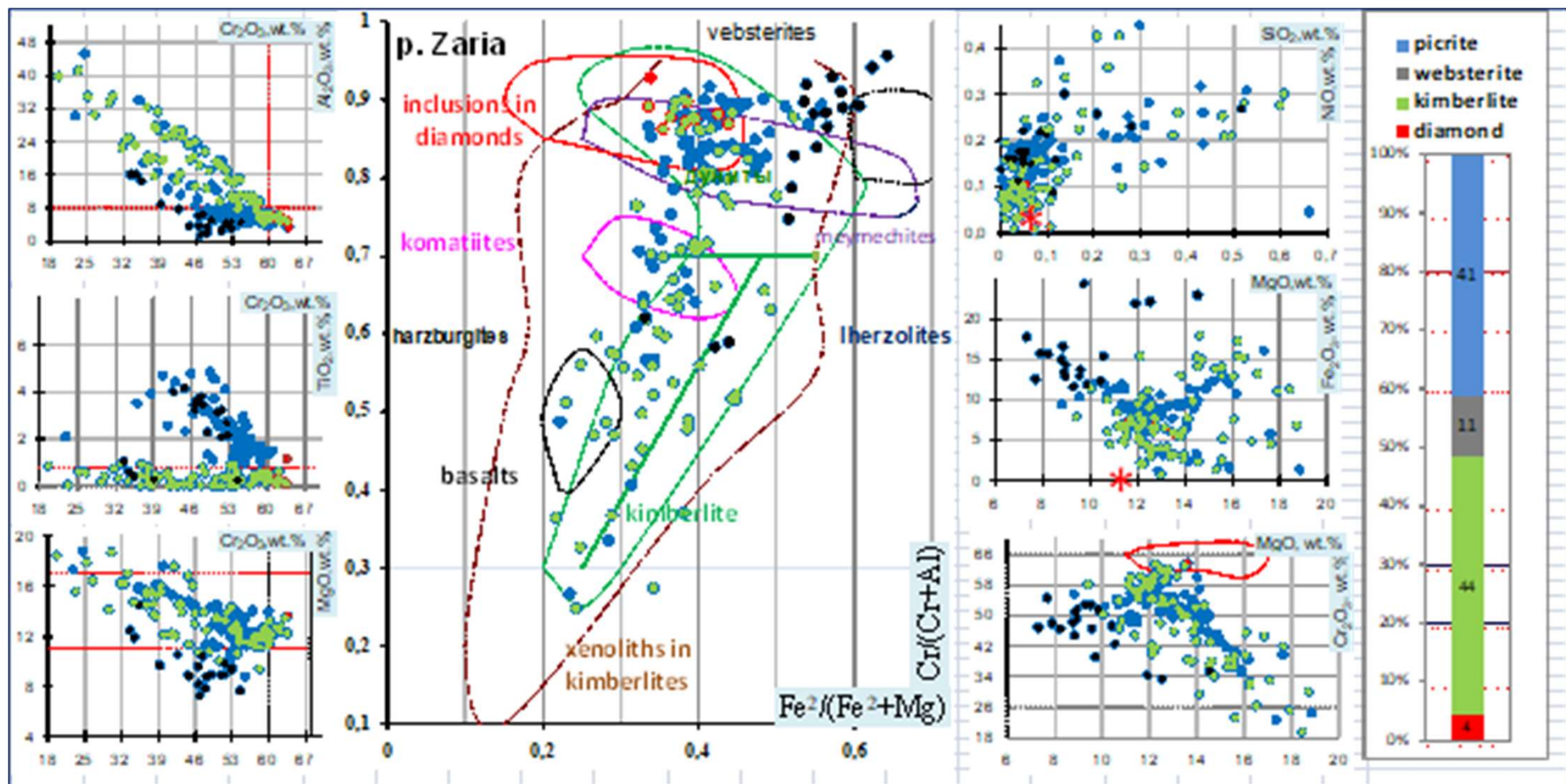
MgCh - **Magnesiochromite** (MgCr_2O_4)

The method is based on calculating and constructing a histogram of known chemical characteristics compositions of chromspinel. Structures at calculation of ratio of ulvashpinel mineral from chromspinel compositions with creation of histograms.

At double prevalence in the samples of picritic and websterite paragenesis - kimberlite does not contain diamonds.

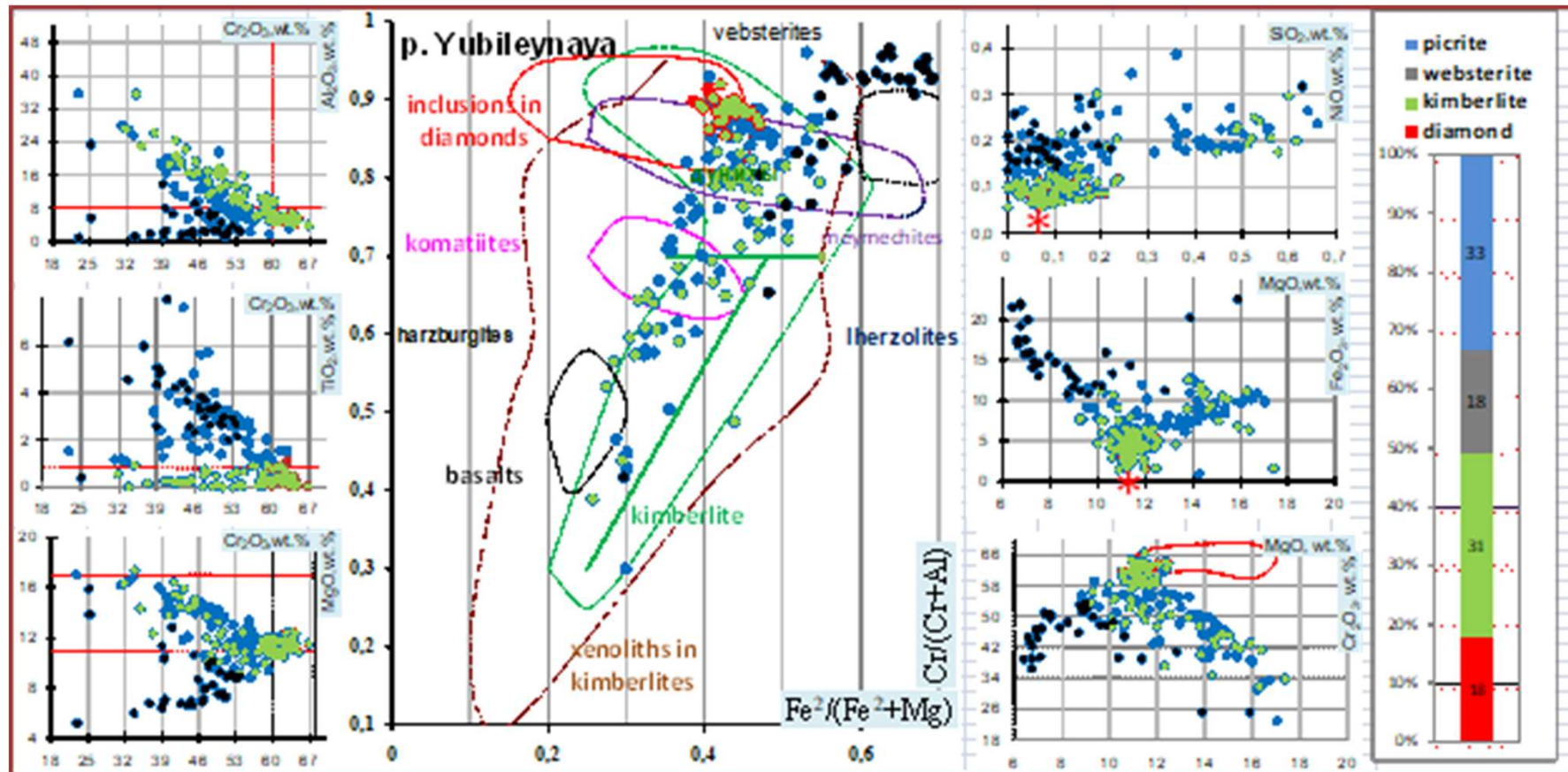


Kimberlite of Shchukina pipe does not contain diamonds



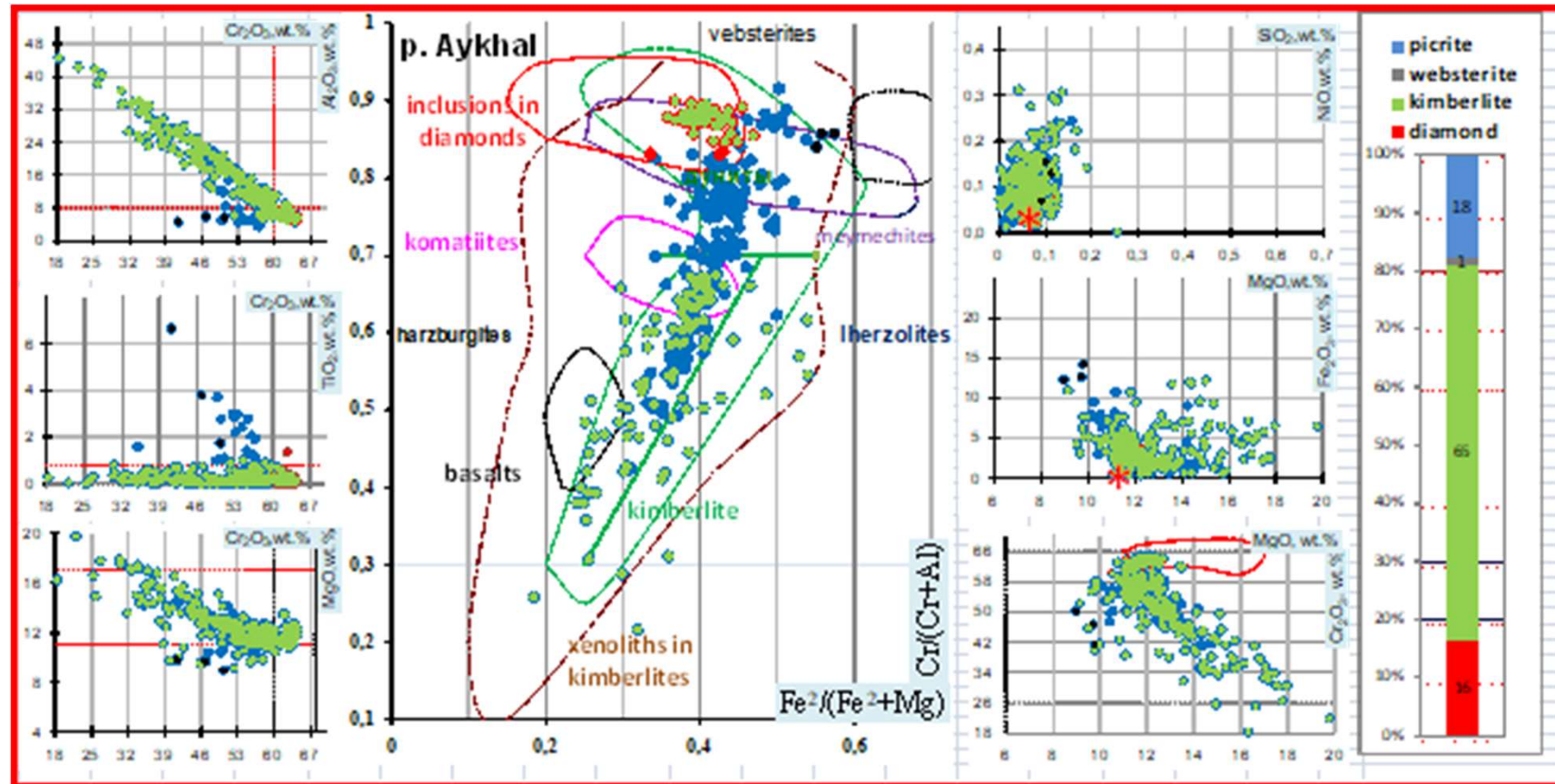
Zarya kimberlite is poorly diamondiferous

Although it is already necessary to take into account the diamond-bearing paragenesis



Yubileynaya pipe is moderately dimondiferous

With the dual prevalence of kimberlite and diamond-bearing over the first two



Aykhal pipe is highly dimondiferous

