Bumerang pipe Ary Mastakh field Upper Anabar region Yakutia – relatively fertile mantle in the transitional part between Anabar shield and Magan trerrane

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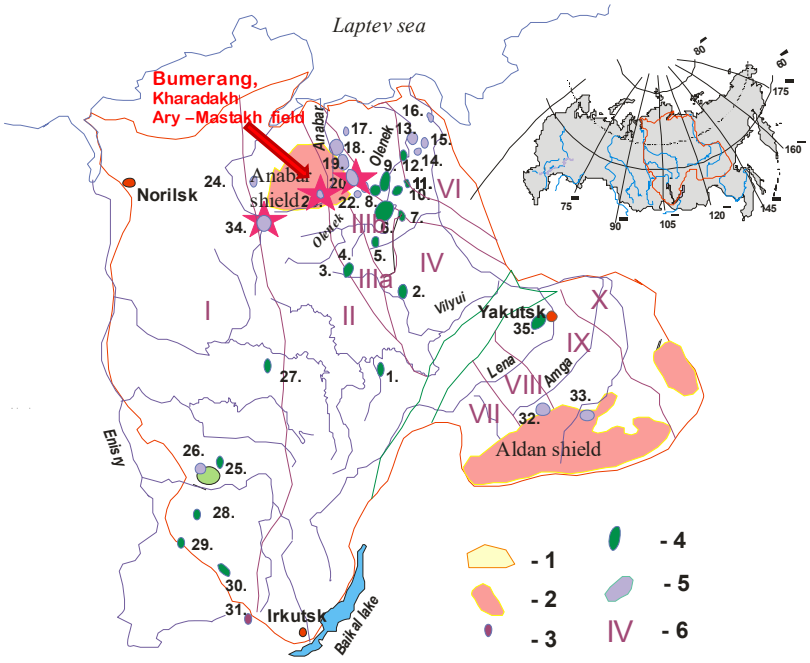
The Bumerang kimberlite pipe is unusual for the Anabar shield because it contain great amount of the pyroxene both of Cr diopside and pyroxenite type (after eclogite) and commonly in Anabar region the mantle is ultra-depleted and even garnets occurs rarely in kimbelrites Ashchepkov et al (2010, 2014; 2015;). This is because the pipe is close to the Margin of Anabar shield in the transition permeable zones.

The PTX diagram show presence of the rare pyrope garnets to 6 GPa of lherzolitic pipe and grate amount of the eclogitic garnets mainly of Fe of type. Both eclogitic and Cr diopside garnets occurs mainly in the middle part of the SCLM within the in the pyroxenite layer.

The ilmenite give long fractionation trend. From the LAB to the GPa 2.5 which is typical of the Magan terrane (Mir, Internationalnaya pipes etc.). The pyroxenes mostly have straight-line REE patterns, which create the fan - as series .They most depleted, have some Ba, U peaks of subduction type but deep Pb minima evidencing about the fractionations. The garnets of subduction type reveals the U peaks and all have EU, Sr, minima and varying Ba The HFSE minima are common But Ta>>Nb and Zr>Hf/

All this features evidences about possibility of finding of diamond bearing kimbertites within the suture zone between Magan terrane and Anabar shoed in the west part of Yakutian kimberlite province. Grant RFFI 19-05-00788



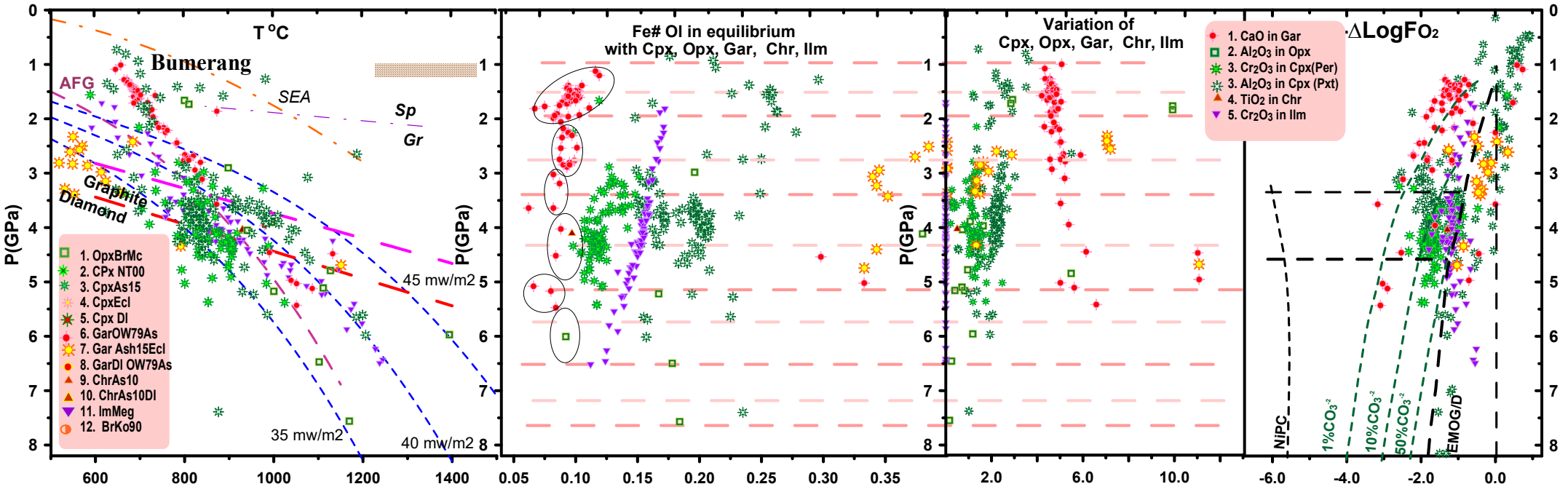


Fig.2. PTXfO_2 diagram for the minerals xenocrysts from Bumerang pipe.

Signs: 1. Opx: T°C (Brey and Kohler, 1990)-P(GPa)(McGregor, 1974). 2.. Cpx: T°C- (Nimis and Taylor, 2000) P(GPa) - Ashchepkov et al., 2017(forCr -diopsides);3.The same for Ferich Cr -diopsides s. 4.The same for eclogites and and pyroxenite)Gar: 6..T°C (O'Neill and Wood, 1979) -P(GPa) (Ashchepkov et al ., 2017), 7.The same for eclogites; 8.The same for diamond inclusions. Chromite 9.T°C (O'Neill and Well, 1987)-P(GPa) (Ashchepkov et al., 2010); 10. The same for diamond inclusions. 11. Ilmenite megacrysts T°C (Taylor et al., 1998)- P(GPa) (Ashchepkov et al., 2010); 12. T°C-P(GPa) (Brey and Kohler, 1990). The compositions of the diamond inclusions is taken from (Bulanova, 2004).

The field for P-FO2 diagrams after Stagno et al. (2013). The horizontal dashed line at 3.5 and 4.5 GPa corresponds to the Graphite-Diamond boundary at 35 and 40 mWm-2 respectively.

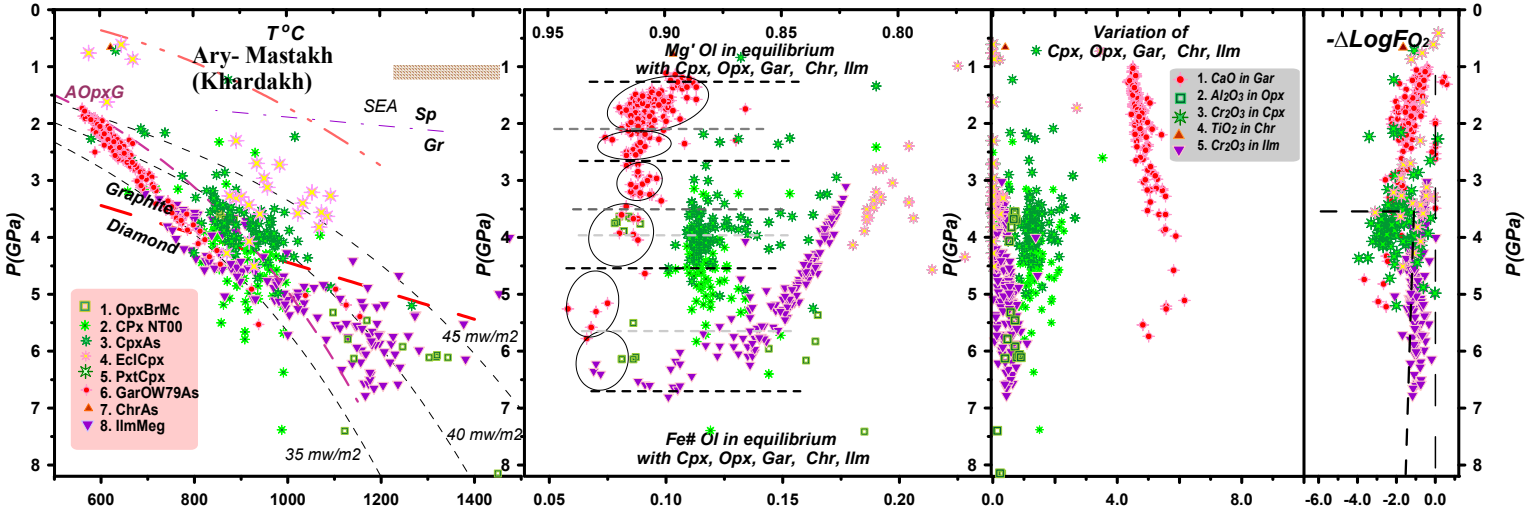


Fig.3. PTXfO_2 diagram for the minerals xenocrysts from Khardakh pipe (Ary-Mastakh field)

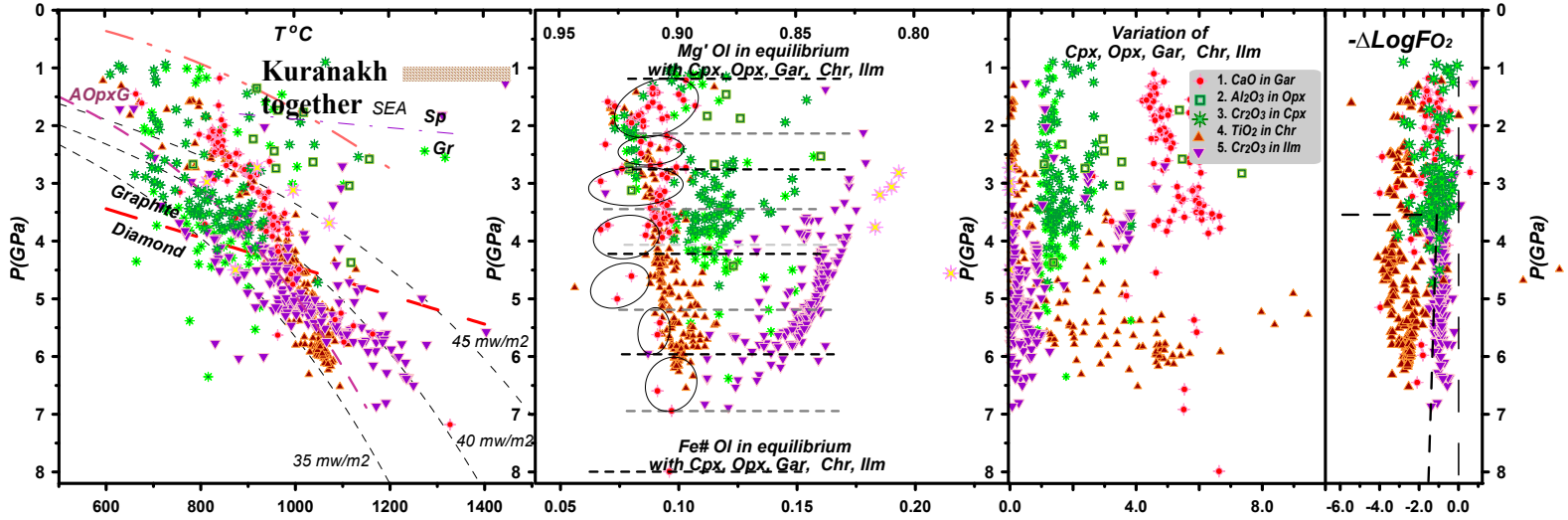


Fig.4. PTXfO_2 diagram for the minerals xenocrysts from Kuranakh field together (East Prianabarie)

Fig. 4A. Variations of Cr garnets from Bumerang pipe **Bumerang**

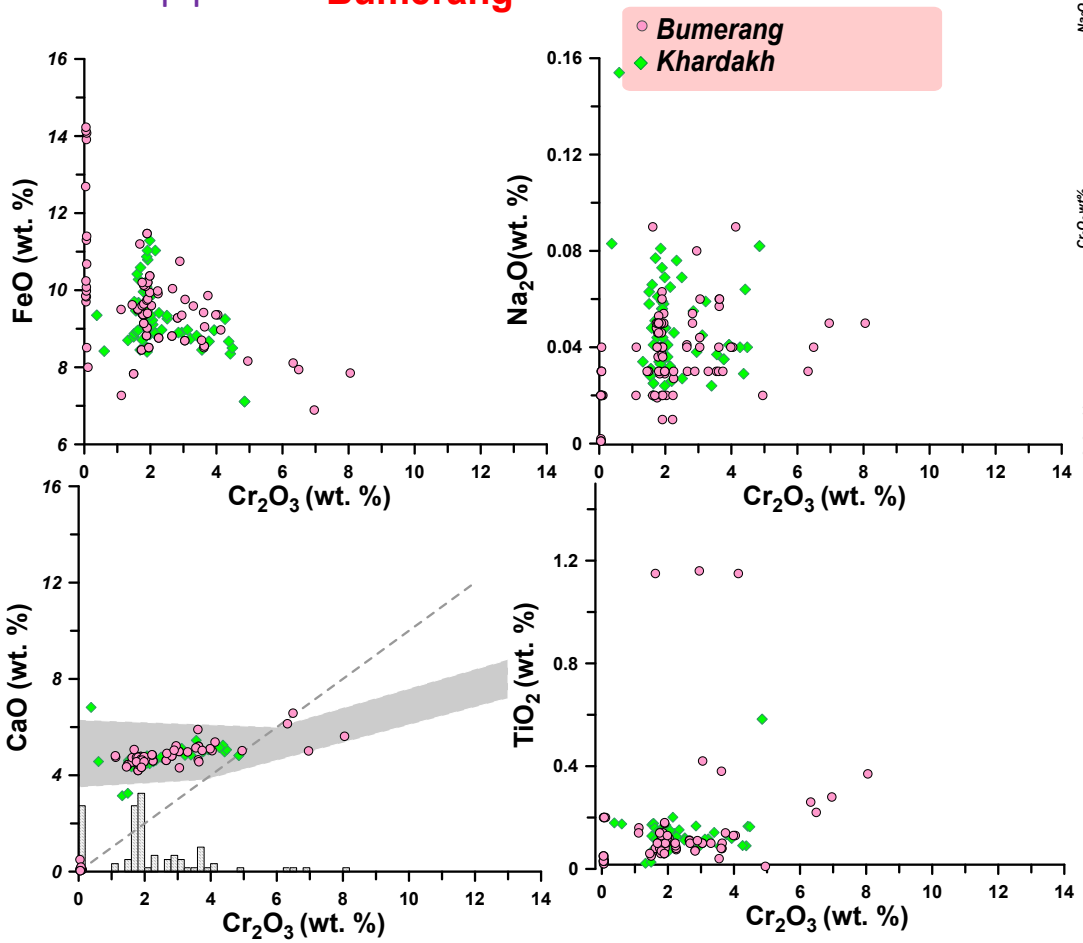


Fig. 4B

Fig 4C

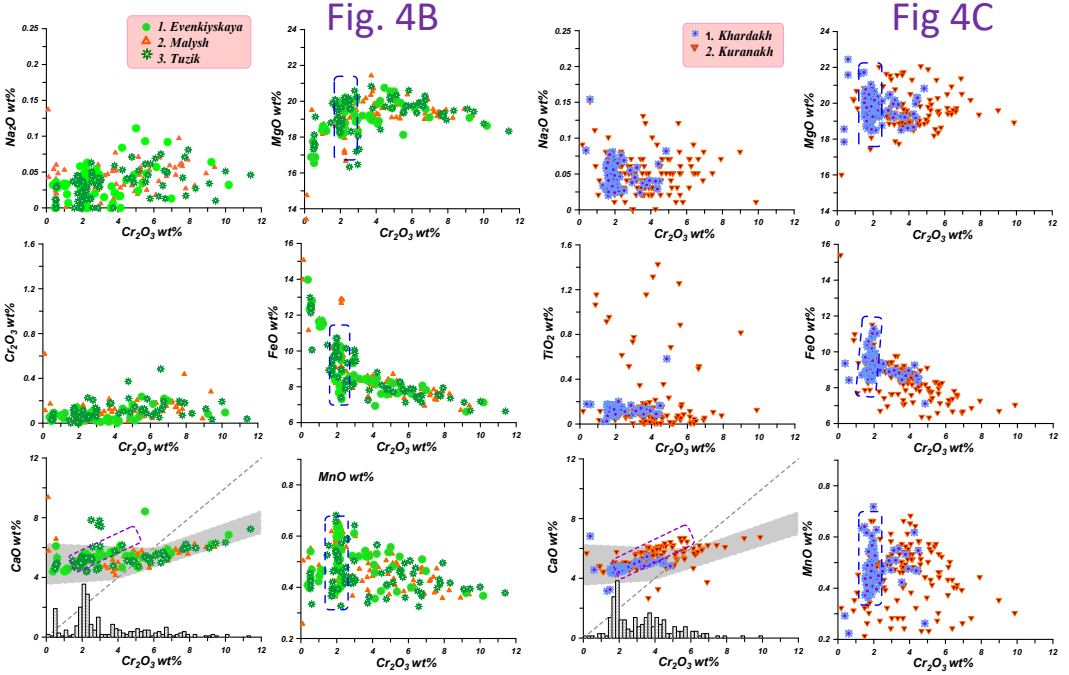


Fig. 4.B. Variations of Cr - garnets from West Prianabarie from Kharamai field and 4C. East Prianabarie from Kuranakh field

Garnets from Bumerang kimberlite pipe is more wider compared to the nearby Khardakh pipe. Garnets are all belong to lherzolite field (Sobolev et al., 1973). In Anabar region garnets are rare in concentrates. They are found mainly on Dyuken field East boundary of Anabar shield and outside the shield in East Prianabarie in Kuranakh field (Ashchepkov et al., 2015).

Clinopyroxenes

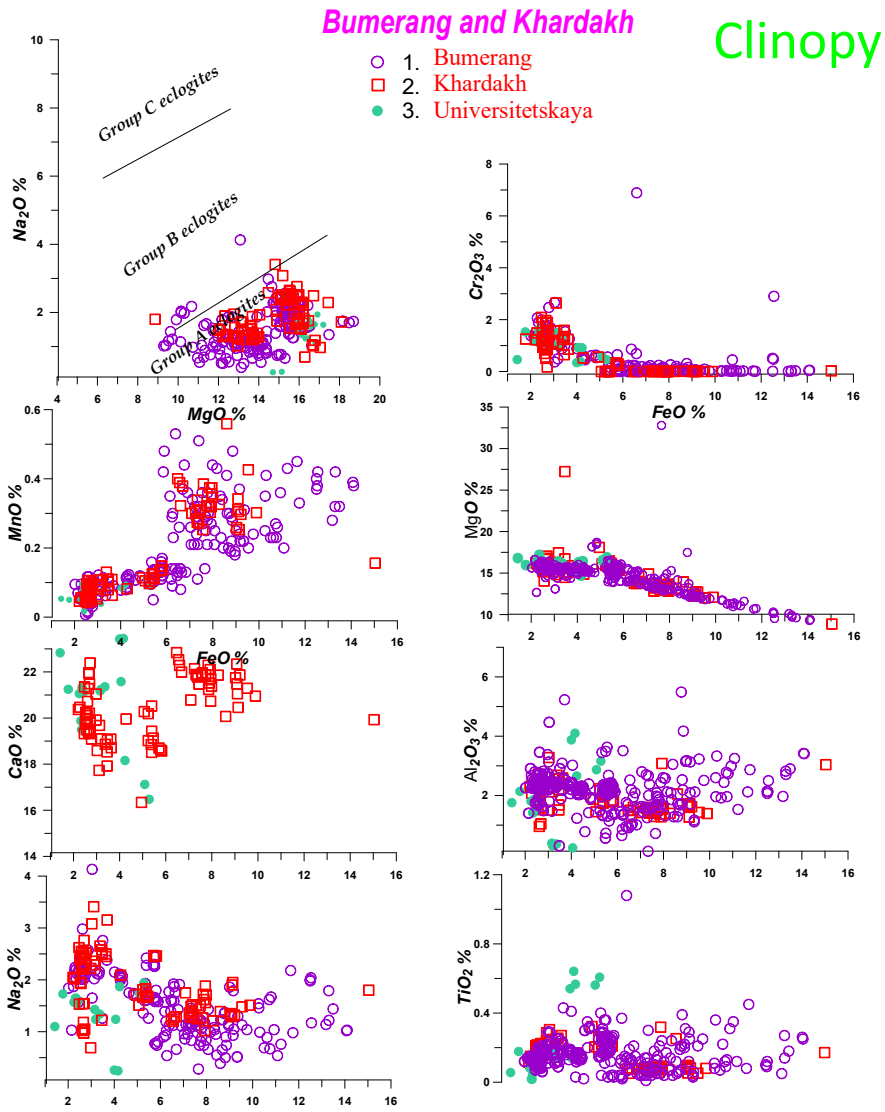


Fig. 5A. Variations of clinopyroxenes from Bumerang pipe and Khardakh pipe in comparison with Universitetskaya pipe (Kuranakh)

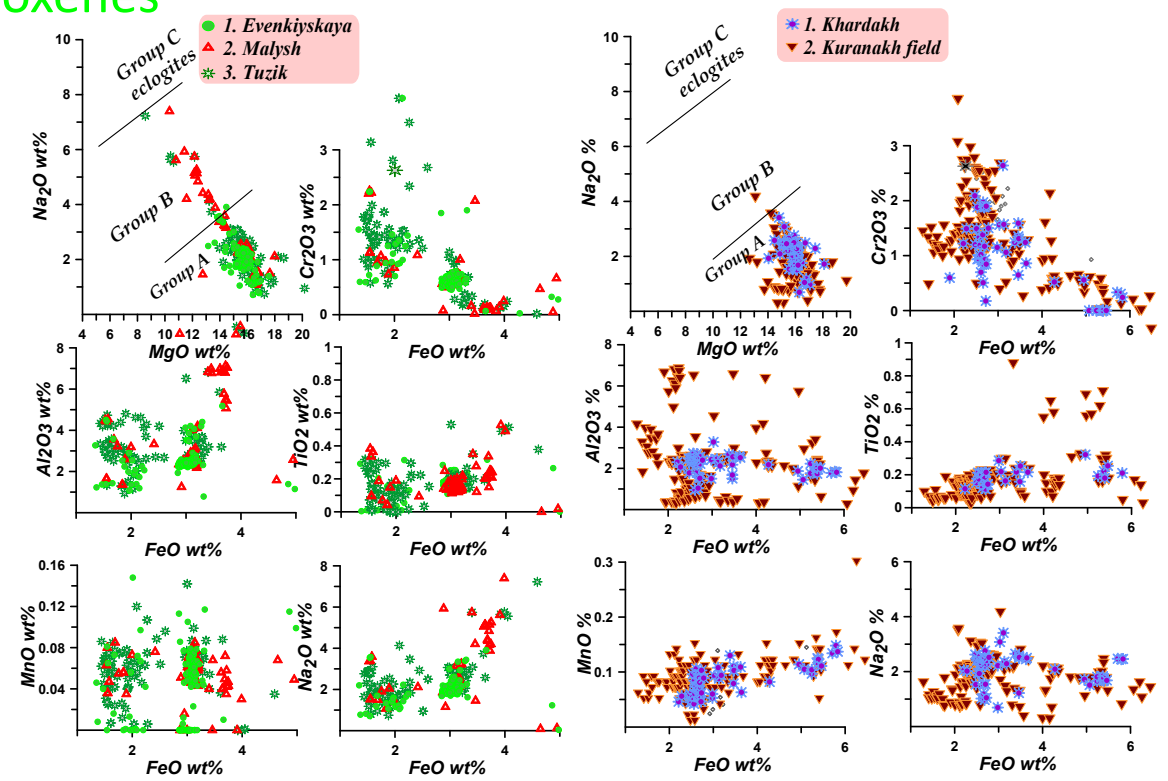


Fig. 5B. Variations of clinopyroxenes from West Prianabarie (Kharamai field) and 5C. East Prianabarie (Kuranakh field).

Practically all Cr- diopsides from Bumerang pipe belong to the refertillized associations which is visible in Fig .2 – they are between Ilmenite and garnet field in P=Fe# diagram. High amount of the deep- Fe rich pyroxenites are mainly belong to the deep plum derrivates and a few of them were formed after do eclogitization reactions

Ilmenites

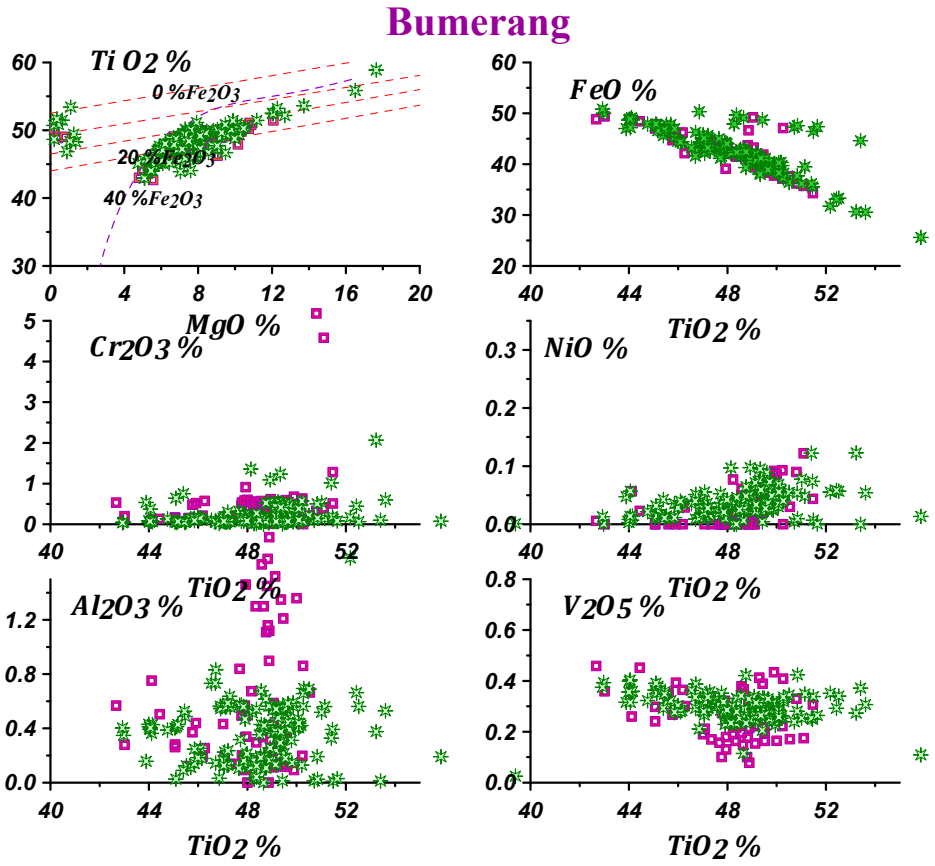
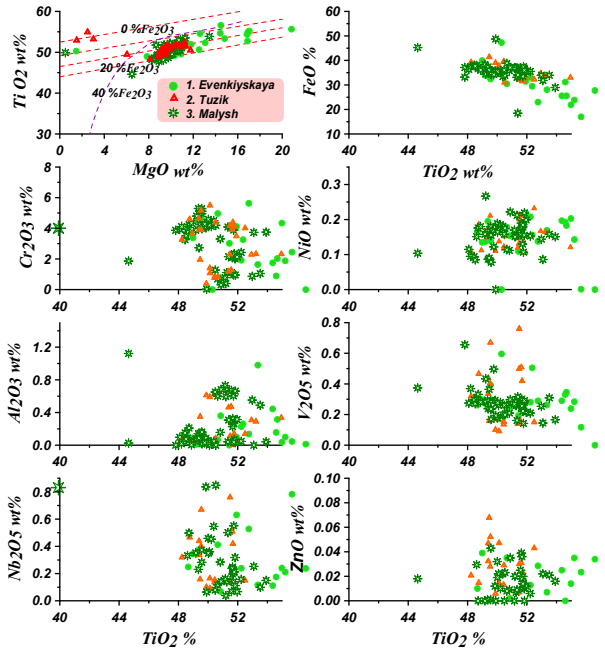


Fig. 6A. Variations of ilmenites from Bumerang pipe and Khardakh pipe



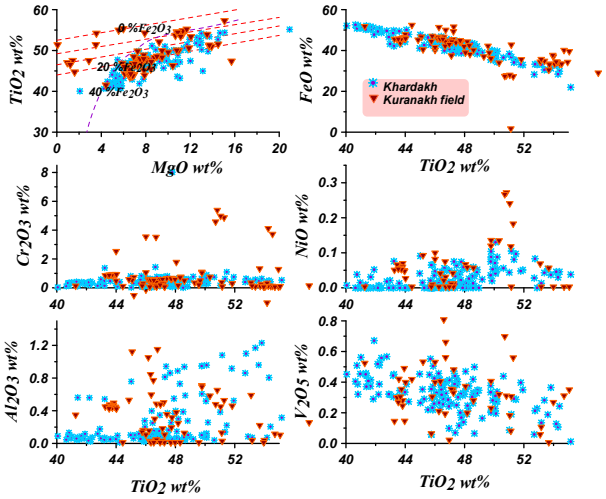


Fig. 6B. Variations of ilmenites from West Prianabarie (Kharamai field) and 6C. East Prianabarie (Kuranakh field).

Ilmenite trend is rather long and practically all belongs to the protokimberlite associations The Cr , Ni contamination became lower to Ti – rich more shallow associations with the decreasing of temperature, AL also in general decreases. But V2O5 rises reflecting growth of FO2.

TRE patterns for garnets from Bumerang pipe

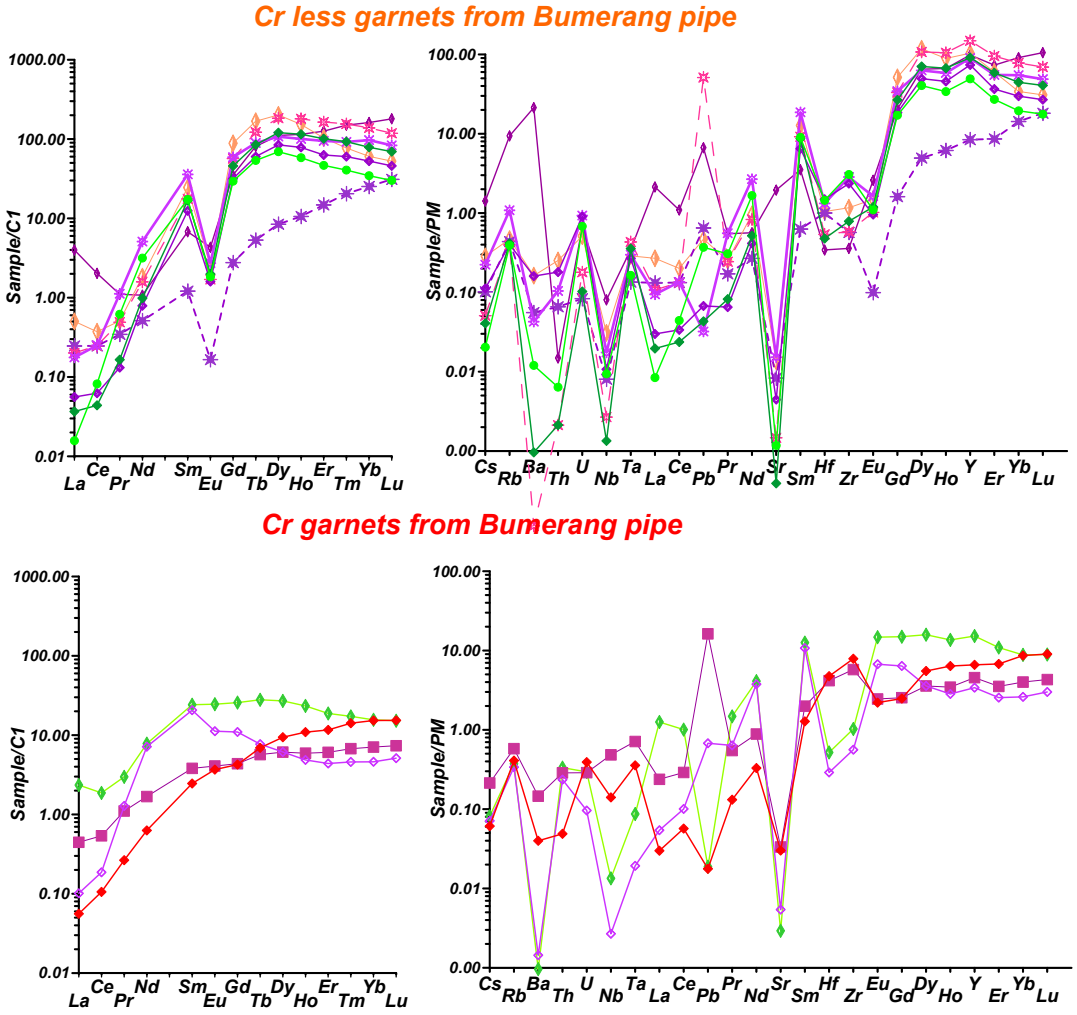


Fig. 7A. REE patterns and TRE spiderdiagrams of Cr- less and Cr – bearing garnets from Bumerang pipe. Normalization to C1 after (Evensen et al., 1979) and Prim mantle after

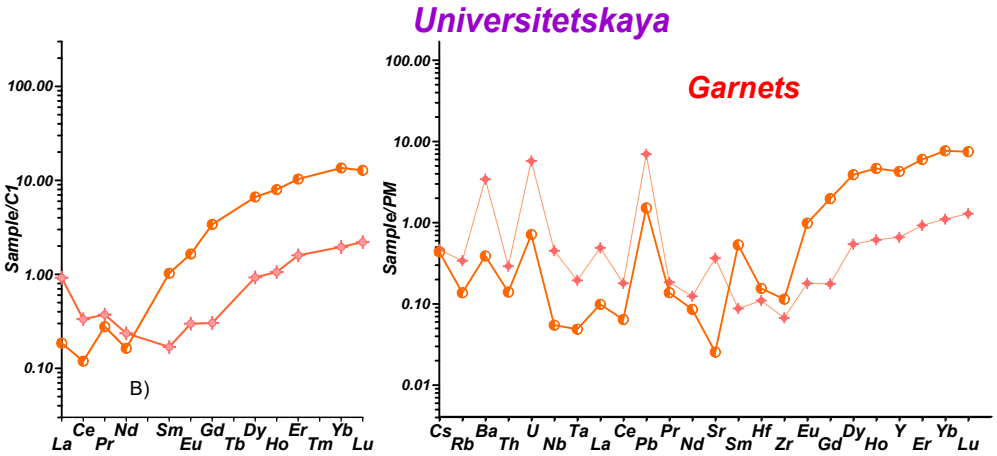


Fig. 7B. REE patterns and TRE spiderdiagrams bearing garnets from Universitetskaya pipe Kuranakh field

All CRr- less garnets are from the the pyroxenitic associations but probably accured due to the reactions of the eclogites with plume melts. They Reveals the Ba, U, Pb peaks and show the HFSE troughs as typical for subduction related magmas. But they are not omphacites (Low Na- Al).

Cr- bearing associations are different ,Two of them show increased Hf, Zr the other 2 also have minima. Humped REE patterns HFSE minima are typical of the pyroxenites, the others possibly influenced by the protokimberlites

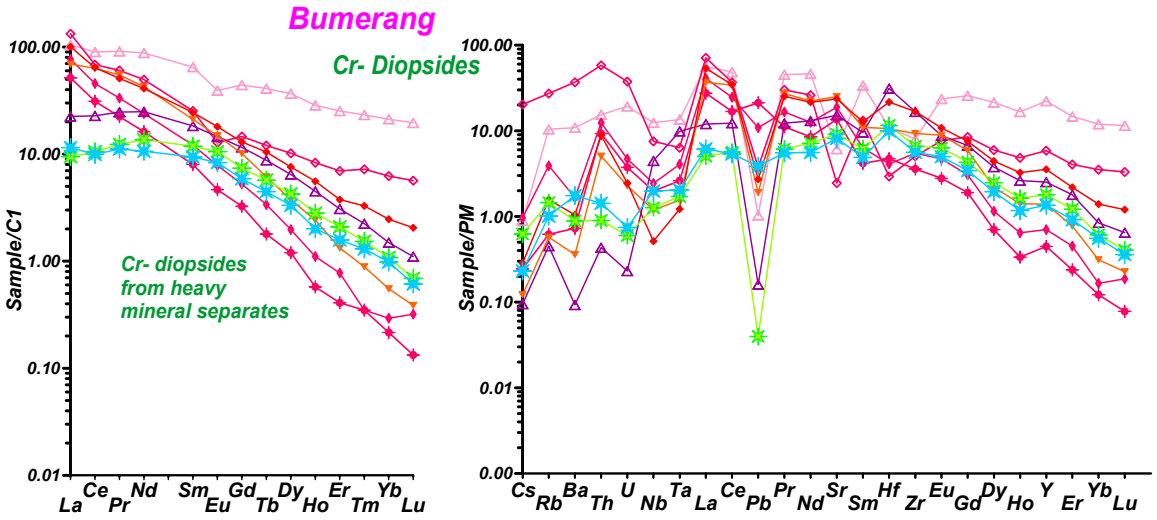
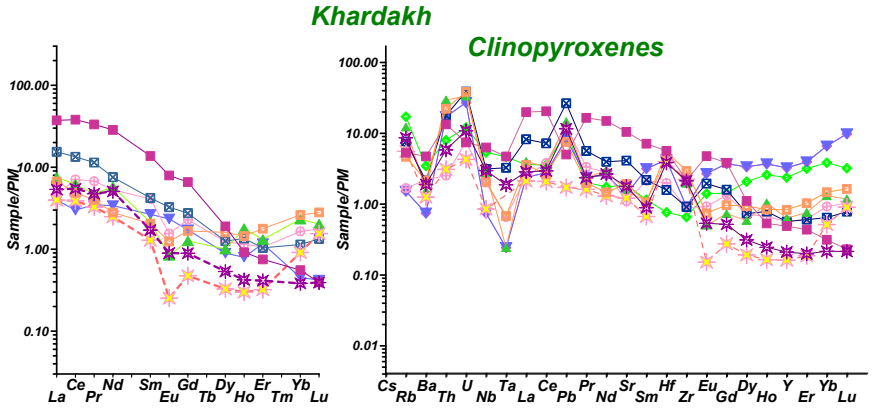


Fig. 8A. REE patterns and TRE spiderdiagrams of Cr- bearing diopsides from Bumerang pipe.



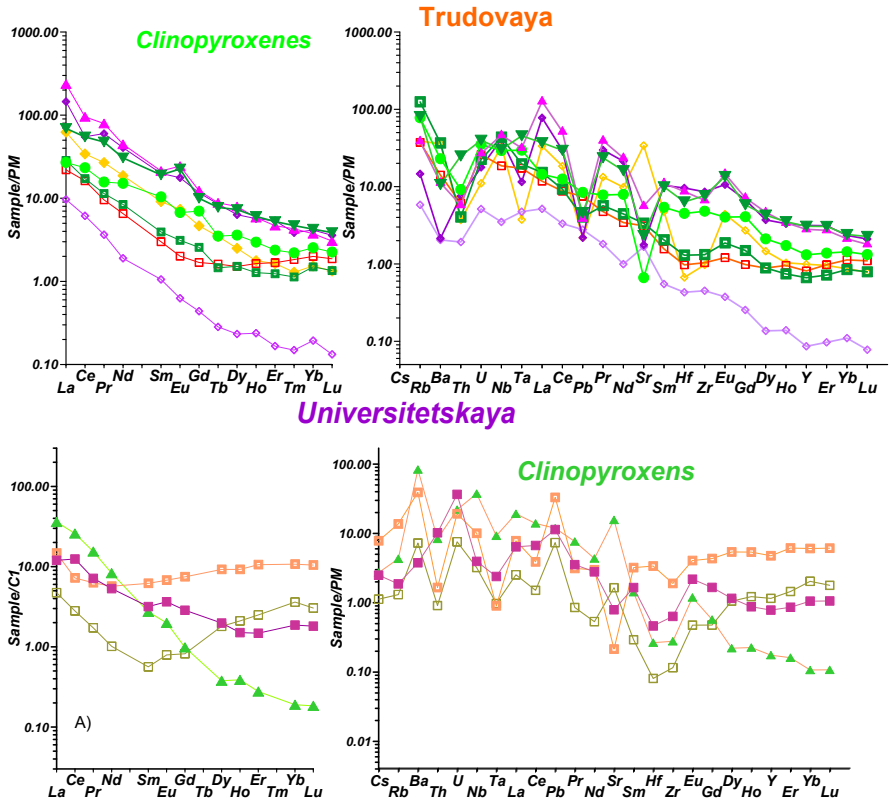
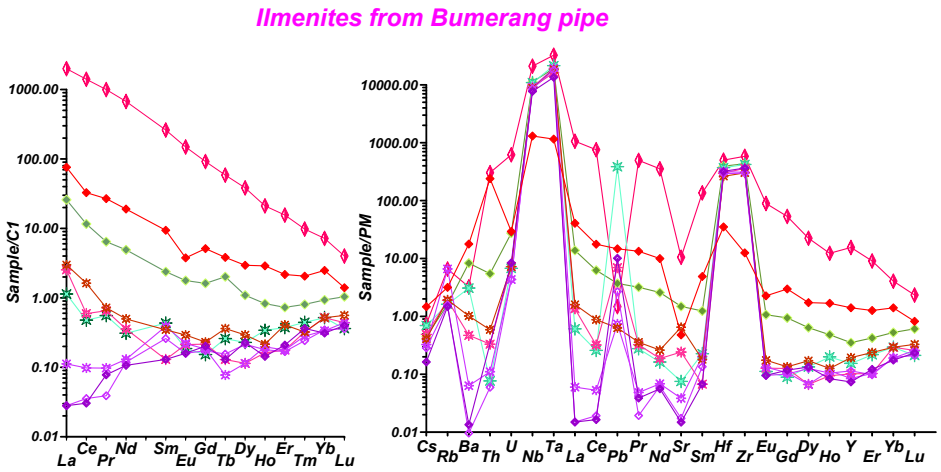


Fig. 8B. REE patterns and TRE spiderdiagrams of Cr-bearing diopsides from . East Prianabarie (Kuranakh field).

Concave REE patterns from most CPX in Anabar region and Prianabarie are typical of bomimite and other subduction related magmas (U, Ba, Sr peaks). But in Bumerang Cpx mainly are related to the reactions with the evolved carbonatitic protokimberlite melts (Th peaks)



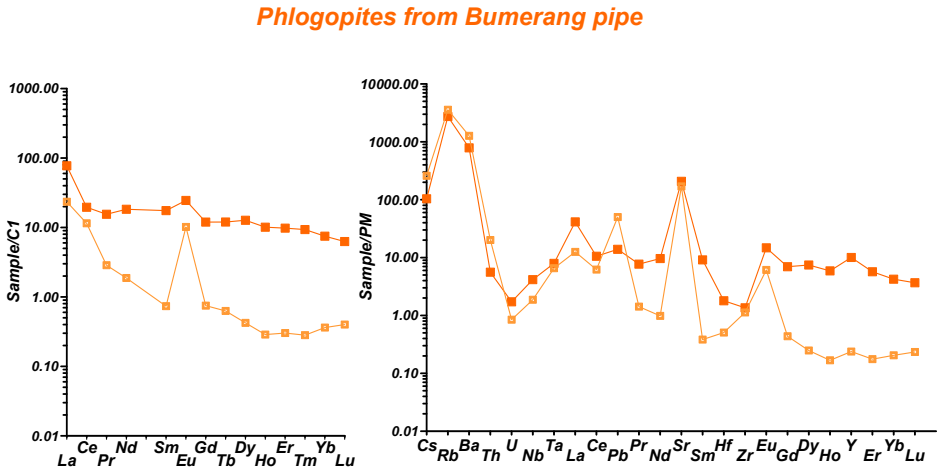


Fig. 9A. REE patterns and TRE spiderdiagrams of picroilmenites from Bumerang pipe.

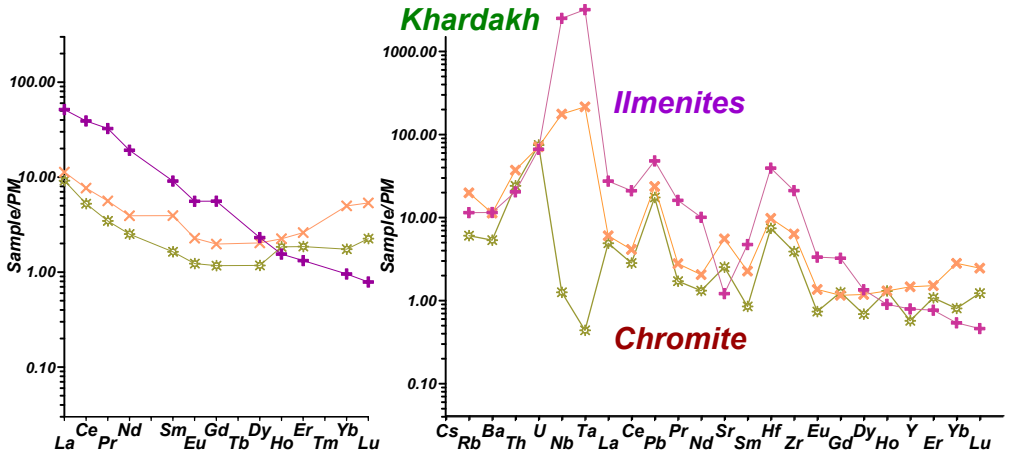


Fig. 9C. REE patterns and TRE spiderdiagrams of picroilmenites Khardakh pipe)

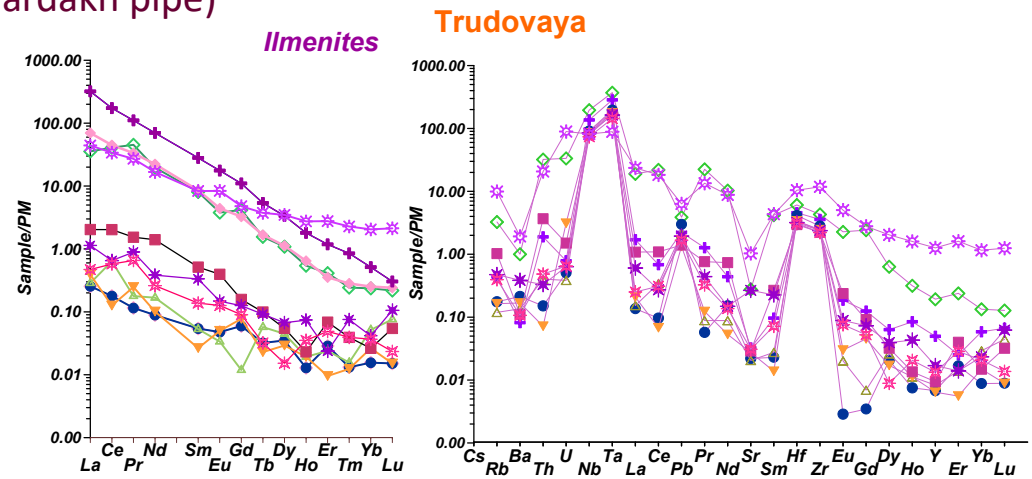


Fig. 9C. REE patterns and TRE spiderdiagrams of picroilmenites from Trudovaya (Kuranakh)

Picroilmenites of very depleted type from Bumerang are from deeper part and dunite veins. Upper located ilmenites are from very enriched protokimberlite melts.

Conclusions.

- **Bumerang pipe is represented by the associations occurred in the very depleted mantle column refertillized by the plume melts Both garnets and Cr- bearing Cpx are of reactional refertillized associations**
- **Reactional associations with the protokimberlites are Cr diopsides. The Pyroxenitic associations are formed after the reactions of subduction related eclogites with the plume melts .**
- **Fractionation patterns of CPx suggest contamination with garnets (lowering of the Gd-Yb ratios)**
- **In general Bumerang pipe contains more than half pyroxenitic associations .**
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