

Lamprophyres of Kayla pipe and their mantle xenocrysts, SE Yakutia

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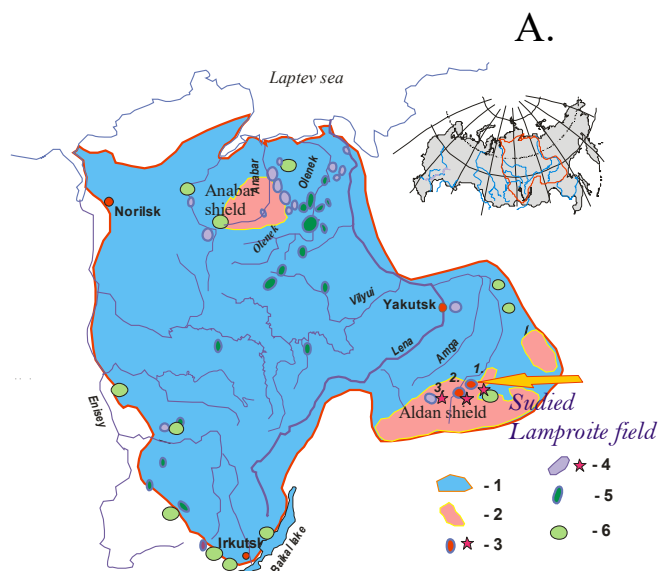
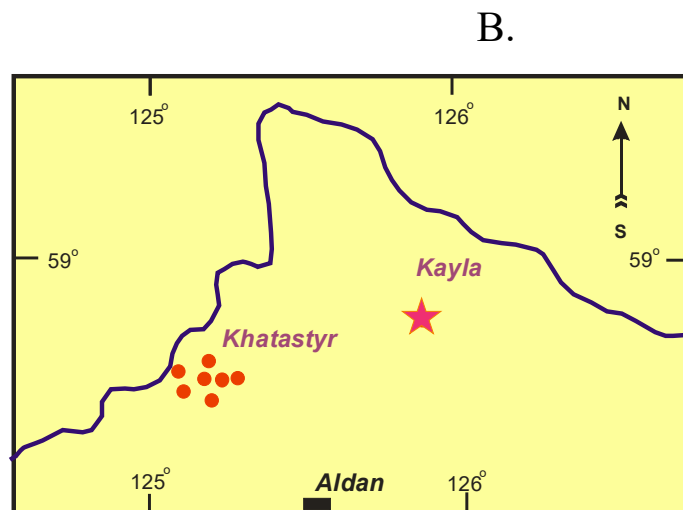
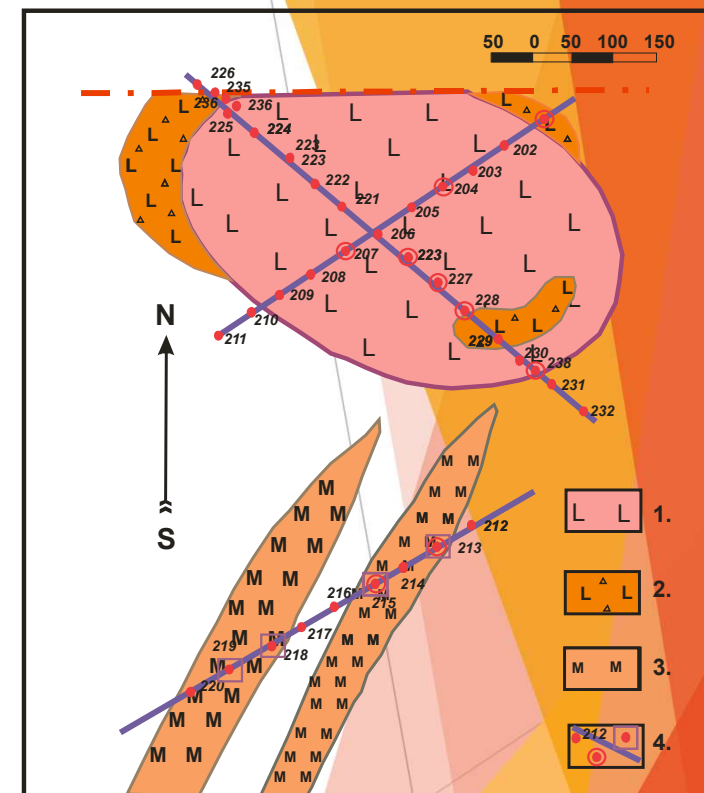


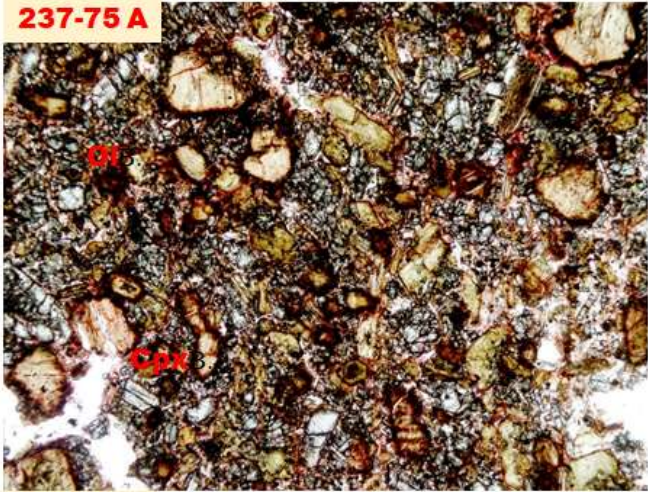
Fig 1. Location of the lamproitic fields in Siberian platform. Signs: 1. Siberian platform. 2. Shields. 3. Studied lamproitic and lamprophyric fields - (Stars: 1. Kayla. 2. Tabuk - Khatastyr. 3. Chompolo). 4. Devonian kimberlites. 5. Mesozoic kimberlites. 6. Carbonatites.

Fig 2. A. The scheme of location of the pipe Kayla and Tabuk – Khatastyr fields. B. geological structure of the Kayla pipe. Signs: 1-volcanogenic part of the lamproite pipes-tuffitic breccia, 2-xenobreccia, 3 – dykes of minnetes, 4-Numbers of drilled wells, circled numbers - sampled wells.

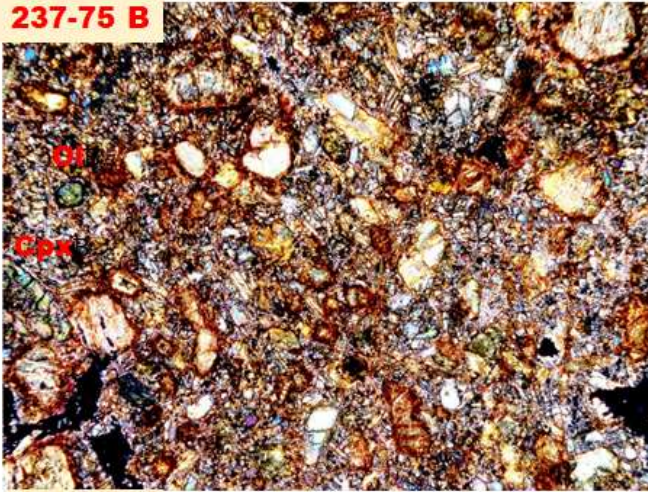
Fig.3

A.

237-75 A

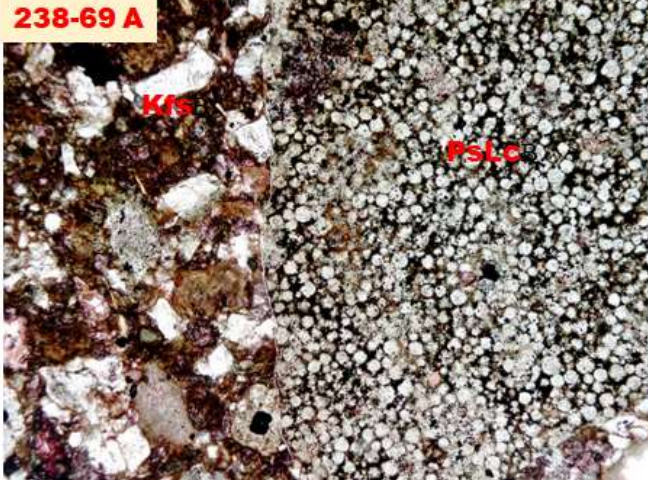


237-75 B



B.

238-69 A



238-69 B

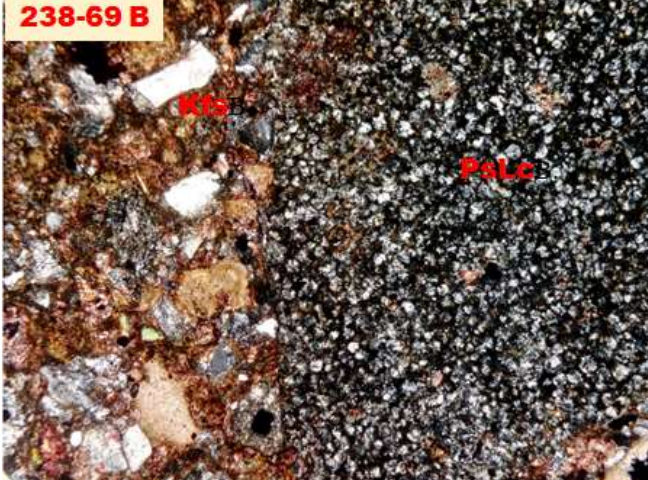
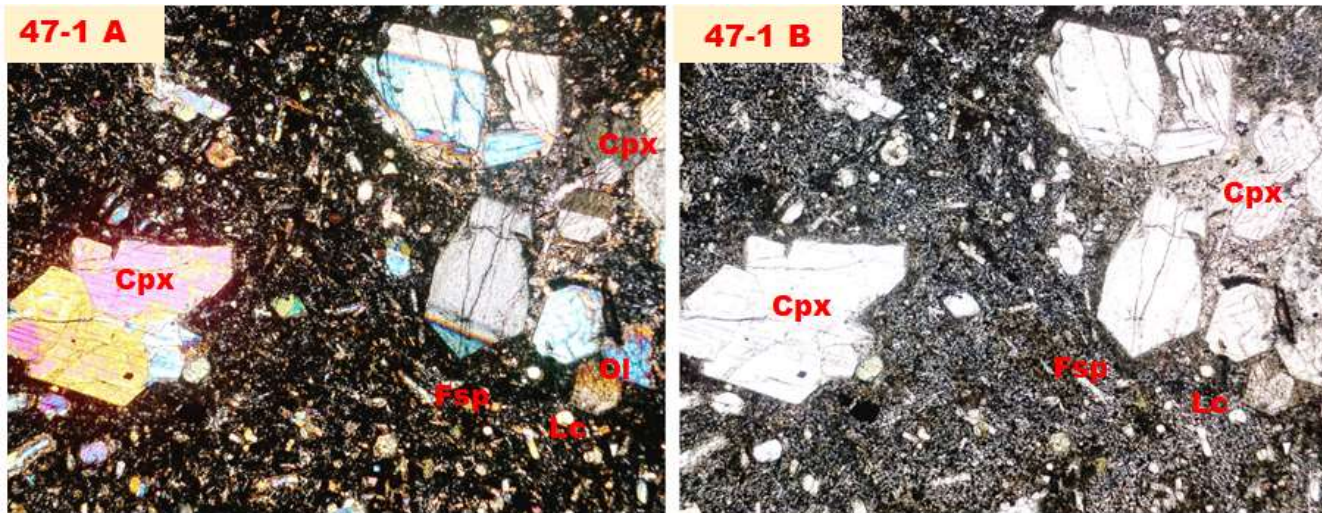


Fig 3. Photo of the Kayla lamproites. 237-75 - mafic Ol-lamproite breccia. A crossed nicols. B. Parallel nicols. 238-69 leucocratic pseudoleucite (PsdLc) breccia.

Fig.4

A.



B.

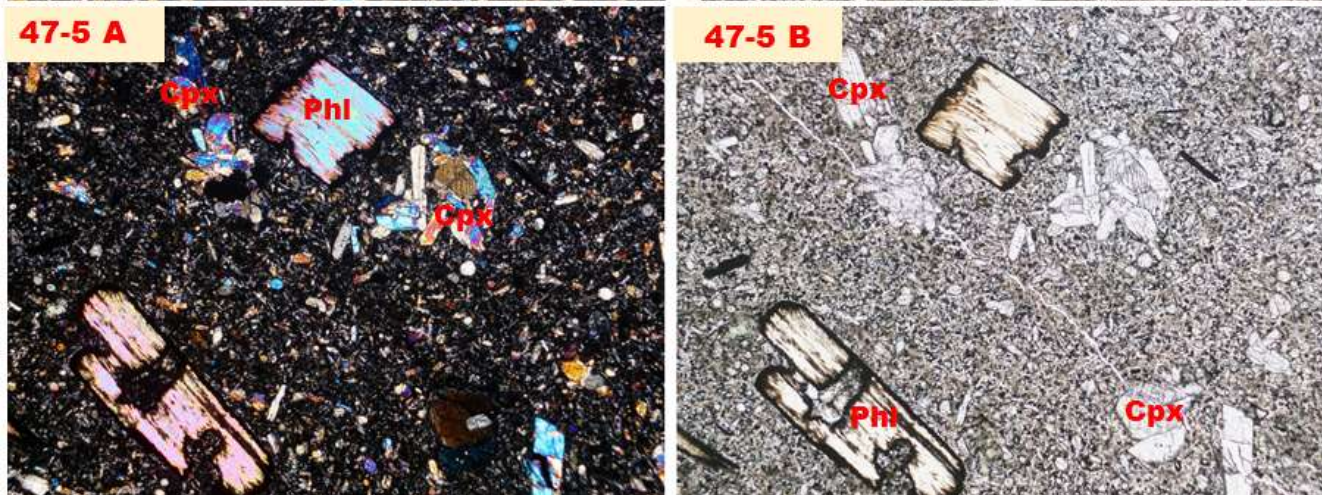
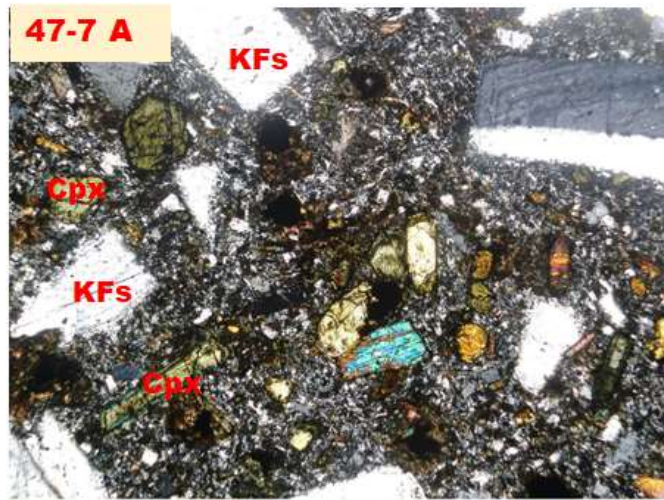
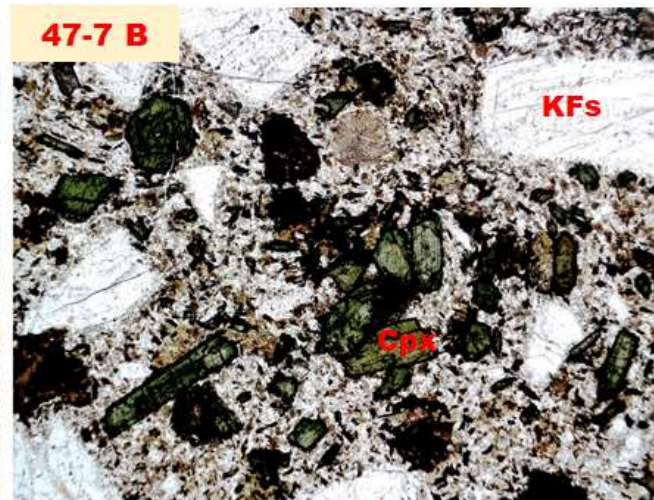


Fig 4. Photo of the Kayla
lamproites 236-55
leucocratic Lc breccia. 236-
60 leucocratic Lc breccia.

Fig.5

A.



B.

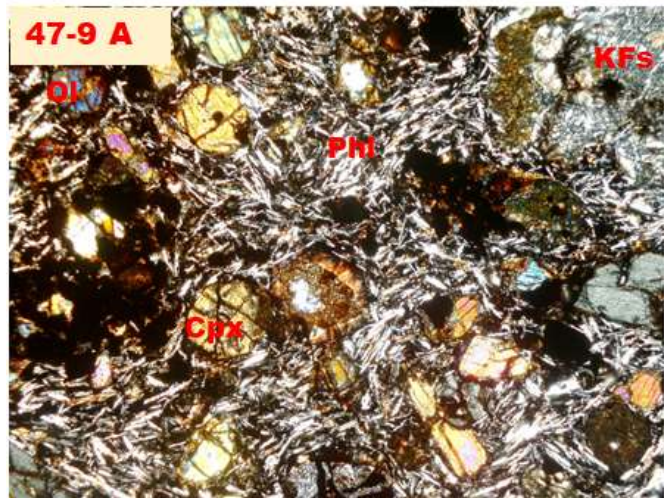
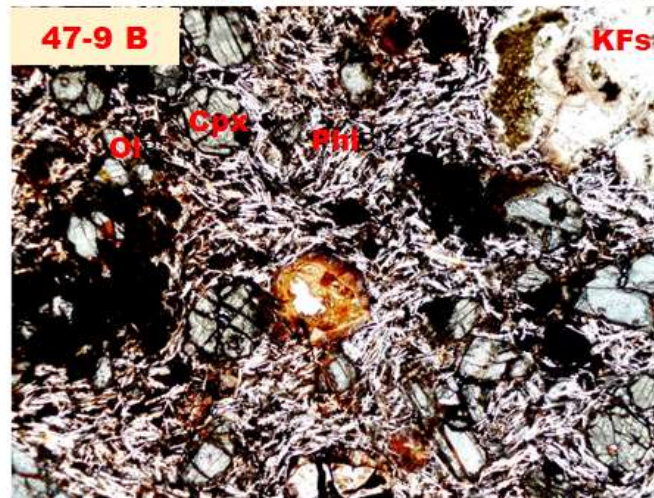
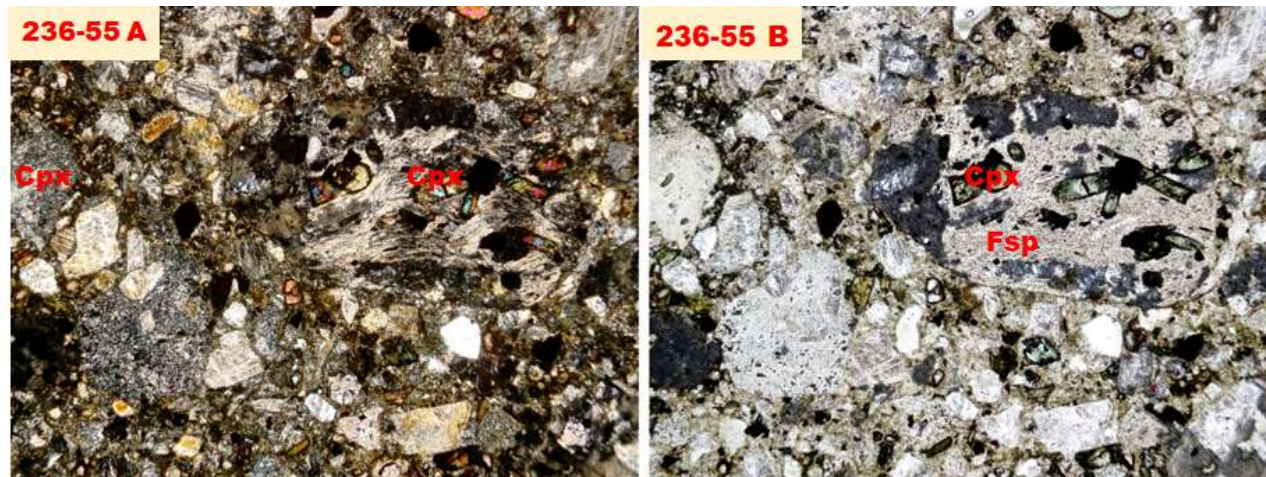


Fig 5. Photo of the
Kayla lamproites
47-1. Porphyric
breccia. 47-5 .
Porphyric breccia.

Fig.6

A.



B.

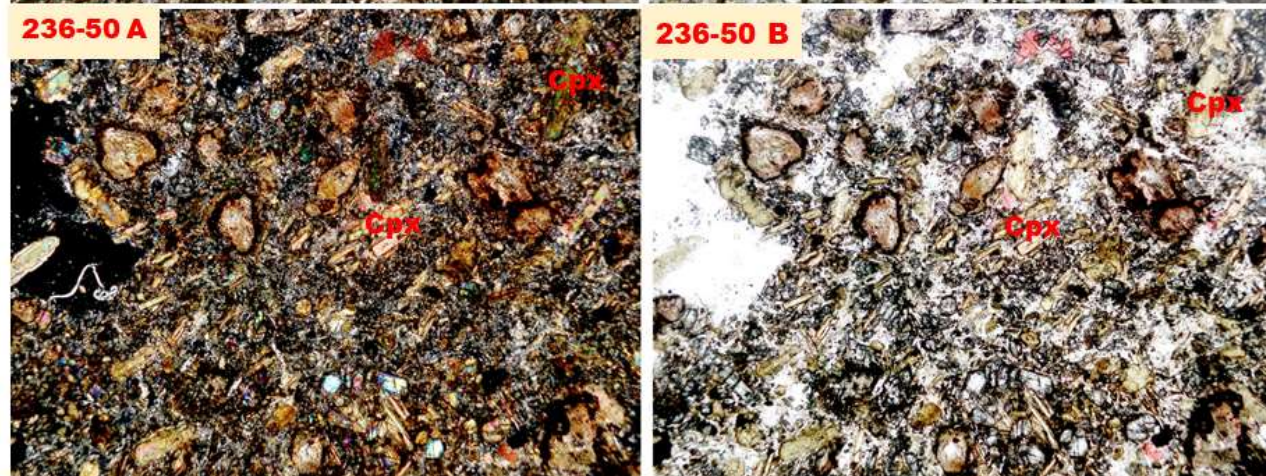


Fig 6. Photo of the
Kayla lamproites
47-7. Leucocratic
porphyritic breccia.
47-9 . . Leucocratic
porphyritic breccia

Fig.7

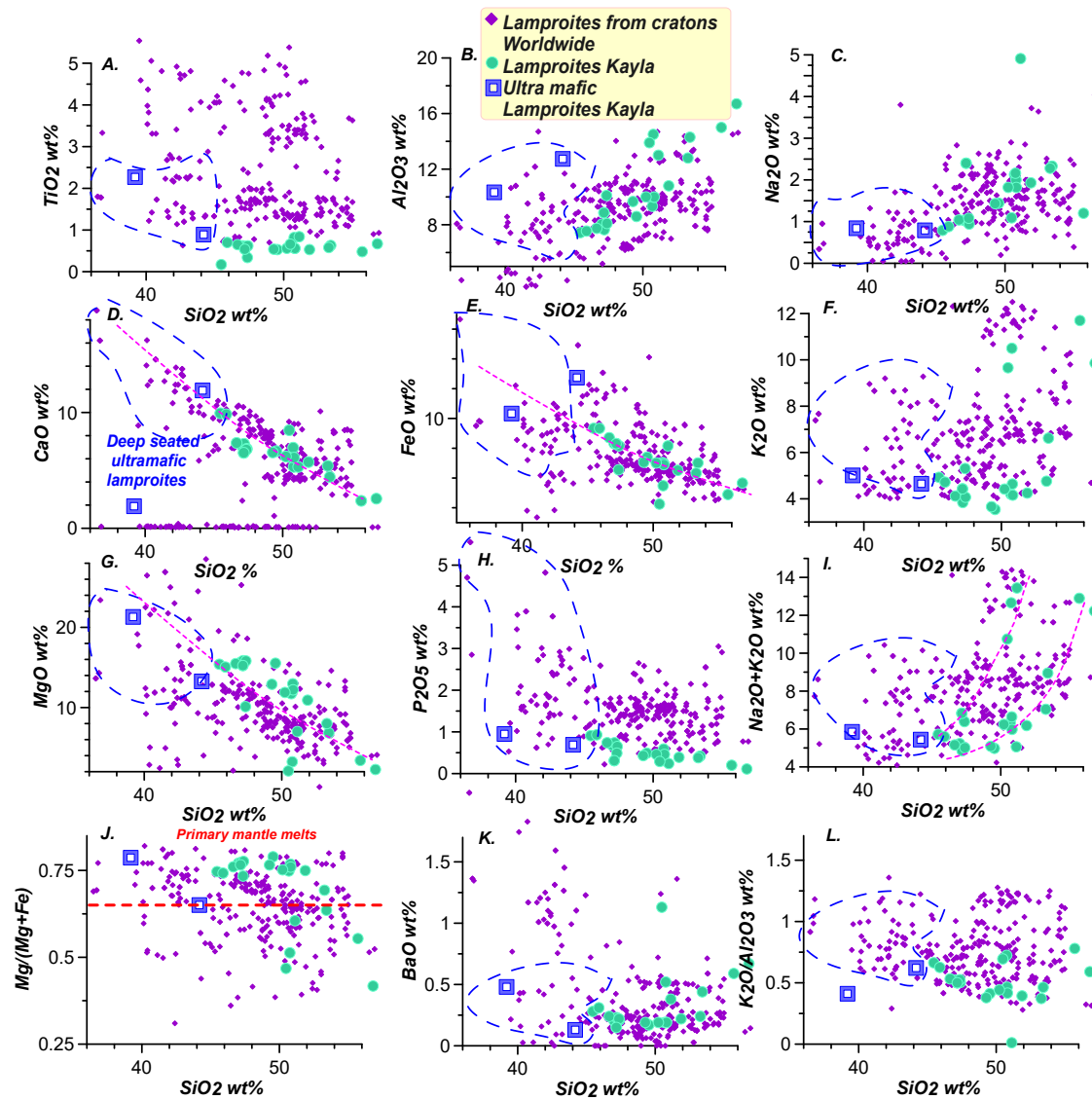


Fig 7. Variation diagrams of major rock-forming elements for rocks of the Kayla pipe.

Signs : 1.- lamproites worldwide (GEOROC, Max-Planck-Institute database), 2-olivine-bearing rocks Kayla pipe, 3-Kayla prevailing lamprophyric rocks

Fig.8

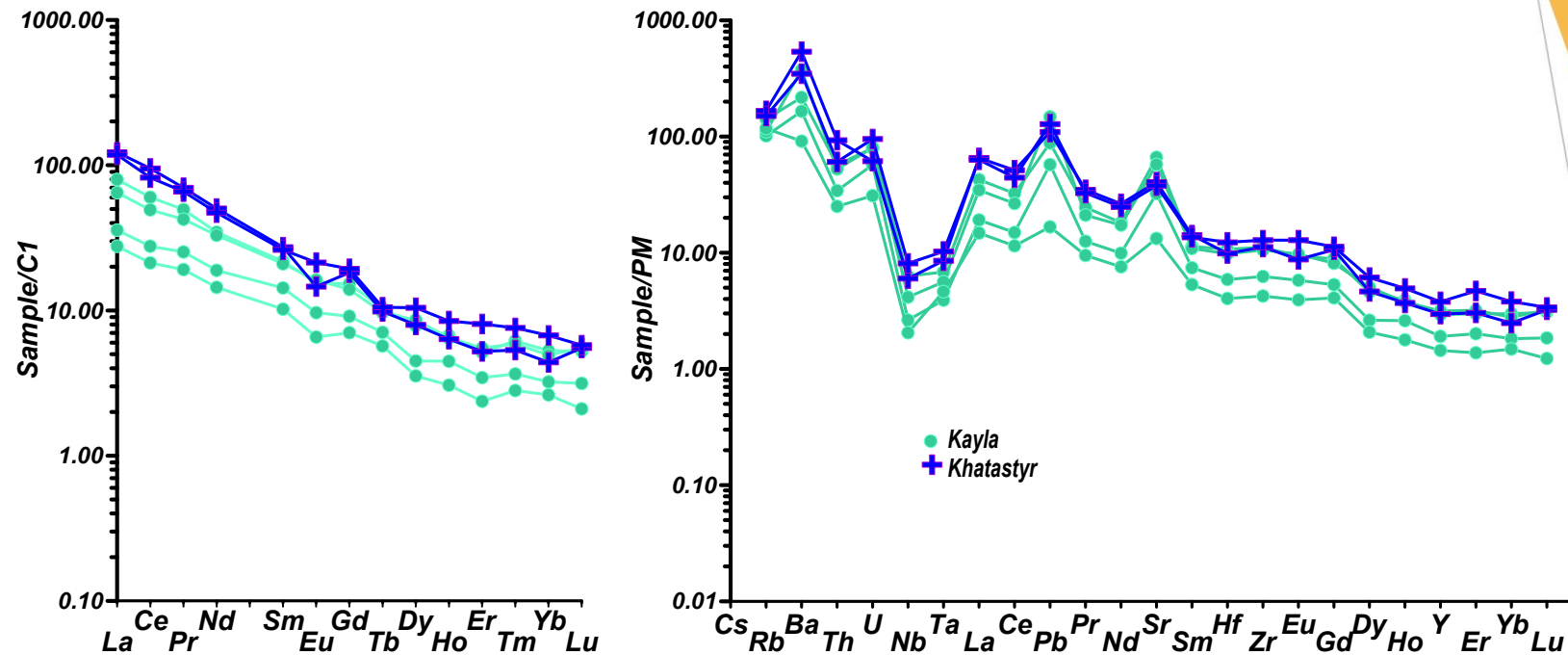


Fig 8. Spider diagrams of TRE and REE o spectra of lamproites from the Aldan shield (Kayla and Khatastyr).

Notes: 1- average spider-diagram of all lamproites of the Aldan shield, 2-spider-diagrams of lamproites of Kayla and Tobuk-Khatastyrsky field and Yakokutsky massif (AYK, 3 – TRE spider diagram of lamproites of Kayla and Tobuk-Khatastyr field and Yakokutsky massif. Normalization of REE pattern to chondrite C1 (Evensen, Frost, 1979) and spider diagrams to primitive mantle (McDonough , Sun, 1995).

Fig.9

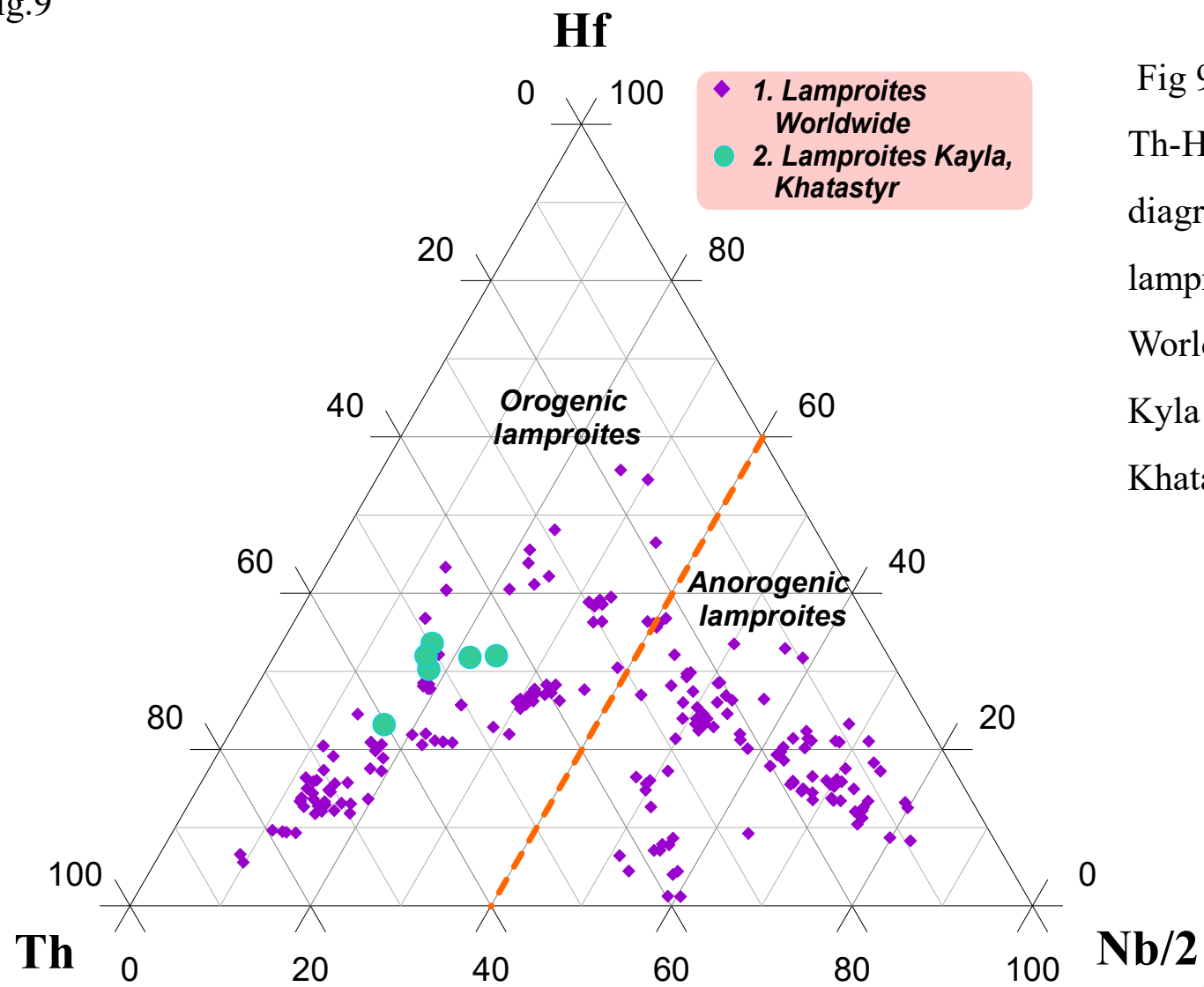


Fig 9. Ternary
Th-Hf-Nb/2
diagram for
lamproites 1.
Worldwide 2.
Kyla and
Khatastyr

Fig.10

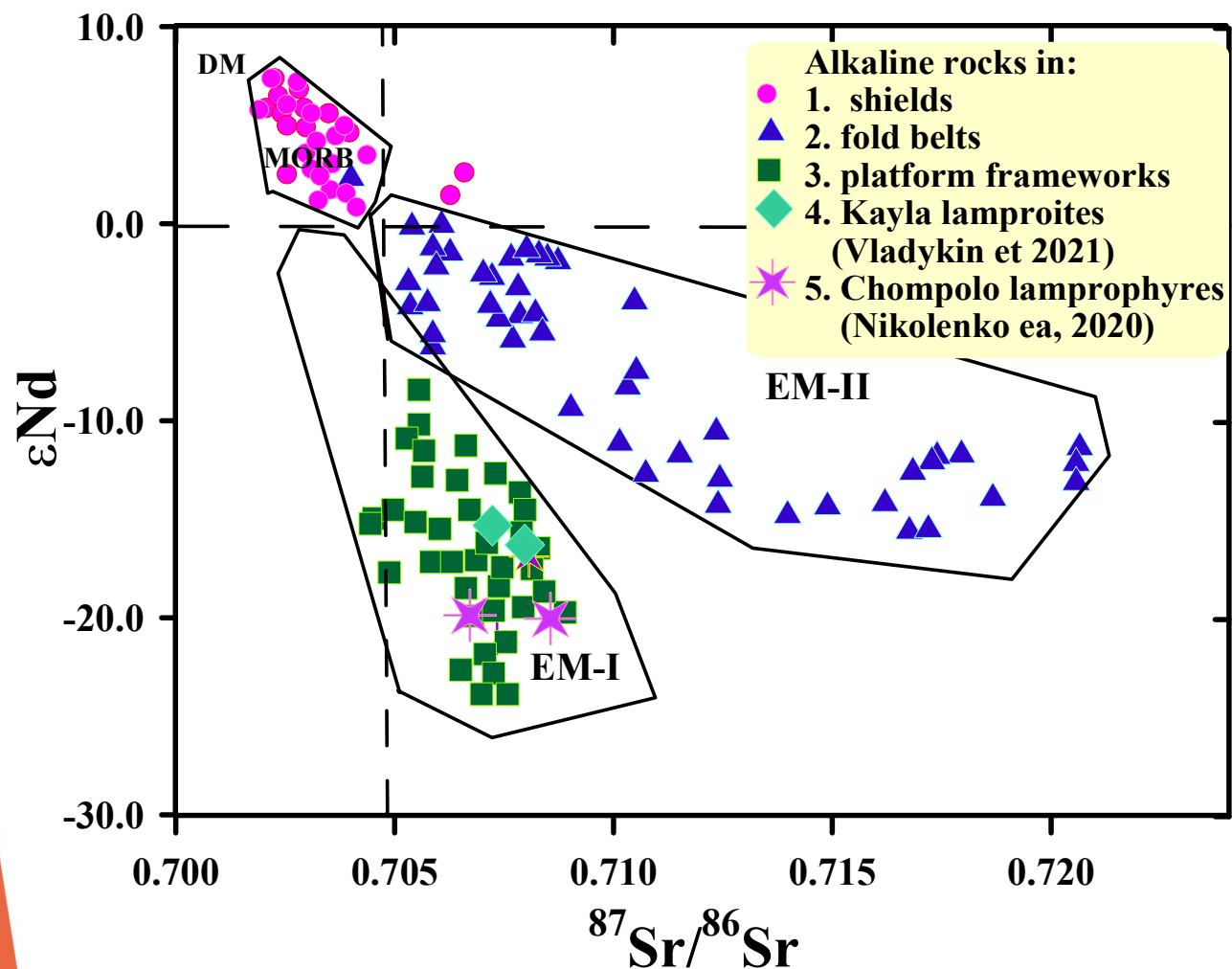


Fig. 10. Nd и Sr isotope systematics according to (Vladykin 2016).

Signs: 1- carbonatites and lamproites of Aldan shield and Leucite Hills, 2- carbonatites and lamproites of the folded belts, 3- carbonatites of NA complexes of craton marginal zones, 4- lamproites of Kayla and Khatastyr

Fig.11

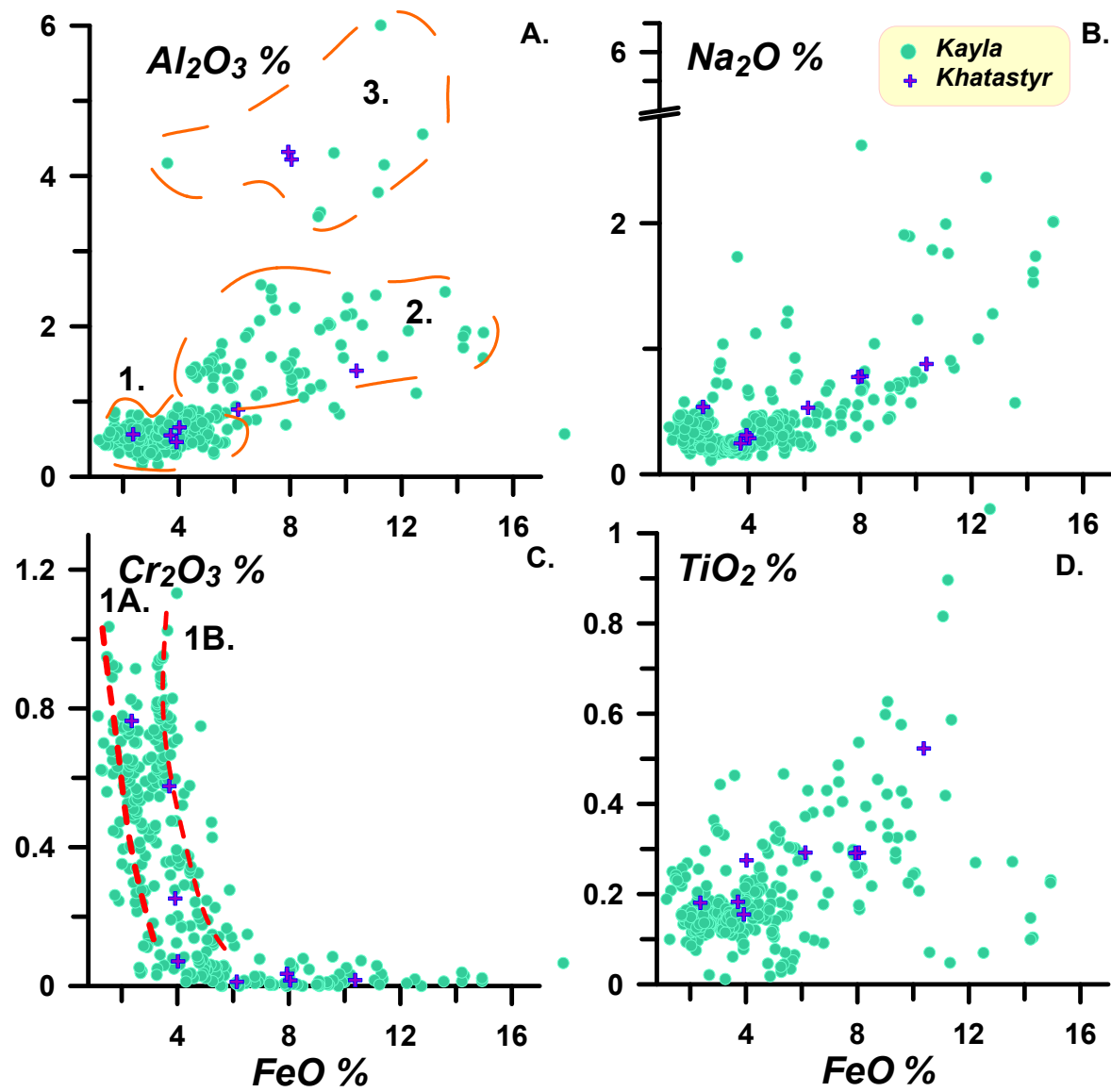


Fig. 11. Variation diagrams for the clinopyroxenes from Aldan shield lamproites.

Fig.12

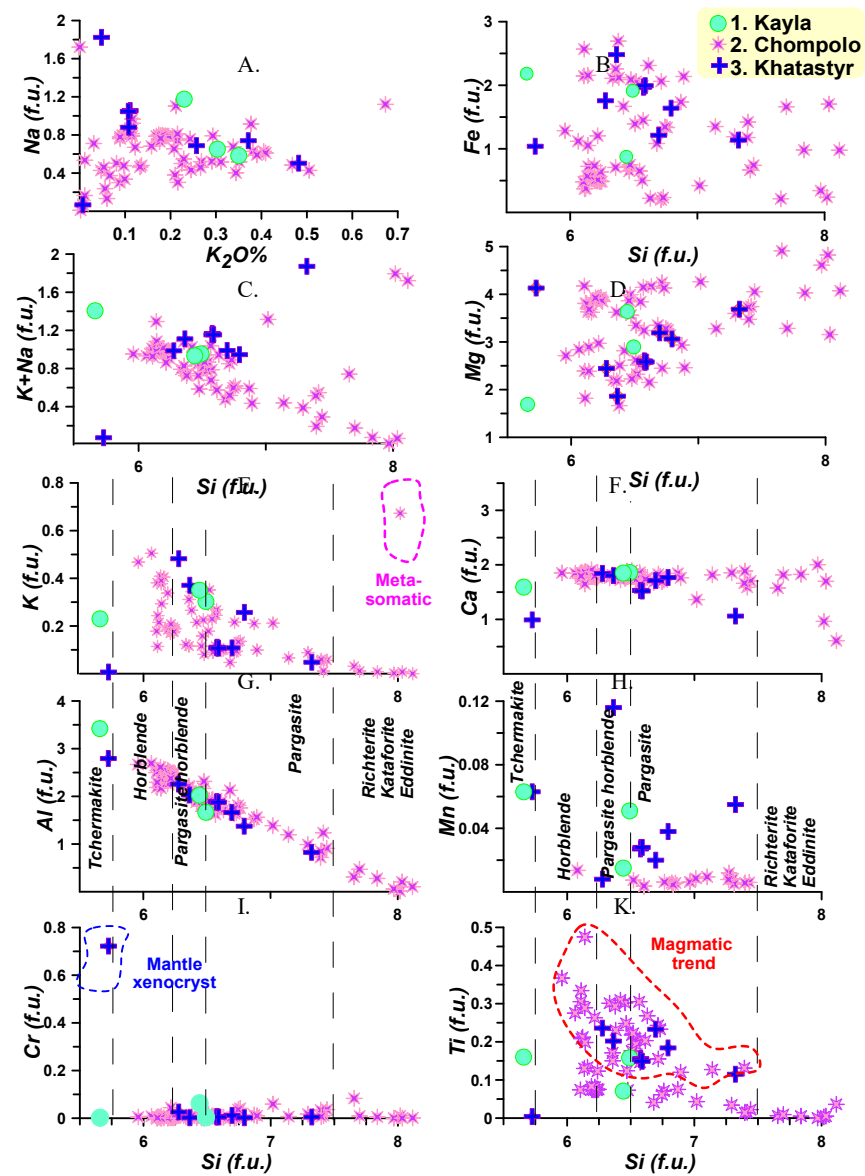


Fig. 12. Variation diagrams for amphiboles from Aldan shield lamproites (according to Leak et al., 1997; Locock, 2014)

Fig.13

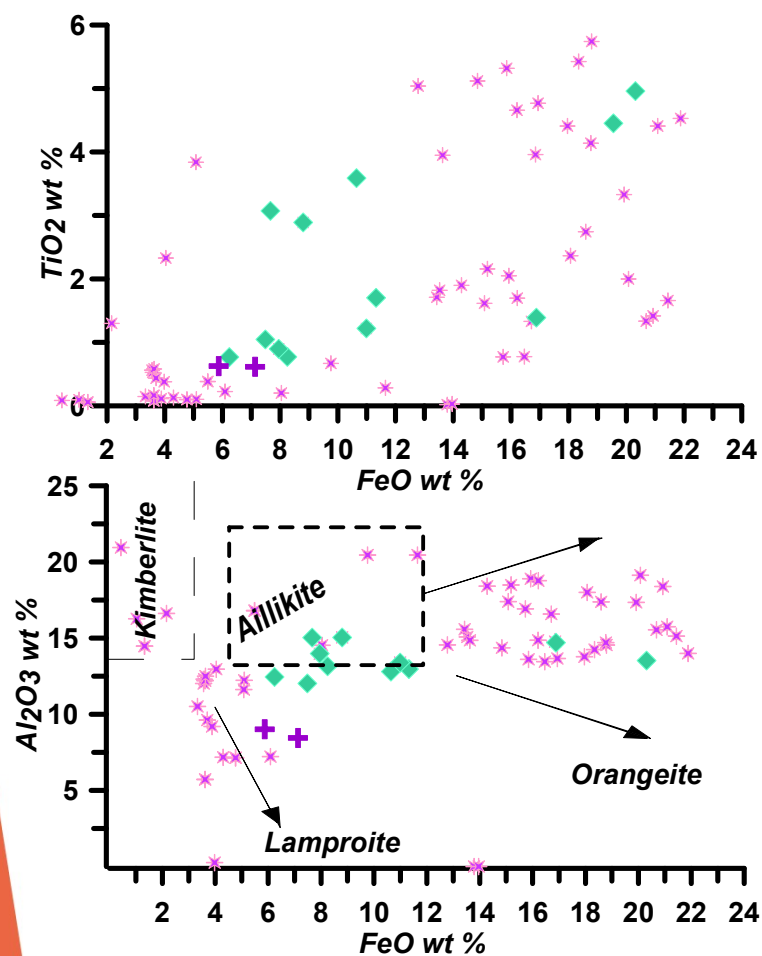
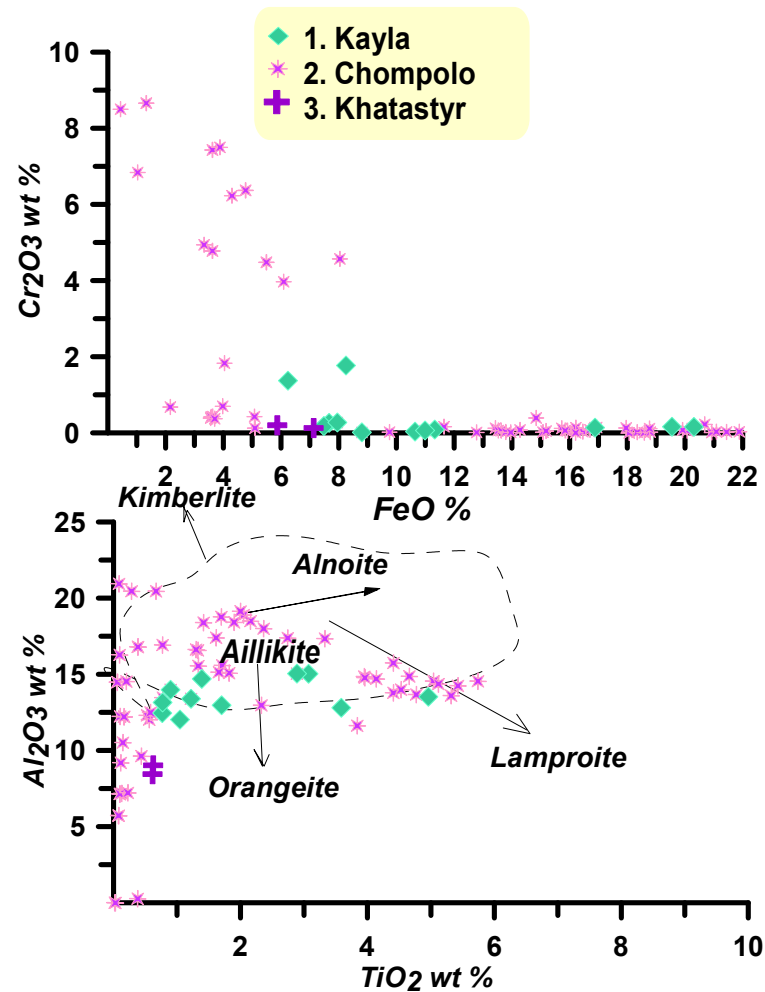


Fig. 13. Variation diagrams for chromites from Aldan shield lamproites. 1. Kayla. 2, Khatastyr

Fig.14.

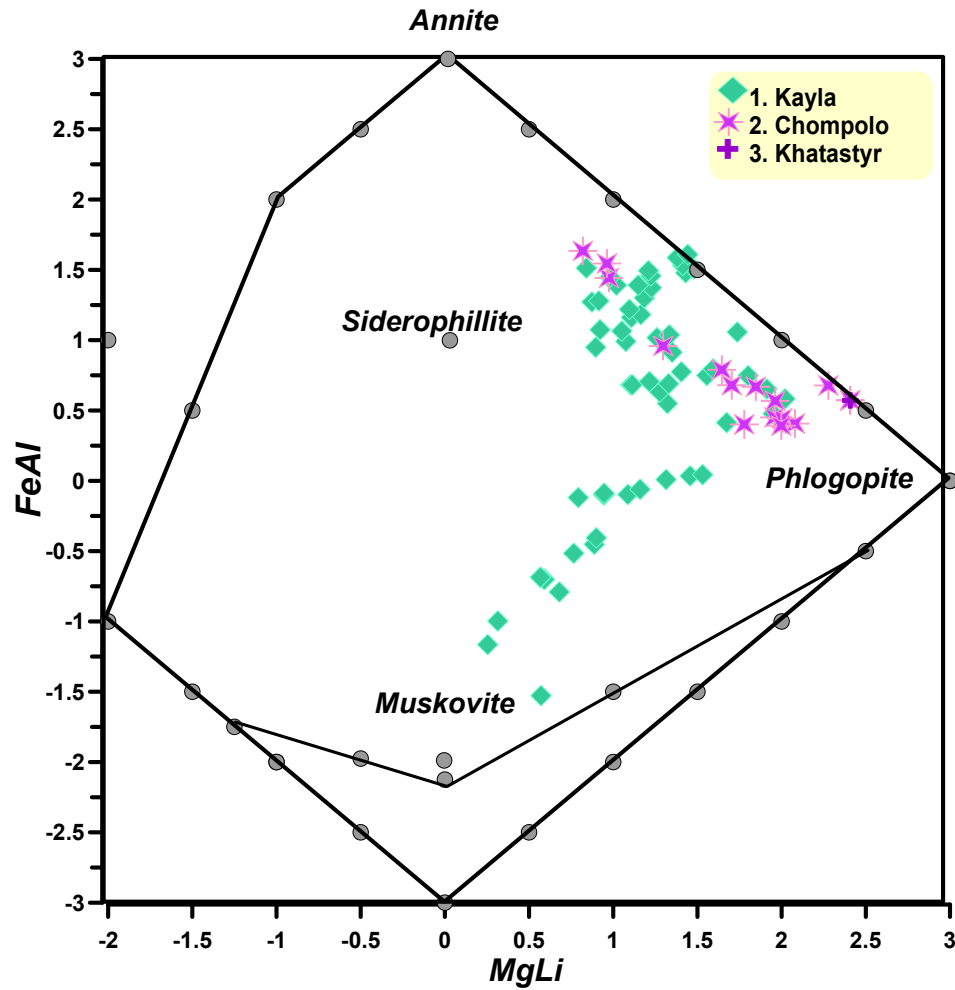


Fig. 14. Classification diagram (Tischendorf et al.2004) for phlogopites from a. Kayla, b. Chompolo. Axis: $MgLi = Mg - Li$ (formula units); $FeAl = Fe_{tot} + Mg + Ti - {}_{VI}Al$.

Fig.15.

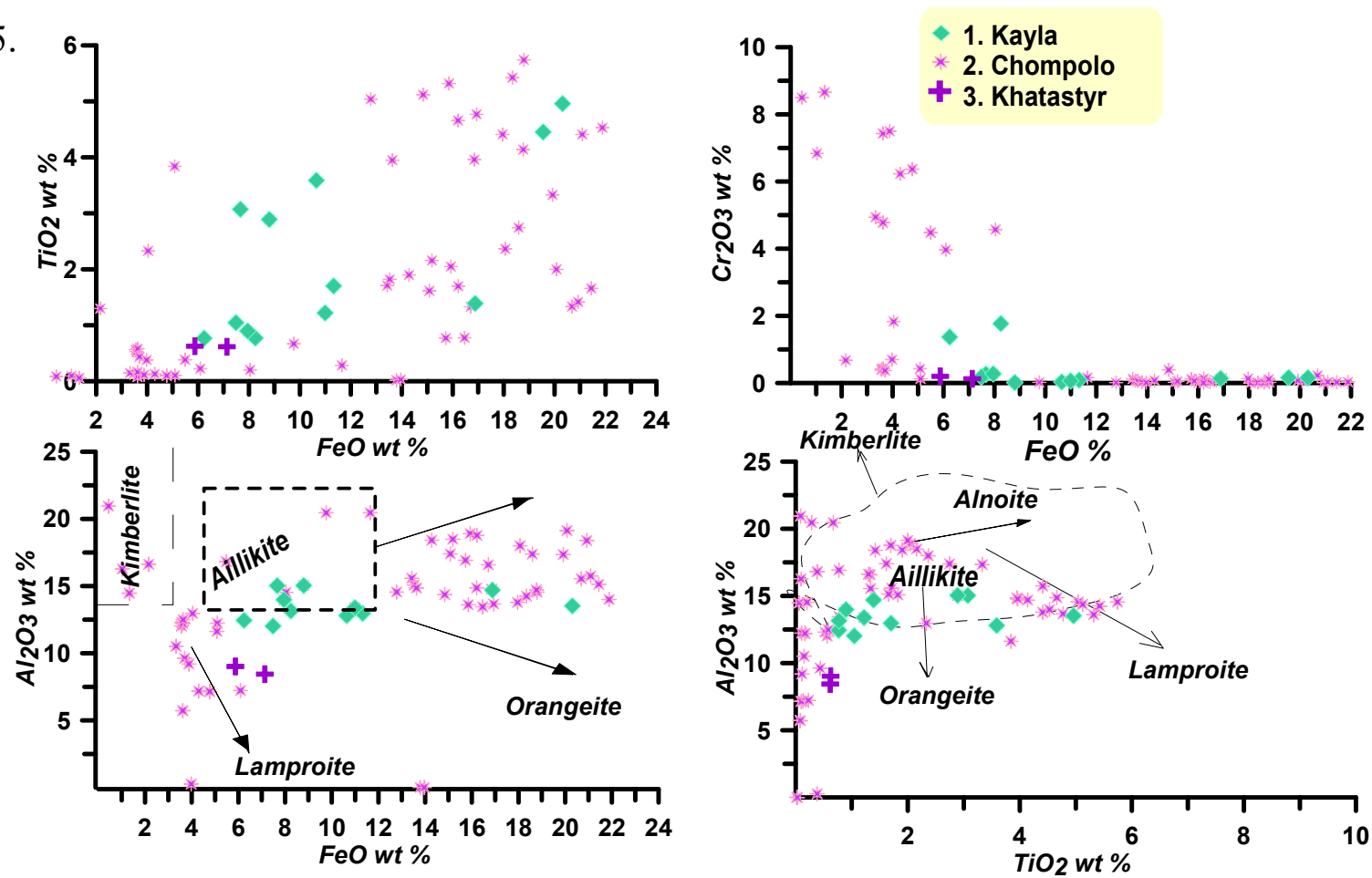


Fig. 15. Variation diagrams for phlogopites from Aldan shield lamproites. The lines and arrows are according to (Giuliani et al., 2016)

Fig.16

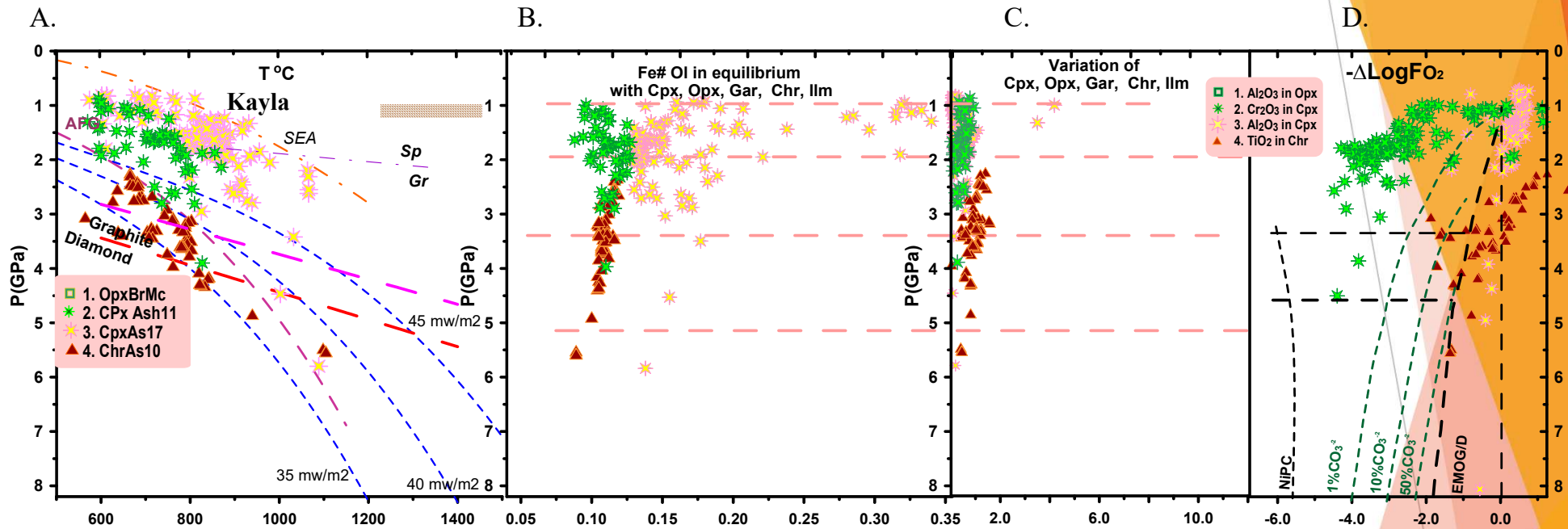


Fig. 16. PTXFO2 conditions for xenocrysts of Kayla lamproites defined according to the mono-mineral thermobarometry for clinopyroxenes (Ashchepkov et al., 2017) and chromites (Ashchepkov et al., 2010). Signs: 1. Opx: T°C (Brey and Kohler, 1990)-P(GPa)(McGregor, 1974). 2.Cpx: T°C- (Nimis and Taylor, 2000) P(GPa) - Ashchepkov et al., 2017(for Cr -diopsides), 3.The same for pyroxenite sand Fe- Cr -diopsides . 4. Chromite 4.T°C (O'Neill and Well, 1987)-P(GPa) (Ashchepkov et al., 2010)

Fig.17

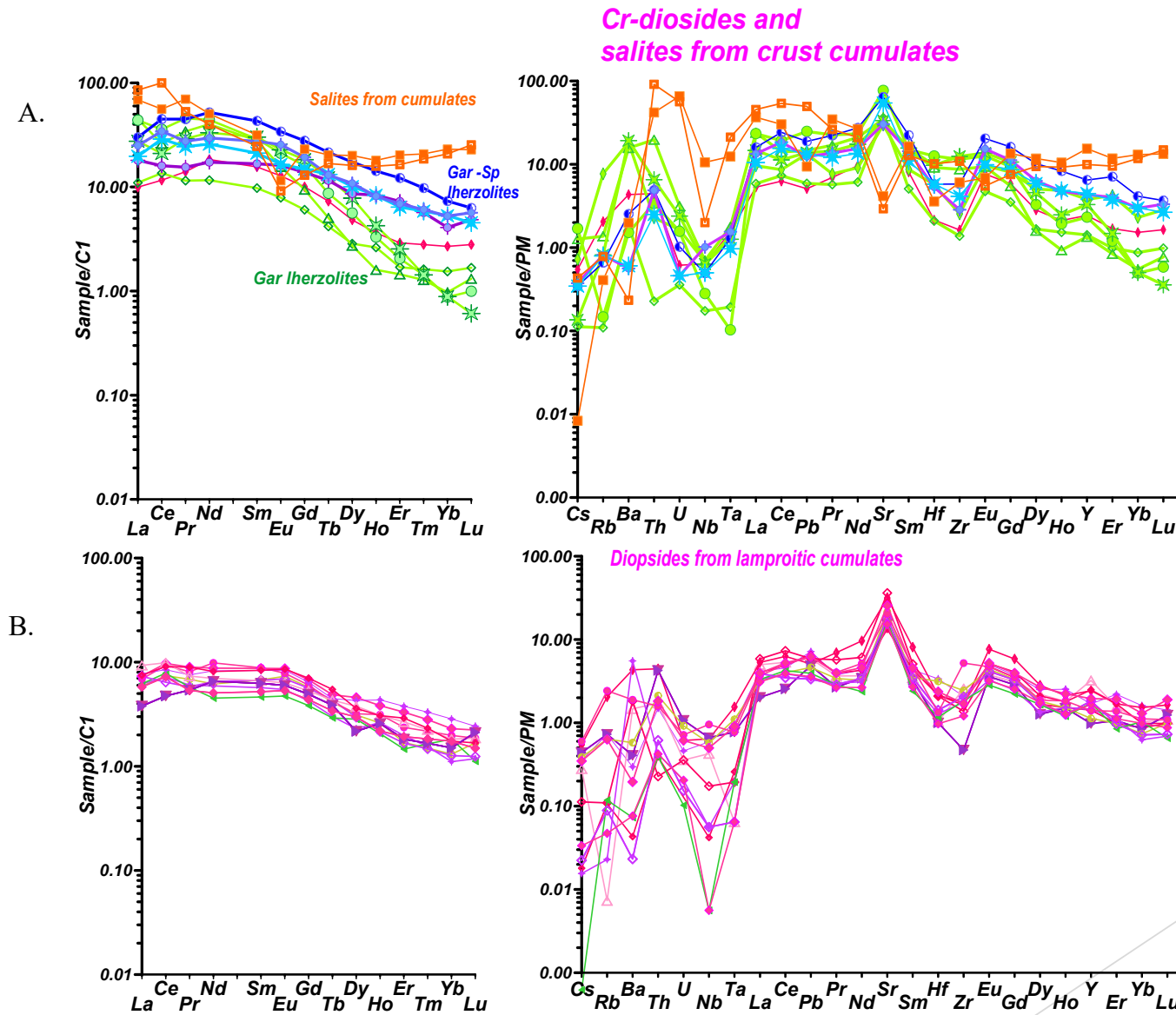


Fig. 17. TRE patterns for minerals from Kayla pipe: a) Cr-diosides, b) low Cr diosides c) salites from low crust granulites. Normalization of REE pattern to chondrite C1 (Evensen, Frost, 1979) and spider diagrams to primitive mantle (McDonough, Sun, 1995).

Fig.18

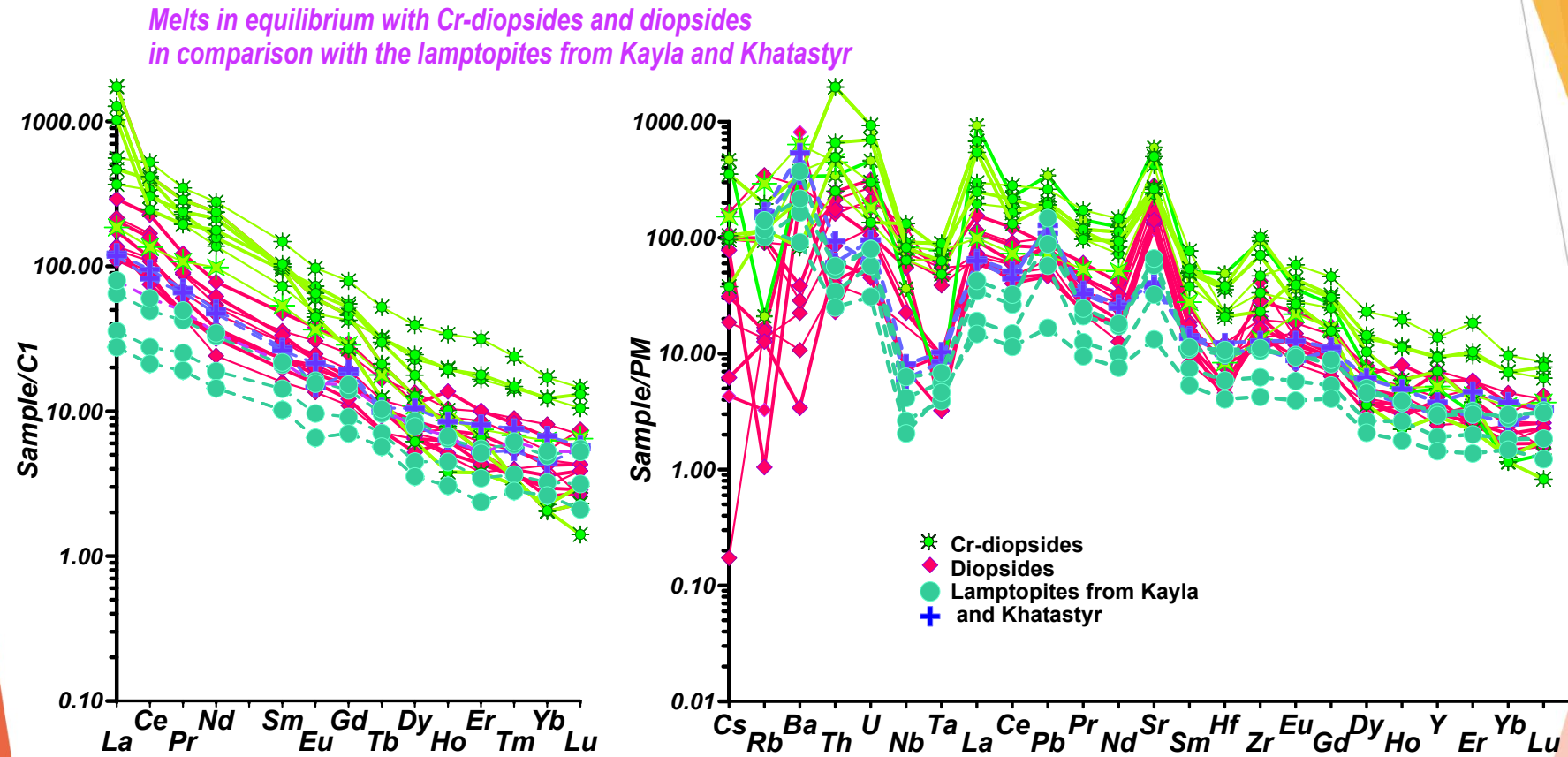


Fig. 18. TRE patterns for melts equilibrated with the xenocrysts minerals from Kayla pipe. Normalization of REE pattern to chondrite C1 (Evensen, Frost, 1979) and spider diagrams to primitive mantle (McDonough, Sun, 1995).