

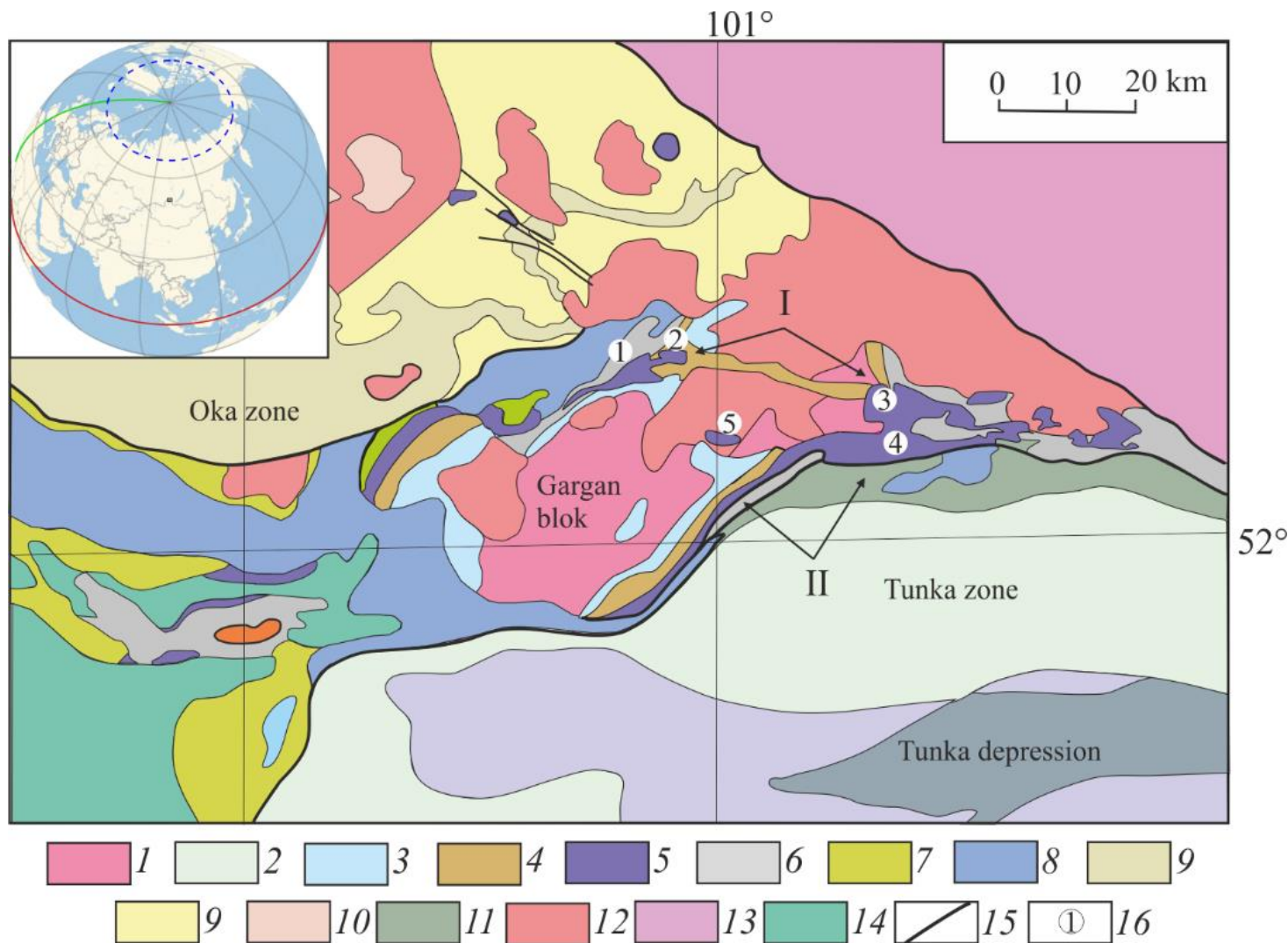
# **Geochemical characteristics of the gabbro Kharanur and Kholbyn-Khairkhan ophiolite massifs (East sayan, Russia).**

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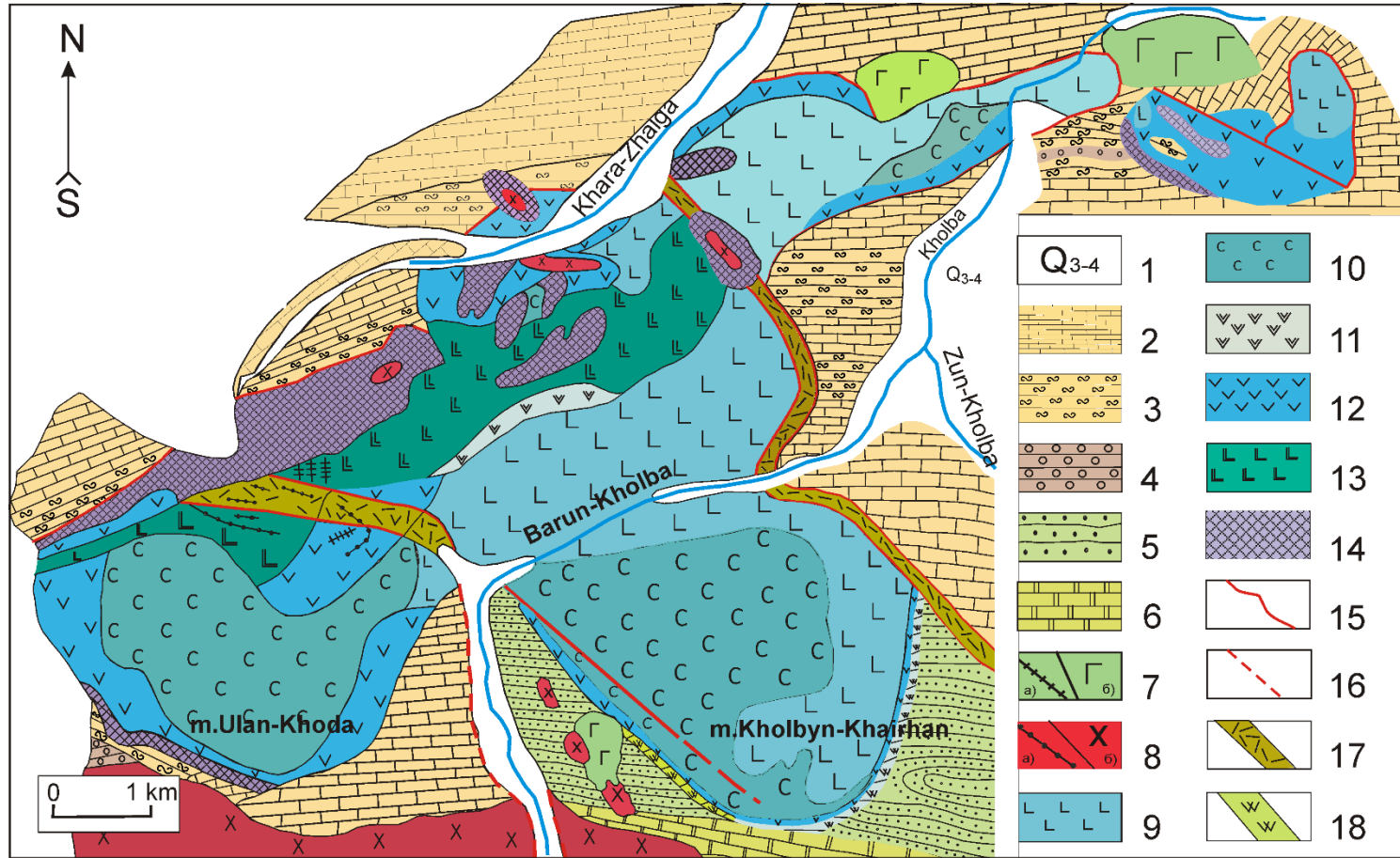
# Geological schem of part of the Eastern Sayan region



- 1 – Gargan “block”, metamorphic basement
- 2 – Khamardaban microcontinent:  
metasedimentary, metavolcanic rocks
- 3 – Gargan “block”, carbonate cover
- 4 – shale, olisthostromes, metavolcanic rocks,
- 5 – ophiolite, serpentine mélange,
- 6 – flysch, mafic metavolcanites,
- 7 – Sarkhoy island-arc volcanic rocks (V-Np),
- 8 – Bokson sequence: limestone, dolomite (V-O),
- 10 - Oka sequence, metasedimentary rocks,
- 11 – Toltinskaya formation: limestone,  
dolomite (O-S)
- 12 – Sagansayr suite – conglomerate (D3-C),
- 13 – granite; 14 – Siberian craton basement complex;
- 15 - disjunctive break,
- 16 – Ophiolite nappe:
- 1 – Kharanur,**
- 2 – Kholbyn-Khayrhan,**
- 3,4 – Ospa-Kitoy,
- 5 – Ulan-Sardag

(after Geology and ore-bearing zones of Eastern Sayan, 1989)

# Geological scheme of the Kharanur and Kholbyn-Khairkhan ophiolite massifs



1 – Quaternary deposit  
Mongoshinskaya suite:  
2 – limestones, 3 – shales, 4 – quartzites;  
Ilchir suite: 5 – shales;  
Irkut suite: 6 – limestones;  
7 - Bokson complex (a) gabbro, (b) mafic dyke; 8 – Holbyn complex: granite-porphyry, quartz-porphyry, plagioclase-porphyry; 9, 10, 13 – serpentinized peridotite, 11 – carbonatized serpentinite, 12 – serpentinite; 14 – talc-carbonate rocks;

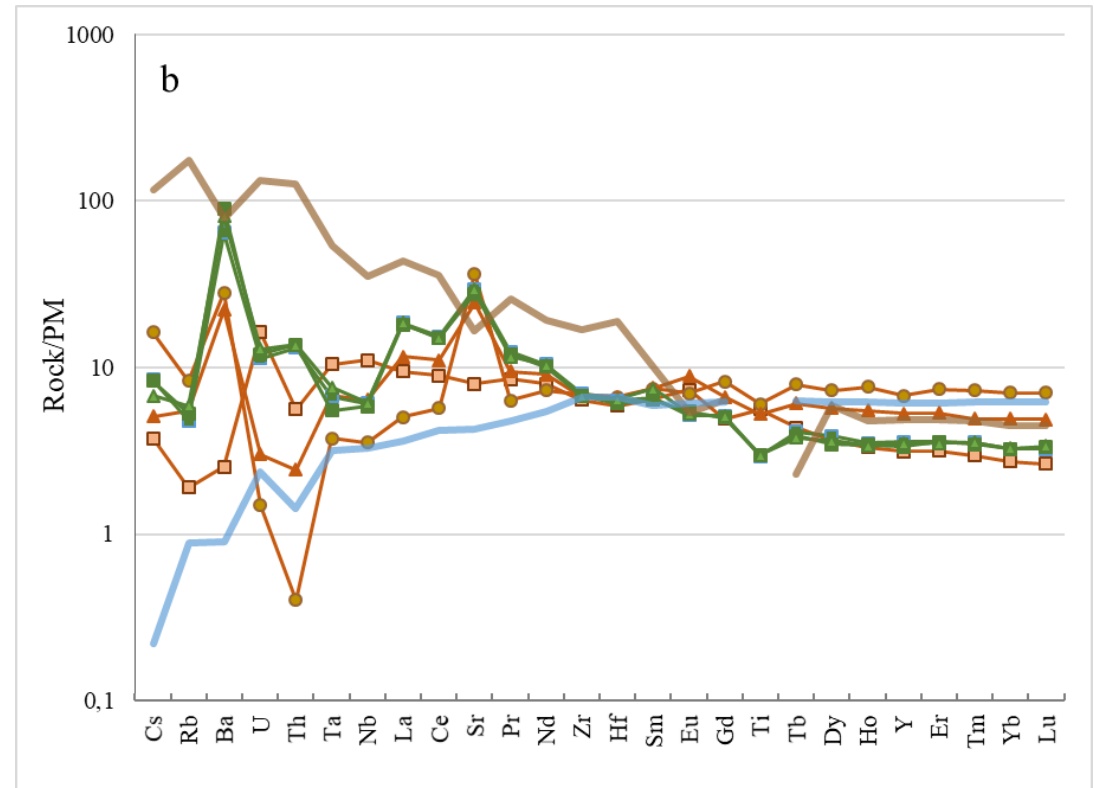
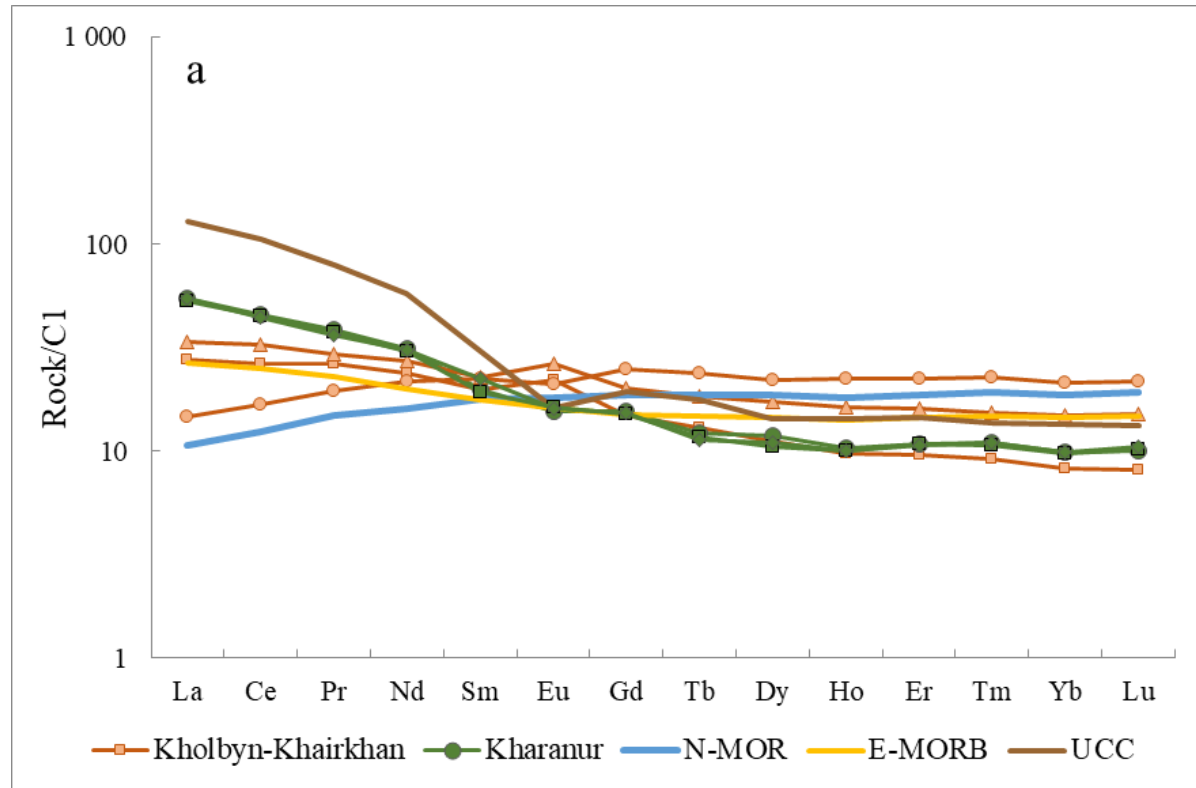
Disjunctive break:  
15 – identified, 16 – probable, 17 – intense shear zone, 18 – amphibole shale zone

Schem after Zamaletdinov R.S., Yakshin I.S., Pevchenko N.Ph., Suturin A.N.

# Geochemical characteristics of the ophiolitic gabbro

The ophiolite massifs Kharanur and Kholbyn-Khairkhan are considered to be a single overthrust, consisting of two tectonic sheet, separated by a fault. The ophiolite gabbros, in these two sheets, have different geochemical characteristics.

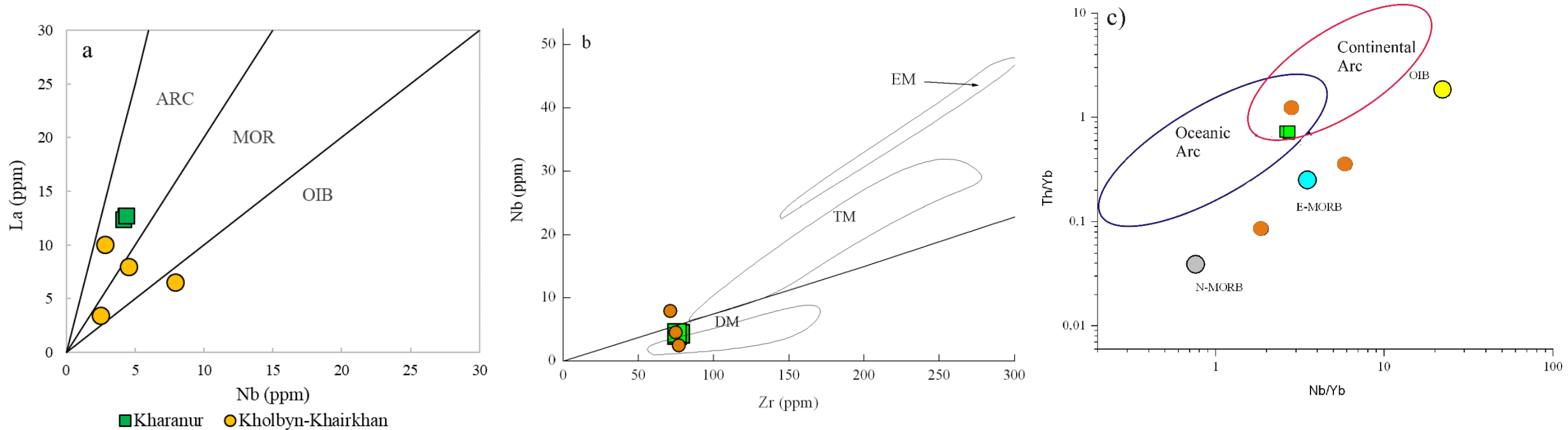
- Gabbro of the **Kharanur massif** have low content Ti and content of Nb, Zr are look like with the content in N-MORB. On the spider diagram, gabbro have positive anomalies in Ba, Th, Sr and negative anomalies in Ta, Nb, Ti. The REE distribution is similar to these in upper continental crust and island-arc rock.
- Gabbro of the **Kholbyn-Khairkhan massif** have a flatter REE distribution spectrum than gabbro of the Kharanur massif, more consistent with the REE distribution in E-MOR, BAB basalts. They have positive anomalies in Ba, Sr and negative anomalie in Th. There are not negative anomalies in Nb, Ta, Ti.



# Geochemical characteristics of the ophiolitic gabbro

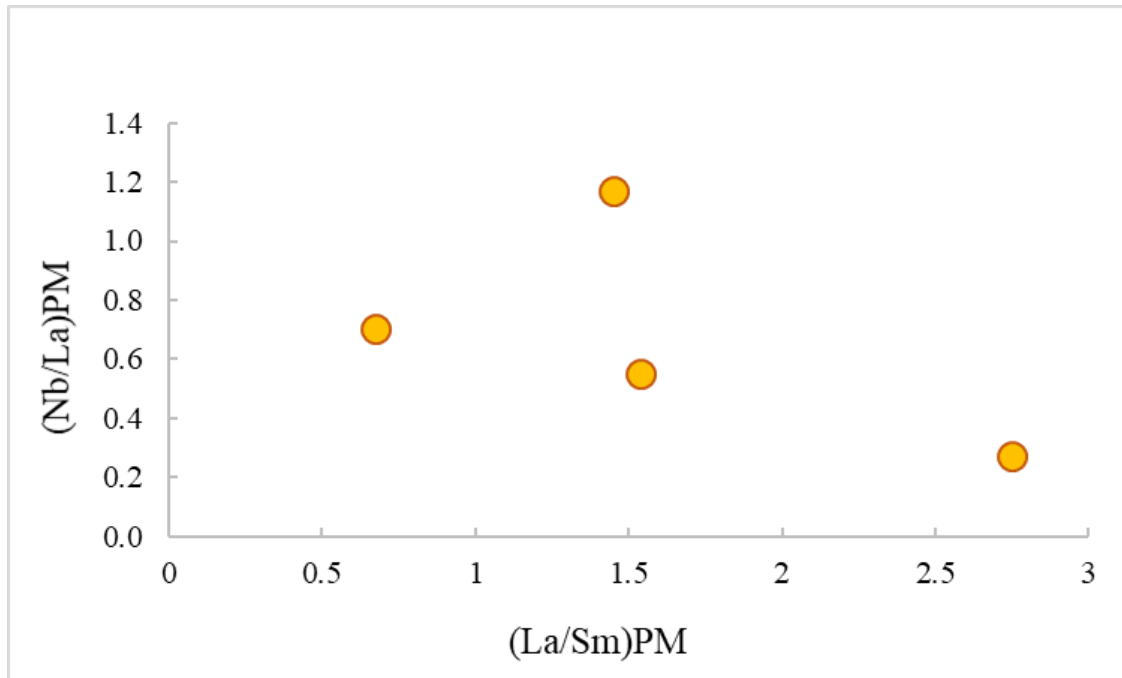
On the discrimination diagrams, the gabbro of the **Kharanur massif** lie in the fields of island-arc rocks. The value (Ta/Yb) vary 0.14-0.19, Sr/Y more 25, (La/Nb)PM is three, it may indicate the participation of the subduction component in the melts.

In the gabbro of the **Kholbyn-Khairkhan massif**, the value (Ta/Yb) vary 0.04 – 0.3, Sr/Y less 25, (La/Nb)PM is 0.8 – 1.8. On the discrimination diagrams, the gabbro lie in the fields MOR – OIB basalts.



## Isotopic characteristic

- The isotope data are the Sm/Nd ratios: 0.14 – 0.19,  $^{143}\text{Nd}/^{144}\text{Nd}$  0.511730 – 0.512715,  $\epsilon \text{ Nd (0)}$  (-10) – (+1.5) and the epsilon Nd changes from negative to positive values with increasing rock alkalinity;
- Epsilon Nd (1020 m.y.) vary from (-5) to (+2.5). The rocks have a strong negative correlation (La/Sm)PM – (Nb/La)PM, which suggests the assimilation by crust material of the magmatic source.



- The magmatic source of the gabbro from the Kholbyn-Khairkhan massif is supposed to be assimilated by the crustal material of the Archean Gargan TTG complex.
- The Kholbyn-Khairkhan gabbro was formed from an enriched (terrigenous material from the TTG complex) mantle source.
- The calculated percentage of the crustal component is 9–25%.



THANK YOU FOR YOUR ATTENTION

