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U-depleted versus U-enriched signatures in complementary crust-mantle sources of volcanic rocks from Asia

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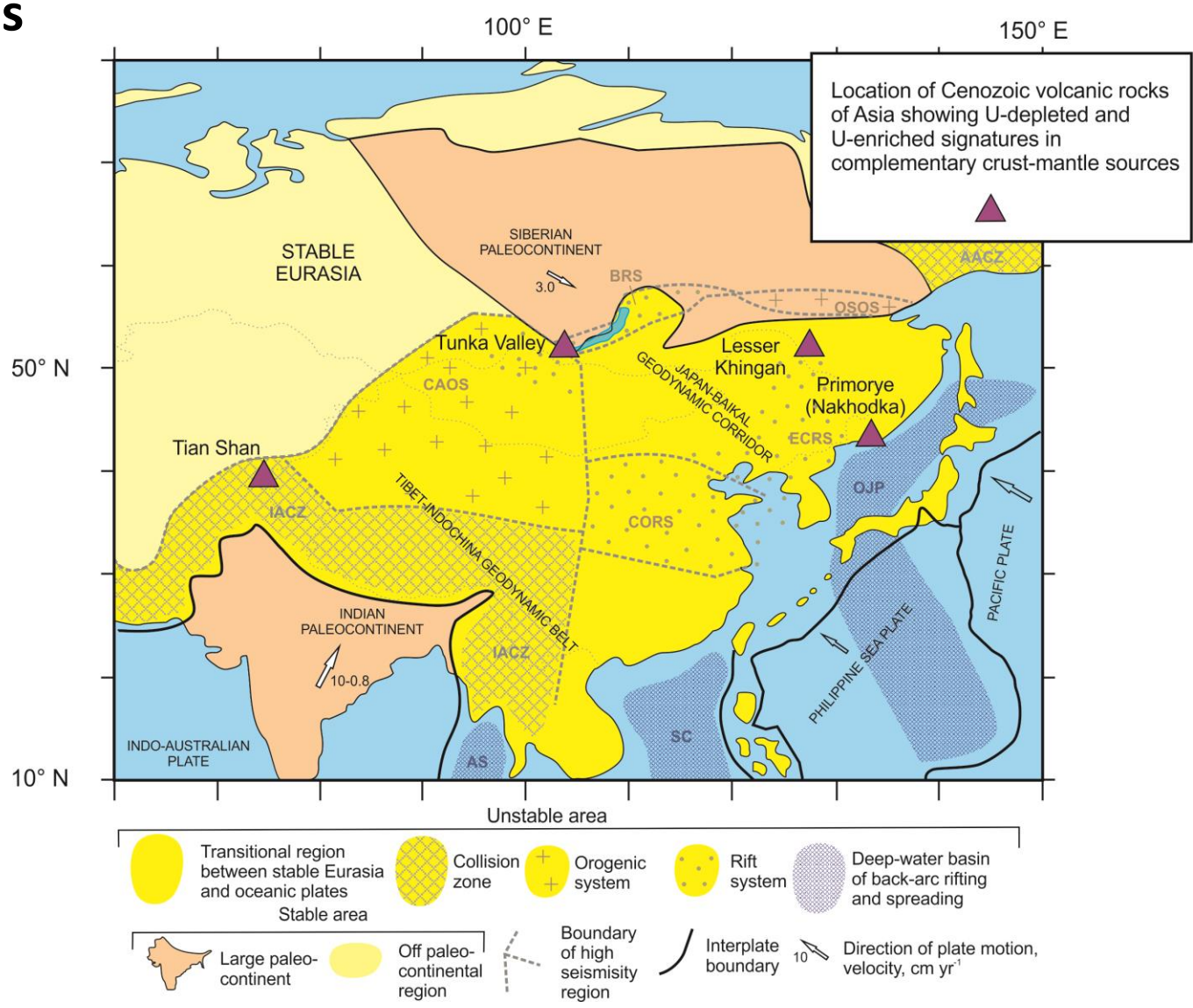

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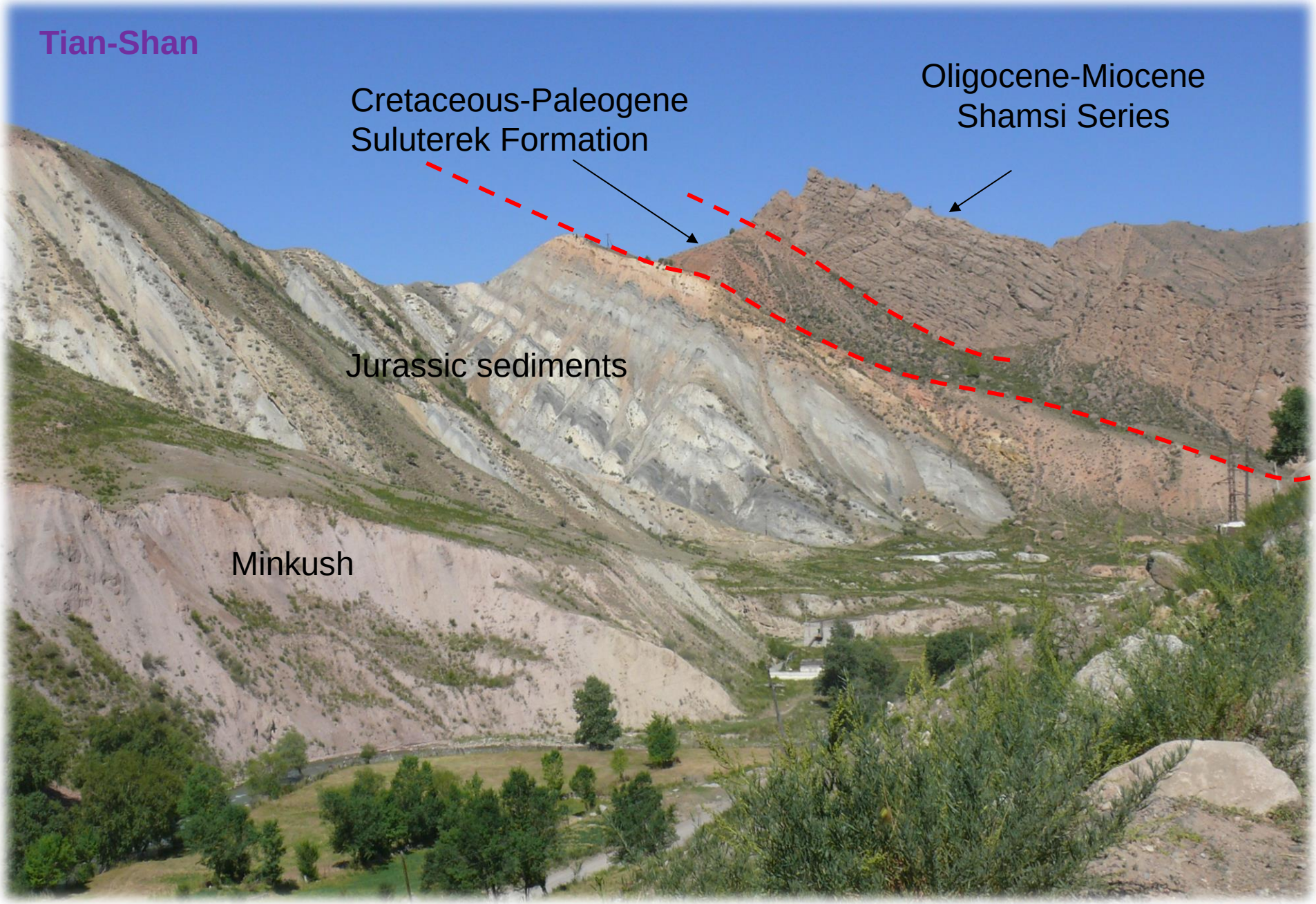
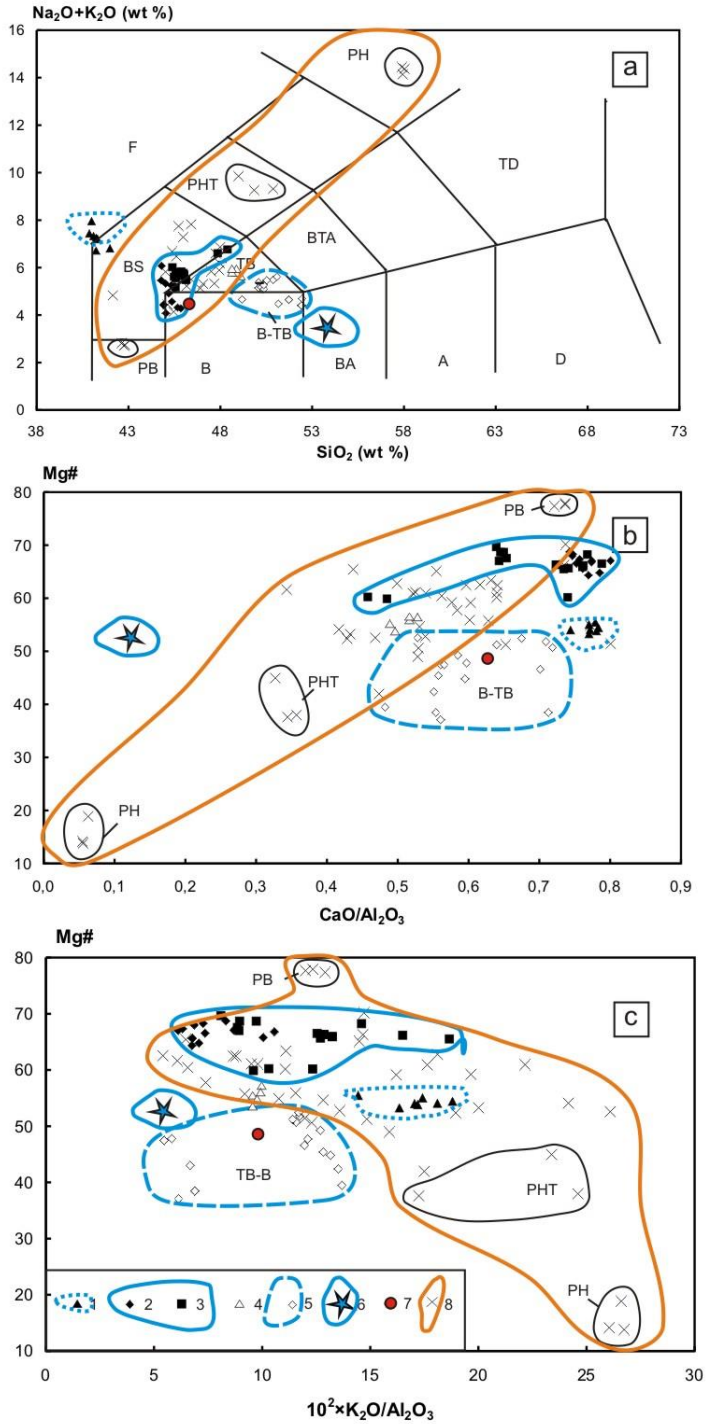
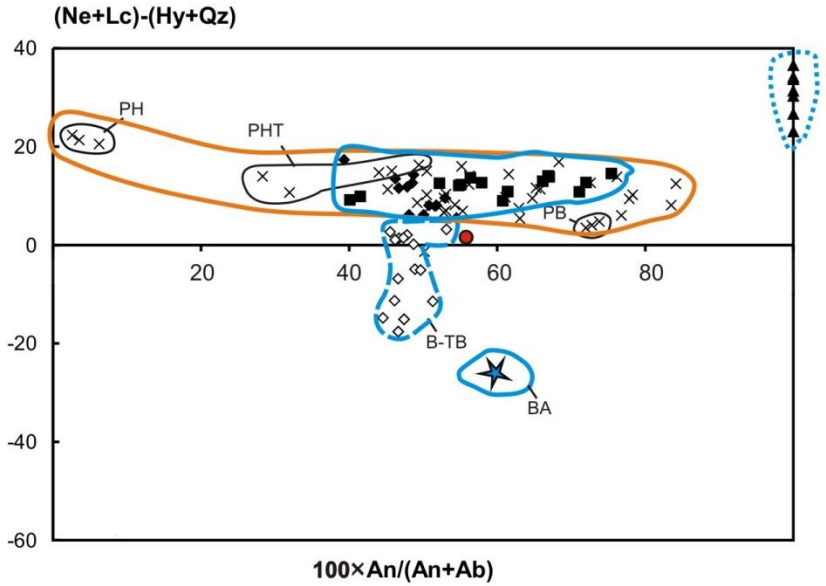

Tian-Shan
Cretaceous-Paleogene
Suluterek Formation
Oligocene-Miocene
Shamsi Series
Jurassic sediments
Minkush

TAS diagram (a), Mg# vs. CaO/Al_2O_3 (b), Mg# vs. $10^2 \times K_2O/Al_2O_3$ (c) and (Ne+Lc)–(Hy+Qz) vs. 100×An/(A+Ab)

1–6 – groups of K-Pg rocks from Northern Tian Shan: 1 – foidites from Kenkol, 2 – basanites from Uchkuduk, 3 – basanites from Karatayun, Kargon and Kastek, 4 – trachybasalts from Tashkumyr, 5 – basalts and trachybasalts from Suluterek, Bailamtal, and Toraigyr, 6 – basaltic andesites from Tossor, 7 – high-Ti basalts from Tekelik; 8 – K-Pg picrobasalt-basanite-phonolite series from the Tuyon basin, data from (Sobel, Arnaud, 2000; Ji et al., 2006; Han et al., 2008).





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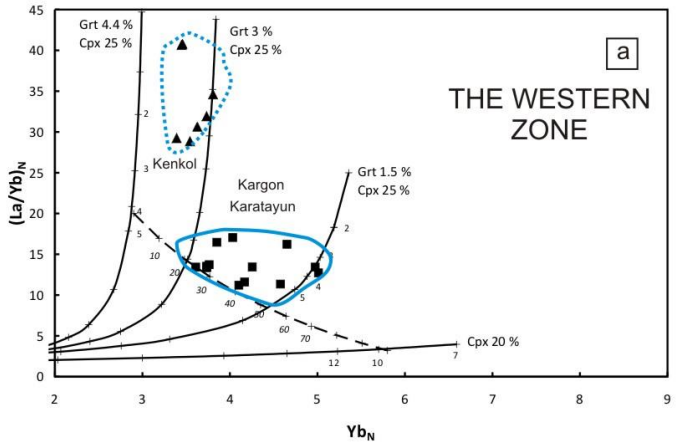
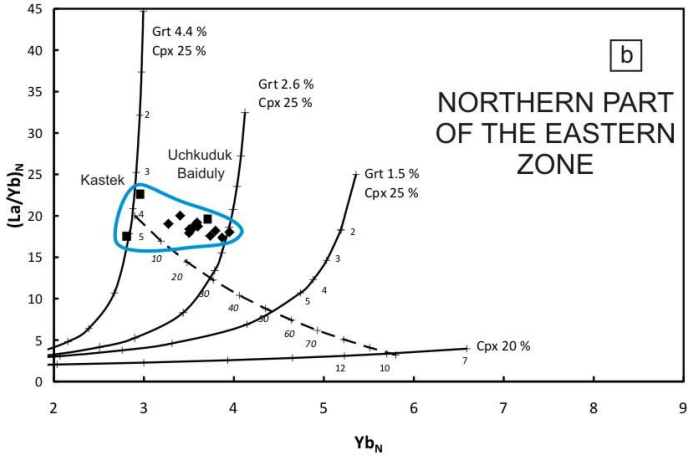
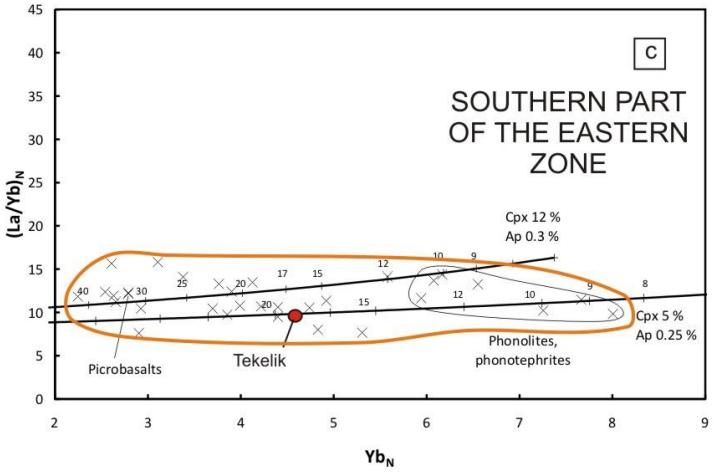
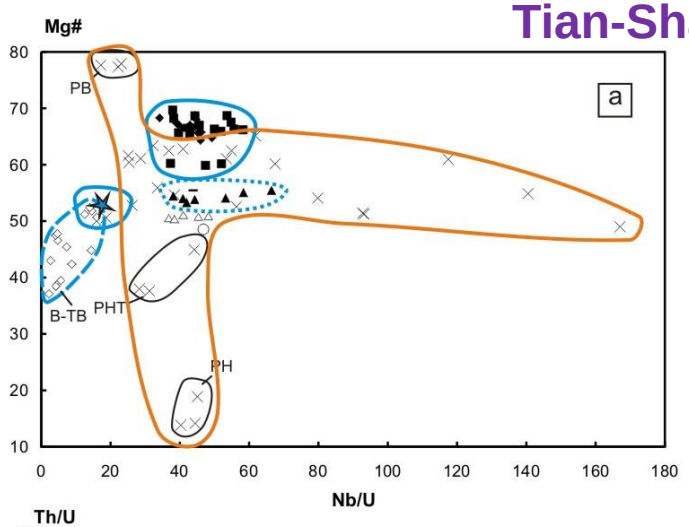
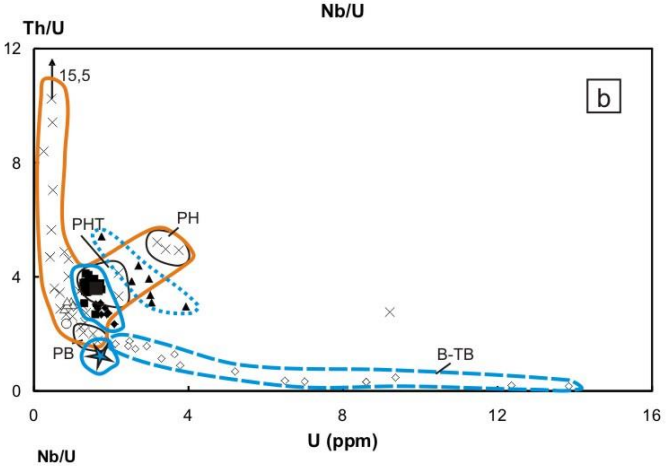
Tian-Shan

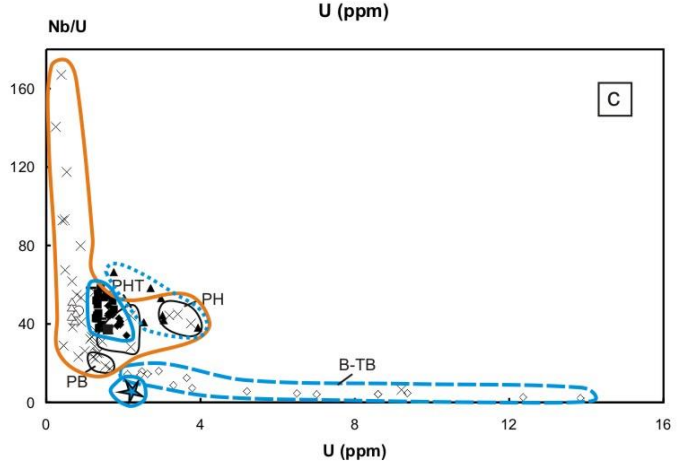

a
THE WESTERN ZONE
Grt 4.4 %
Cpx 25 %
Grt 3 %
Cpx 25 %
Kenkol
Kargon
Karatayun
Grt 1.5 %
Cpx 25 %
Cpx 20 %
(La/Yb)N
YbN


b
NORTHERN PART OF THE EASTERN ZONE
Grt 4.4 %
Cpx 25 %
Grt 2.6 %
Cpx 25 %
Uchkuduk
Baiduly
Kastek
Grt 1.5 %
Cpx 25 %
Cpx 20 %
(La/Yb)N
YbN

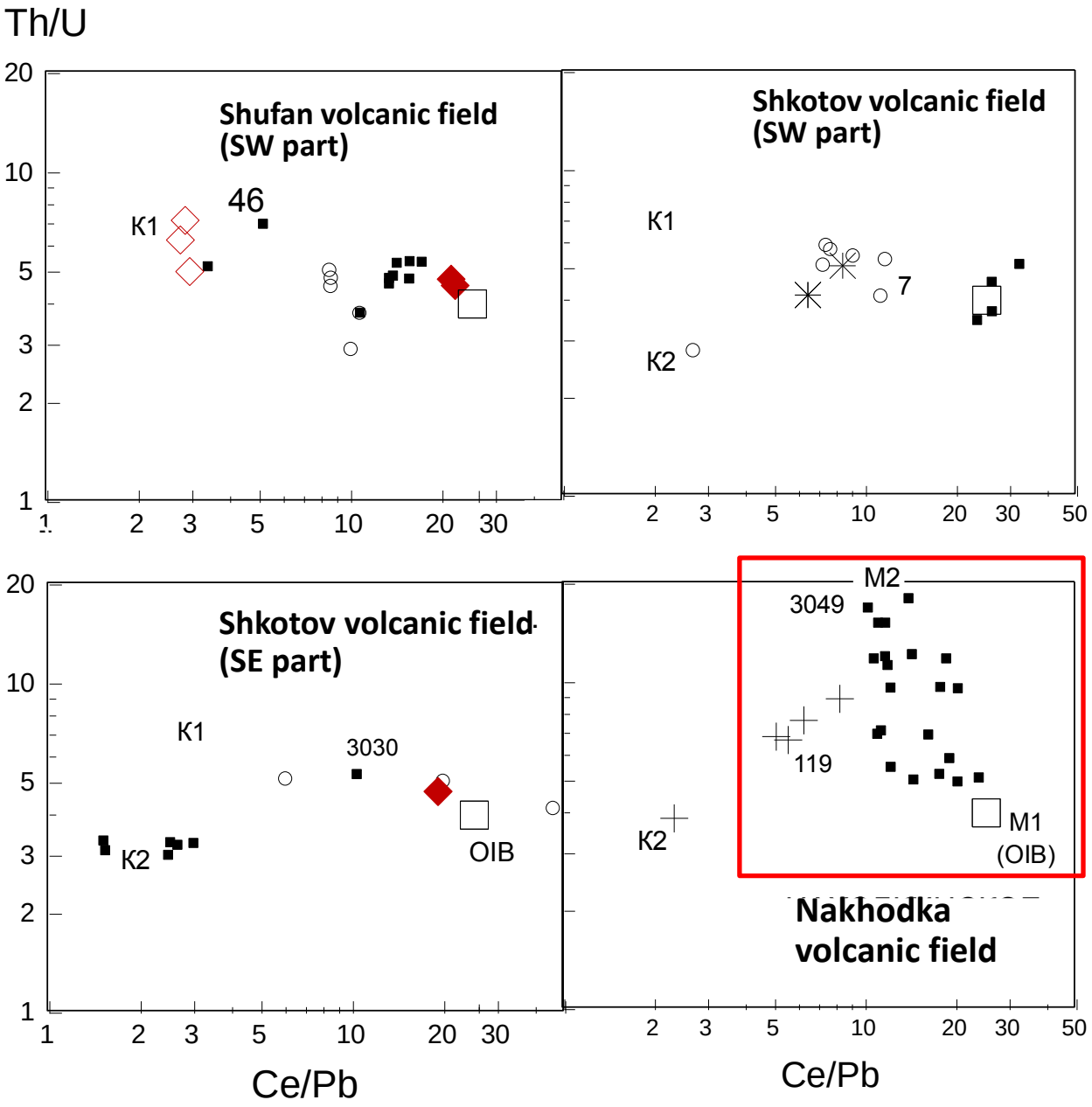

c
SOUTHERN PART OF THE EASTERN ZONE
Cpx 12 %
Ap 0.3 %
Cpx 5 %
Ap 0.25 %
Picrobasalts
Tekelik
Phonolites,
phonotephrites
(La/Yb)N
YbN


Mg#
a
PB
B-TB
PHT
PH
Nb/U


Th/U
b
15,5
PHT
PH
PB
B-TB
U (ppm)


Nb/U
c
PHT
PH
PB
B-TB
U (ppm)

Primorye (Nakhodka)



Th/U – Ce/Pb in volcanic rocks from Southern Primorye

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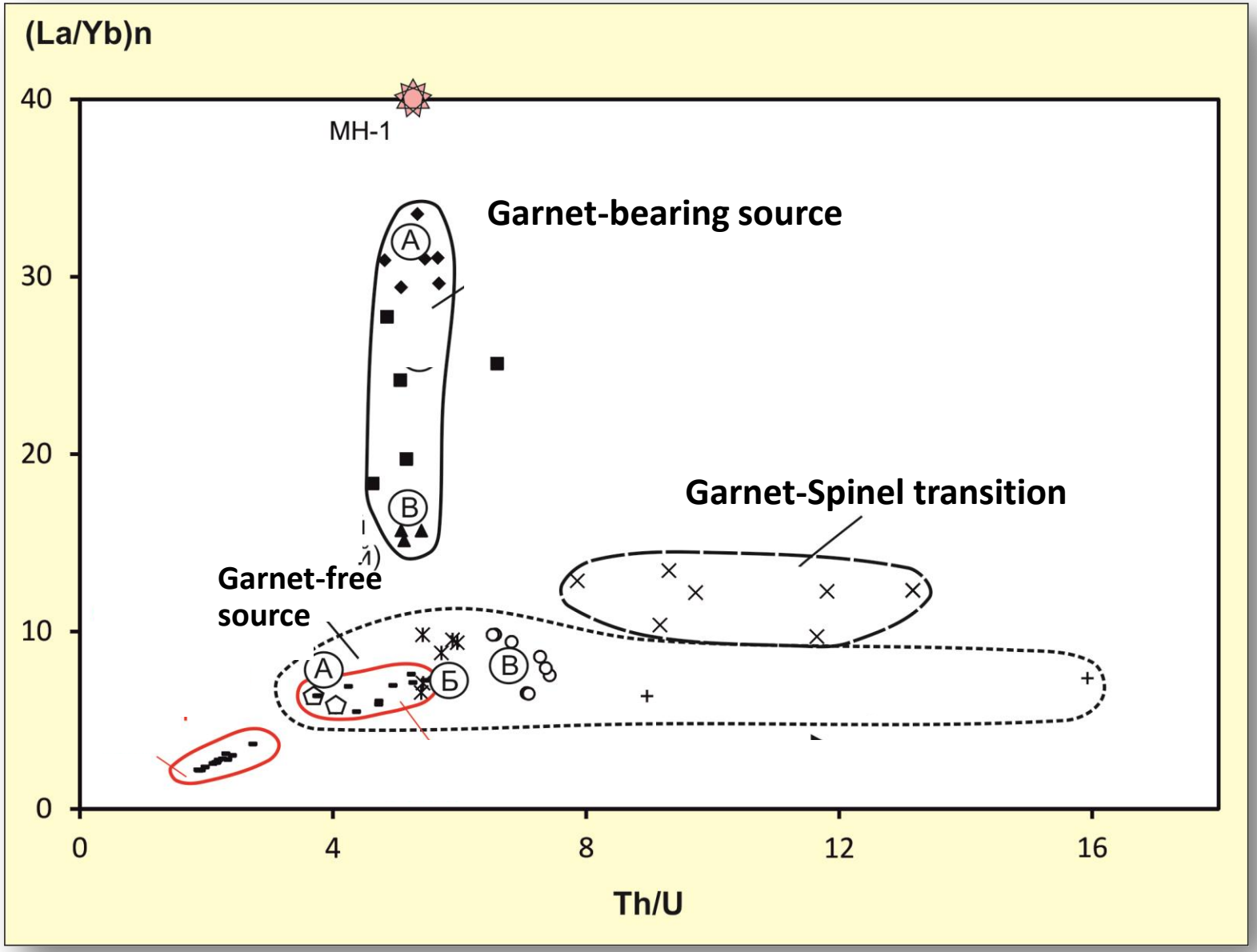

$(La/Yb)_{NPM}$ – Th/U in Miocene lavas from Lesser and Greater Khingan

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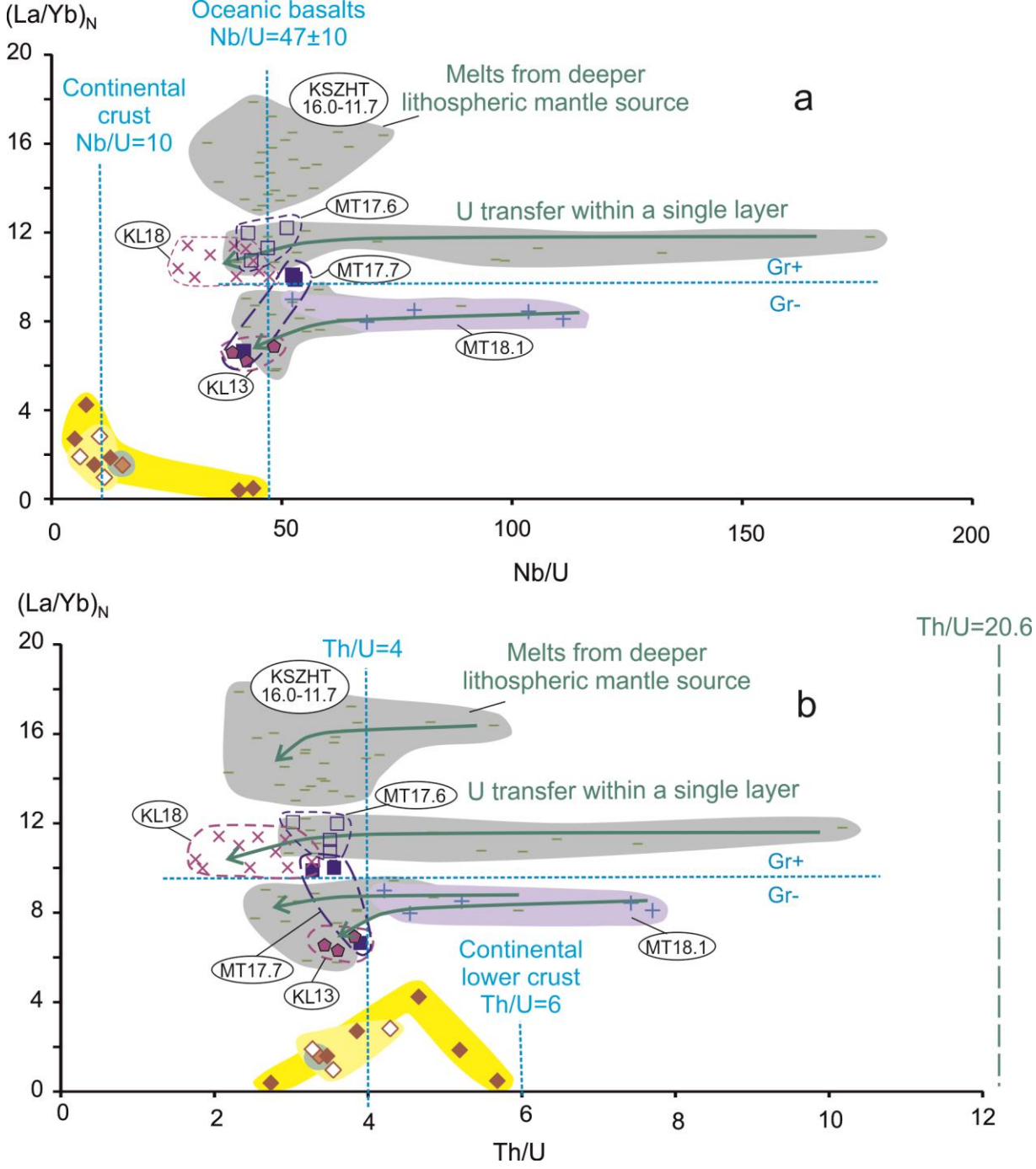
Tunka Valley



Comparison of basic pseudotachylytes from the MSF and volcanic rocks from the KSZHT on $(La/Yb)_N$ – Th/U (*a*) and $(La/Yb)_N$ – Nb/U (*b*) diagrams. Symbols are as in Figure 9. Green arrows indicate extraction of U from layers by oxidized fluids that result in decrease of $(La/Yb)_N$ due to locally increasing degrees of melting. The upper Th/U limit of 20.6 is shown for a source region from Pb isotope data. $(La/Yb)_N$ is calculated using the pyrolite composition after [McDonough, Sun, 1995].

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CONCLUSION

Ranges of Th/U ratios of volcanic rocks from the Tunka Valley, Central Baikal Rift System, Kamar-Stanovoi Transtension Zone (KSZHT) in comparison with those from Crus-Mantle Tranzition sources in other Asian regions

Region, area	Central BRS KSZHT	Sea of Japan Nakhodka v.f.	Tian Shan South	Tian Shan Middle-North	Lesser Khingan Udurchukan v.f.
Crust	2.5<Th/U<6	4<Th/U<10	No erupted melts	0.17<Th/U<1.8	No erupted melts
CMT Grt-	2.5<Th/U<8	5<Th/U<20	2<Th/U<15.5	No erupted melts	4<Th/U<16
CMT Grt+	2<Th/U<10	No erupted melts	No erupted melts	OIB-like	8<Th/U<13
Deeper mantle	2<Th/U<6				OIB-like

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