Geol. Mag. **154** (3), 2017, pp. 419–440. © Cambridge University Press 2016

10.101 / 0016 56 16000042

[illegible]

[illegible]
10003
210016,
36 4 -5305,

(*Received* 1 2015; *accepted* 2016; *first published online* 1 1 2016)

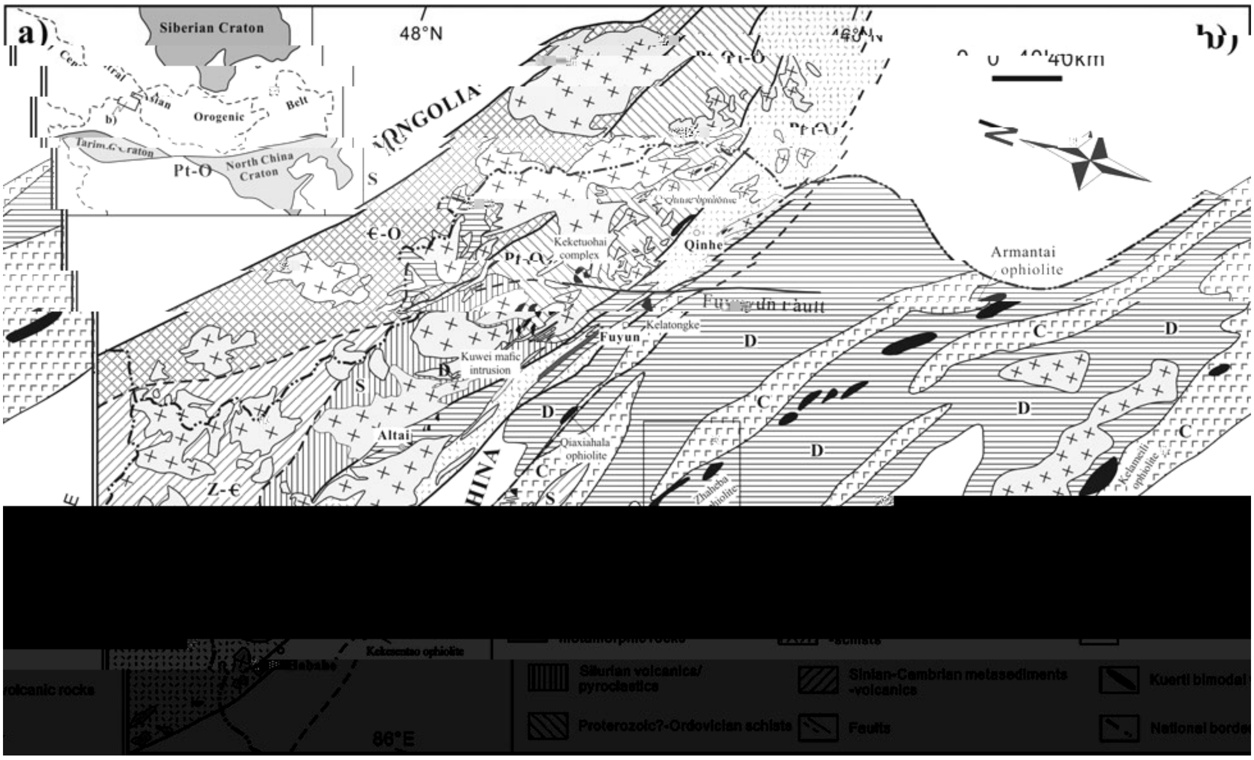
Abstract [illegible] ~4 5 [illegible] ~400 [illegible] ε (*t*) (13 20) [illegible] δ (+5.3 ‰) [illegible] 1% [illegible]

1. I[illegible]

[illegible] (e. *et al.* 200 , 200 , *et al.* 2012; *et al.* 2012, 2013; *et al.* 2013) [illegible] *et al.* 200 ; *et al.* 200 a) [illegible] *et al.* 2000; 2003; *et al.* 200 ; 2014) [illegible] (2011) [illegible] (2014) [illegible]

[illegible] *et al.* 2002; *et al.* 2004, 200 a) [illegible] *et al.* 200 a,b [illegible] 2012) [illegible] *et al.* 2003; *et al.* 2003; *et al.* 200 a) [illegible]

† [illegible] 1 6


a)
Siberian Craton
Central Asian Orogenic Belt
Tarim Craton
North China Craton
Pt-O
48°N
40 km
MONGOLIA
Keketuohai complex
Qinhe
Armantai ophiolite
Fuyun fault
Fuyun
Kelatongke
Kuwei mafic intrusion
Altai
Qiaxiahala ophiolite
Zhaheba ophiolite
Kelameili ophiolite
CHINA
[redacted]

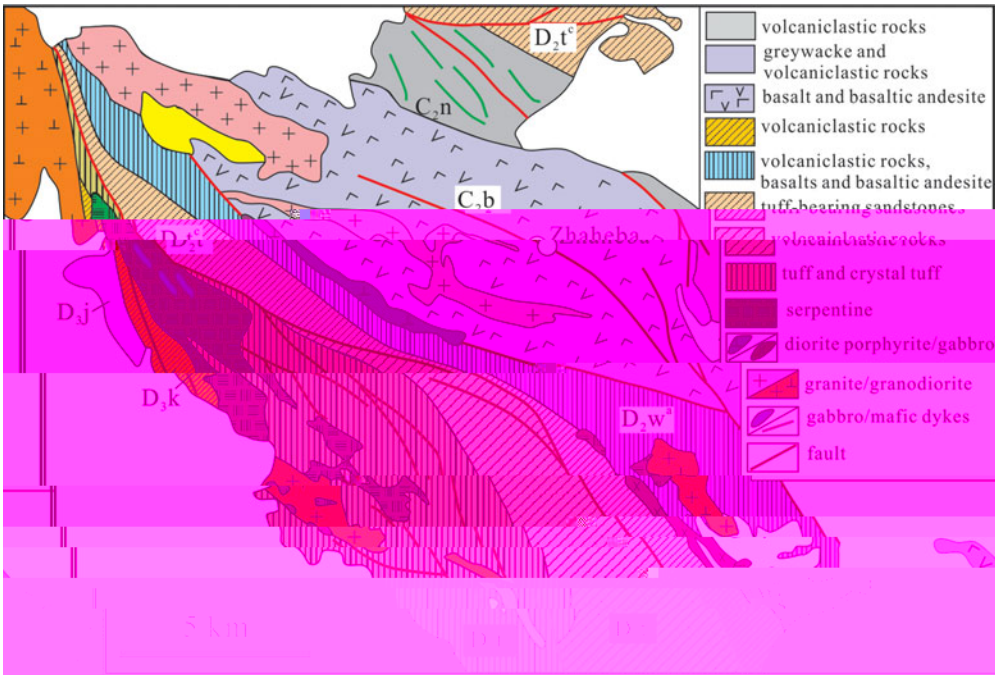


Figure 2. [illegible] *et al.* 200[illegible], 200[illegible] *a* [illegible], 1[illegible] 3).

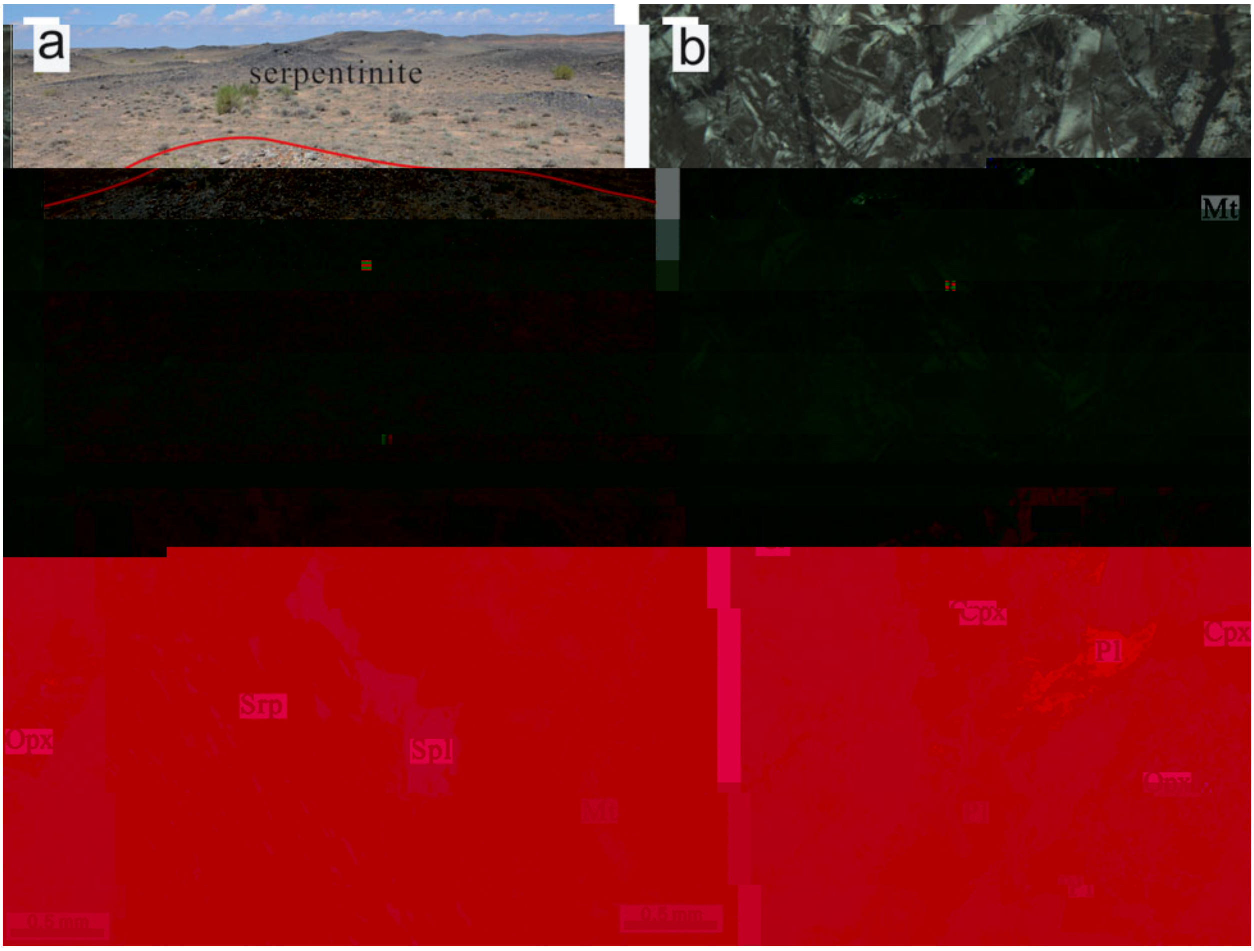


Figure 3. [illegible] > [illegible]0% [illegible] %[illegible] 1% [illegible] 1% [illegible] 1% [illegible] 1% [illegible]

3. A a ca c

3.a. Z c U Pb a a H O a a

(2013 01, 46° 32′ 51 , °2′ 4) ... 1 e (2013 02, 46° 33′ 2 , °2′ 36) ...

... *et al.* (2011). ... (*et al.* 2010) ... (2003). ... 5 % ... 2, ... 1 //.

... 12 0 ... *et al.* (2010*a*). ... = 0.0020052), ... δ ... 5.31 ‰ (*et al.* 2010*b*). ... δ ... 5.44 ± 0.21 ‰ (2), ... 5.4 ± 0.2 ‰ (*et al.* 2013). ... 3 ... 1 //.

3.b. M a a a

... 00 ... 15 ... 15 ... 20 ... 4 ... 5 ... 1 //.

3.c. W - c a a

... 1 ... 100 ... *et al.* (2004). ... 1 ... 2 %. ... 6000 ... 1 ... *et al.* (2004). ... % 50 ... + ... $_3$ ... -1, -2 ... -2, ... -1 ... 3, ... 3 5 %. ... 1.

... 1 ... + ... $_3$ ... (- -) ... *et al.* (2004). ... / ^{6} ... ^{143} /^{144} ... ^{6} / = 0.11 4 ... ^{146} /^{144} = 0. 21 , ... 0. 102 ... 0. 0506 ... -1, ... ^{143} /^{144} ... 0.512104 ... 0.5126 1 ... -1. ... 2.

4. A a ca

4.a. Z c U Pb a

... 100 150 μ ... 1 1 2 1. ... 1 % ... 4). ... (22 123 11) ... (5 11) ... 0.4 0. ... 30 ... 4 5. ± 2.5

[illegible]

[illegible]	2013 01-1	2013 01-3	20132 01-4	2013 01-5	2013 01-6	2013 01-	2013 01-	2013 01. 1	2013 01. 2	2013 01. 4
					Major elements (%)					
[illegible]2	3 . 0	4 .20	3. .41	3 .62	3. .22	3. . 2	3. .05	4 .22	46.4	51.2
[illegible]2	0.05	0.20	0.05	0.05	0.04	0.05	0.04	0.14	0.12	0.2
[illegible]2 3	0.61	1. 6	1.04	0.6	0. 0	0. 4	0. 0	1 .2	1. .64	1. .33
e2 3	.44	4.6	.	. .36	.5	.16	. 4	3.6	3.24	3. .
[illegible]	0.0	0.10	0.11	0.11	0.11	0.0	0.11	0.0	0.0	0.0
[illegible]	3 .21	24.5	3 . 2	3 . .	3. .0	3. .31	3 .44	10.04	. .03	5. .

e 1. . . . , , e.

1 e . e %e	2013 01-1	2013 01-3	20132 01-4	2013 01-5	2013 01-6	2013 01-	2013 01-	2013 01. 1	2013 01. 2	2013 01. 4
.	0.005	0.064	0.00	0.005	0.00	0.003	0.003	0.051	0.044	0.222
. .	0.021	0.34	0.044	0.042	0.0 2	0.031	0.033	0.310	0.25	1.450
,	0.004	0.04	0.00	0.00	0.011	0.005	0.005	0.04	0.043	0.21
. .	0.011	0.232	0.036	0.044	0.012	0.034	0.00	0.123	0.0 0	0.. 3
	0.0 0	0.036	0.03	0.03	0.06	0.026	0.025	0.046	0.031	0.06
.	0.26	1. 10	6.600	1. 0	0.. 3	0.233	1.150	1.5 0	0.516	0.1. 5
.	0.406	0.0. 2	0.12	0.112	0.0. .	0.1. .	0.054	0.16	0.1. 1	0.6. 5
.	0.046	0.034	0.014	0.02	0.050	0.030	0.010	0.050	0.02	0.130
.	0.1. 1	0.144	0.203	0.364	0.042	0.0. 4	0.0 .	0.066	0.042	0.0 3

1 e . e %e	2013 01. 5	2013 01. 6	2013 01. (1)	2013 01. (1)	2013 01. . (1)	2013 03. 2 (1)	2013 03. 3 (1)	2013 03. 4 (1)	2013 03. 5 (1)	2013 01. 3 (2)
					Major elements (%)					
. 2	4 .1	45.	4 . .	53.1	51.. 1	50.40	50.54	50.52	51.22	52.3
. 2	0.34	0.15	1.40	1.24	1.31	1. 0	1.63	1.31	1.1	0.33
2 3	1 .. .	1. .5	16.5	16.1	15.. 3	15.	16. 6	15.55	15.4	1. .61
e2 3	4.52	3.34	.	.11	.43	. .0	. .50	. .42	. 2	3.44
. .	0.0	0.0	0.11	0.10	0.11	0.13	0.11	0.14	0.12	0.0
. .	6.	.42	4. 0	4.2	4.41	5. .	3.2	6.06	.14	4.
	11.03	12.61	6.22	5. 5	6.3	6. 5	4.52	.4	.26	.. 0
2	4. 6	.3	. 2	.3	.00	4.52	.31	4. 0	4.0	.11
. 2	0.13	0.11	0.3	0.31	0.42	2.04	0.33	1.2	2.03	0.1
2 5	0.04	0.02	0.62	0.62	0.65	0. 4	0.6	0.4	0.44	0.04
.	3. 2	3.26	4.24	2.54	2.. 3	2.2	5.14	2.65	1.. 3	2. .
.	. . . 5	. . . 2	. . . 6	. . . 0	. . .4	. . .40	. . . 1	. . .6	. . .6	. . . 1
.	4..	.4	. .11	. 0	.42	6.56	.64	6.0	6.11	.2
. #	5	1	55	54	54	56	41	56	64	4
					Trace elements (ppm)					
.	. .0	4.. 5	1.16	1.12	1.4	. .0	40.4	5.2	6. 2	5. 1
e	0.22	0.135	1.2 4	1.6 3	1.316	1.. 53	1.034	1.100	0.5 5	0.62
e	25.0	23.	1 .6	1 .5	1 .5	.5	1. .2	25.2	1 ..	1 .0
.	11	3.	1 6	166	1 2	22	22	254	1	5.
.	34.	163	60.5	62.6	64.1	116	1 ..	. 0.	203	23.
.	24.2	21.6	26..	23.6	24.6	2 .	2 .5	2 .0	2 .0	16.4
.	. 4.	1 5	63.6	50.	51.4	6.	2 .	5 .3	132	1.1

e 1. e

1 e	2013 01. 5	2013 01. 6	2013 01. (1)	2013 01. (1)	2013 01. (1)	2013 03. 2 (1)	2013 03. 3 (1)	2013 03. 4 (1)	2013 03. 5 (1)	2013 01. 3 (2)
e %de										
	3.	1.20	3 .60	46. 0	4 .30	23.40	43.00	25.20	32. 0	6.56
e	. .	2.6	.50	.1. 0						

e 1.

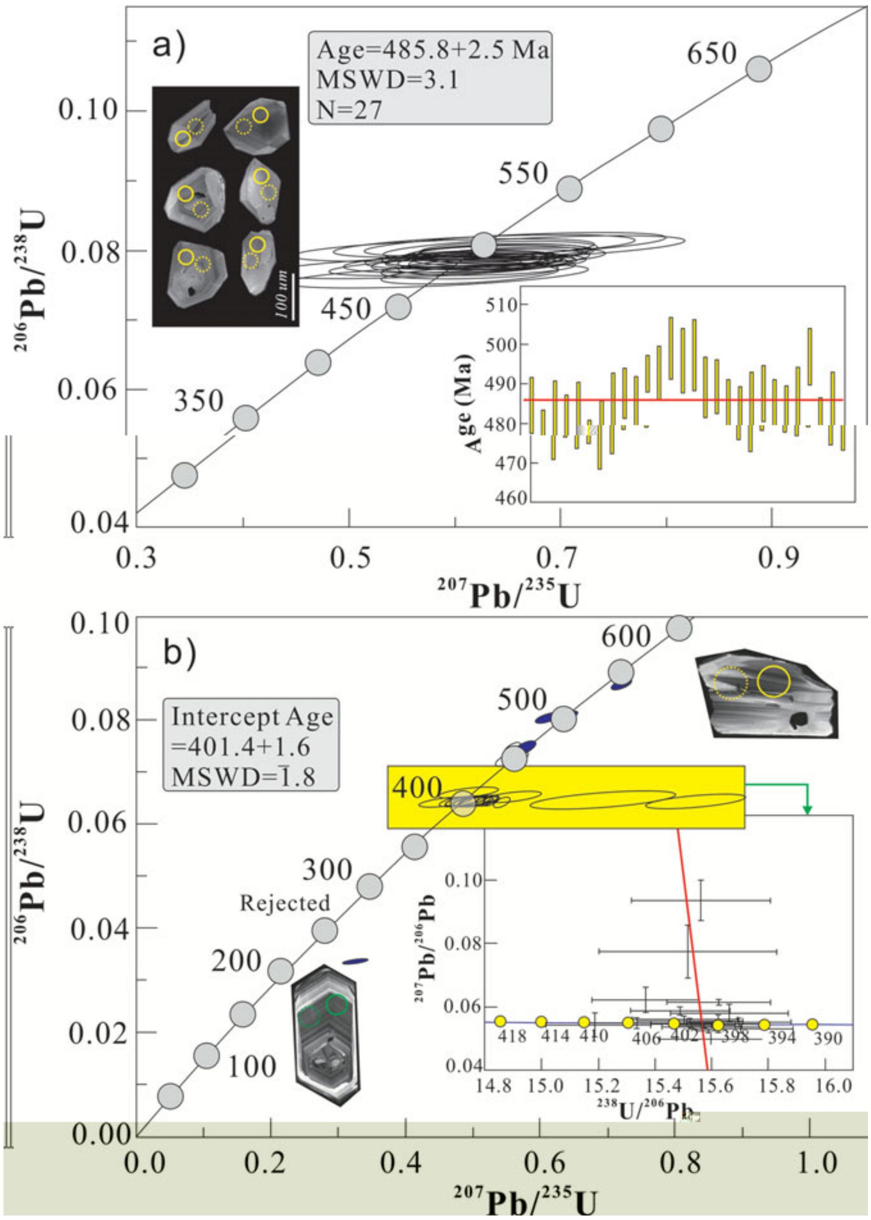
1 e ɐ %de	2013 01 11 (2)	2013 02 1 (2)	2013 02 2 (2)	2013 03 1 (1)	2013 03 6 (1)	2013 01 10 (2)	04 06 (1)	04 24 (1)	04 2 (1)	03 1 (1)
				Trace elements (ppm)						
	1 .4	36.	42.4	26.0	32.4	1 .	/	/	/	/
e	0.3 5	0.153	0.35	1.1	0. 4	0.46	/	/	/	/
ɐ	32.5	33.2	34.5	25.1	26.3	32.1	13.4	20.5	1 .	20.3
	1 4	203	21	33	341	1 5	144	1 4	214	265
	56.5	44.2	4 .	1 .	22.2	53.	15	162	214	265
	34.	3 .5	3 .3	23.1	24.	33.	20.6	30.	2 .	20.2
	66.4	4.6	6.4	25.4	2 .1	66.6	.1	114	5.5	.02
	6.4	236.4	256.	205.4	20 .	114.20	/	/	/	/
	4 .0	44.1	4 .0	4.	103	44.1	/	/	/	/
	12.0	11.1	11.2	14.	13.6	12.0	/	/	/	/
	0.5	1.420	1.0 0	3.130	3.2 0	0.5 3	4.	1 .1	22.0	1 .2
	1	1 50	5	2 0	24	6 6	1	31	111	6
	13.0	13.0	13.2	21.1	22.	12.5	13.2	13.2	14.	20.1
	54.	42.3	41.5	144	154	52.	243	133	164	151
	1.2	0. 4	0. 55	11.315	11. 5	1.25	20.2	12.	21.	12.2
	0.025	0.030	0.02	0.051	0.052	0.02	/	/	/	/
	0.3 1	0.2 6	0.32	1.560	1.450	0.360	/	/	/	/
	0.2	1. 20	1.030	0.365	0.406	0.336	/	/	/	/
	11	3 2	346	25	50	4.3	/	/	/	/
	10. 0	. 40	.610	26.40	26. 0	10.50	30.6	32.2	40.1	26.4
e	23.00	1 . 0	1 .40	51.50	54. 0	22.30	5 .	62.	2.3	52.5
	2. 0	2.520	2.510	5. 50	6.1 0	2.6 0	6.	. 4	10.5	6.4
	11. 0	11. 0	11.60	22.30	24.30	11.60	2 .5	31.2	43.1	24.4
	2.540	2. 00	2.6 0	4.4 0	4. 00	2.3 0	4.5	5.2	6.	4. 5
	0. 6	0. 1	0. 0	1.163	1.25	0. 3	1.45	1.5	2.0	1.03
	2.4 0	2. 13	2. 54	4.14	4.46	2.522	3.56	4.01	5.35	4.23
	0.3 6	0.3	0.3	0.612	0.660	0.3 4	0.4	0.54	0.64	0.63
%	2.1 0	2.150	2.220	3.420	3.6 0	2.130	2.5	2.	3.24	3. 5
	0.46	0.446	0.444	0. 2	0. 5	0.46	0.4	0.52	0.5	0.
	1.350	1.230	1.240	2.120	2.2 0	1.310	1.32	1.3	1.45	2.25
	0.1 0	0.16	0.1 5	0.304	0.32	0.1 4	0.1	0.2	0.2	0.34
	1.210	1.050	1.120	1. 60	2.110	1.210	1.25	1.23	1.24	2.13
	0.1 4	0.164	0.165	0.2 1	0.323	0.1 3	0.20	0.1	0.1	0.34
	1.3 0	0. 41	1.040	3.2 0	3.510	1.460	5.3	3.2	4.16	3. 2
	0.0 4	0.062	0.051	0.5	0.644	0.0	1.35	0.6	1.16	0.6
	0.151	2.0	1.50	2. 5	1.	0.33	/	/	/	/
	0.3 4	0.206	0.200	45.20	35.10	0.41	.13	.0	4.1	21.06
	1. 0	0. 61	0. 1	. 60	.2 0	1. 0	4.50	2.63	3.20	.41
	0.500	0.304	0.302	2. 30	3.4 0	0.501	1.	0.6	1.46	2.5

e _ e 1e e / e ee .
1 e 04 06, 04 26, 04 2 04 1 e *et al.* (200 *a*).

e 2. 1 1

1 e		%e	(11)	(11)	/	/ (1σ)	(/)	(11)	(11)	14 / 144	143 / 144 (1σ)	(143 / 144)	ε (t)
2013	01. 3	(2)	0.36	3 2	0.002	0. 04030(2)	0. 04015	2.4	10.	0.13 4	0.512 3 (40)	0.5124 4	6.
2013	01. 10	(2)	0.5	6 6	0.0024	0. 04 5 (23)	0. 04 45	2.3	11.6	0.1235	0.512 0 (43)	0.5124 6	.1
2013	03. 1	(1)	3.13	2 0	0.0335	0. 06324(20)	0. 06133	4.4	22.3	0.121	0.512533(4)	0.512214	1.
2013	03. 2	(1)	2.	1320	0.0063	0. 042 (20)	0. 04255	4. 5	2 .6	0.1046	0.512 1 (51)	0.512445	6.3
2013	03. 3	(1)	.06	516	0.0452	0. 0536 (43)	0. 05111	5.	36.	0.0	0.512 0 (30)	0.512450	6.4
2013	03. 4	(1)	.65	14 0	0.01	0. 0422 (51)	0. 04120	4.55	24.5	0.1123	0.512 03(53)	0.51250	.5

ε (t) = 10 000((143 /144) (t)/(143 /144) (t) − 1). ε (t) (/) e e e 401 .



e 4. (e) 1 e e e e 1 e e e 1 e e 1σ e % e 2σ ( ) e e .

(. 4 = 2 , = 3.1). e - e 1 e % e1 e 4 ± 4 e e % e e e (*et al.* 2003). e 1 e e 1 e 100 200 μ e

e / 1 3. e - e , e e e e , 1 . 1 1 (1) e , 0 % e e , 1 % e % 1 , e e % e - e e 1 (2) e

(2, ... 4). ... 1 ... 2 ... 450 ... 500 ... 21 ... ^{206} ... ^{23} ... 401 ± 2 ... (= 3.3). ... ^{206} ... ^{23} ... ^{20} ... ^{235} ... 401.4 ± 1.6 ... (= 1.) ... (... 4), ... ^{206} ... ^{23} ... (..., 1 ... 3).

4.b. M... a c...

4.b.1. Spinel composition

(... 3). ... 100 ... 300 μ ... 11 ... 4 ... 1 ... $_2$ $_3$ ... $_2$ $_3$ ... $_2$ ... (100 ... /(... + ...)) ... 44 ... 60 ... (100 ... /(... + ...)) ... 25 ... 61. ... 1 ... *et al.* 2010). ... 1 ... *et al.* 2013).

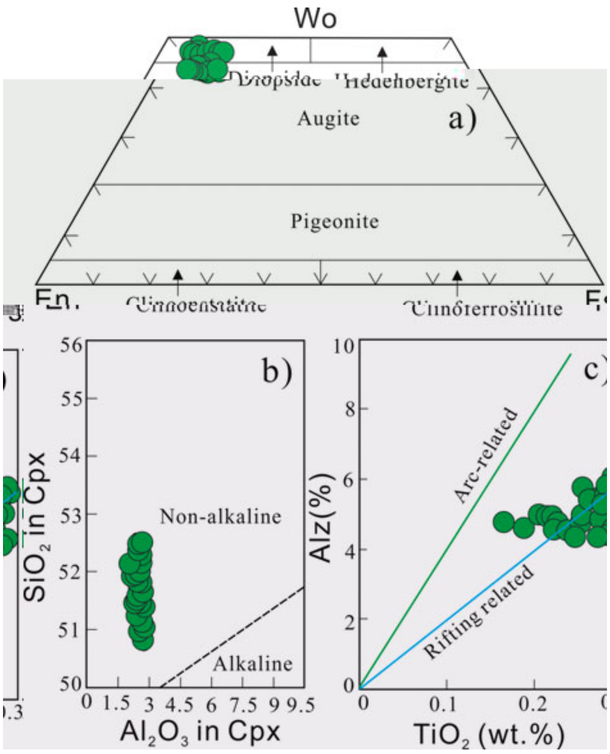
4.b.2. Pyroxene compositions

... 1% ... 1 ... (... = ... 4 ... 6). ... 1% ... $_2$ ... (... 0.5 %) ... 1 ... 11 ... 5 ... 1 ... 1% ... 1 ... 41 ... 4 ..., 46 ... 55 ... 1 ... (... 5). ... $_2$ $_3$, ... $_2$ ... $_2$ ... (... 5, ...).

4.c. W... -c ... a ... c

4.c.1. Serpentinites and cumulates

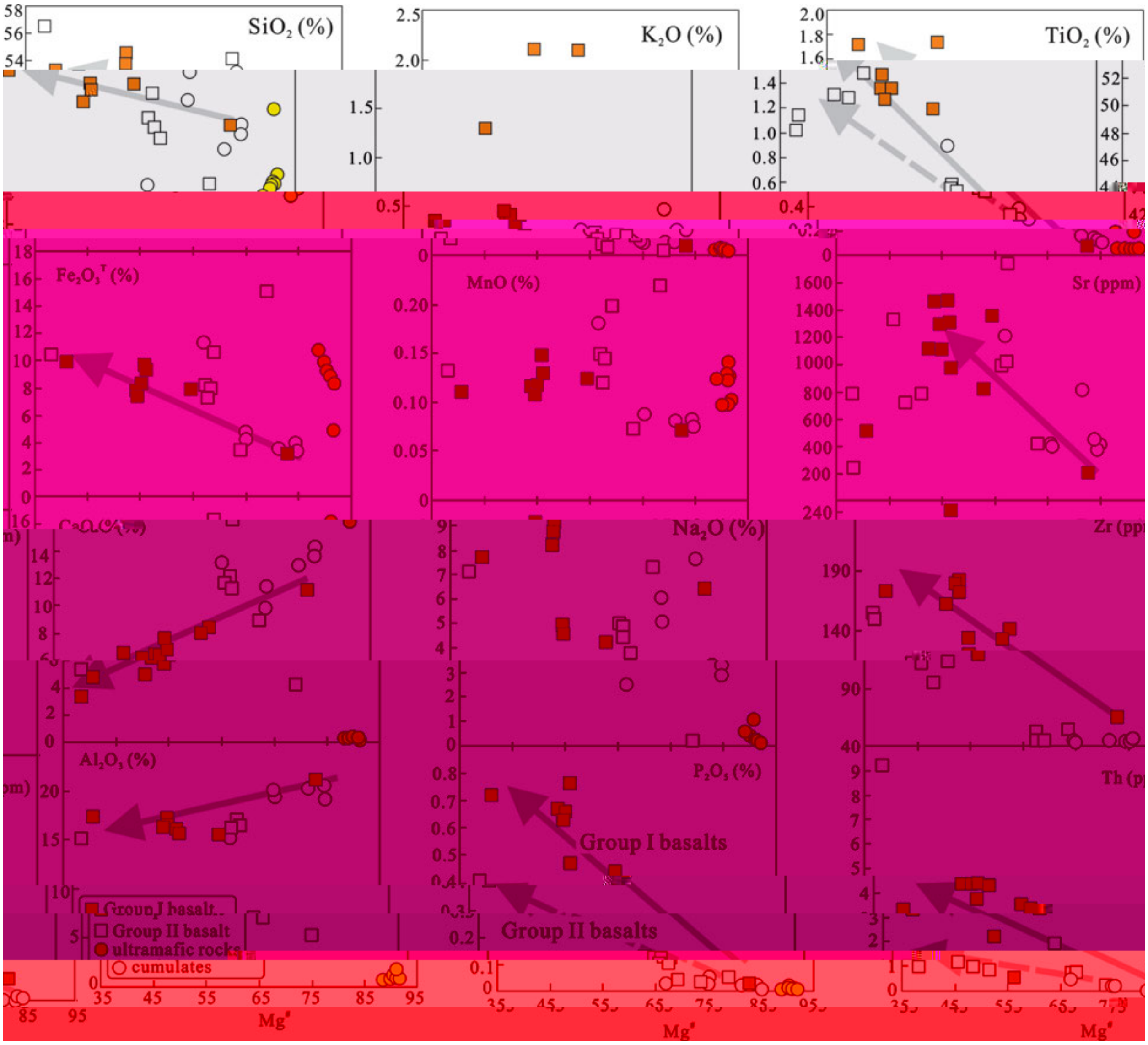
... (> 12 %, ...) ... $_2$ (... 40 %), ... $_2$ $_3$ (... % ... 1.0 %), ... $_2$ (0.03 ... 0.06 %), ... $_2$ (0.04 ... 0. 2 %) ... $_2$ (0.04 ... 0.05 %). ... $_2$ $_3$ ...



... 5. (... e) ... 1 ... 1% ... 1 ... (...) ... $_2$ (... %) ... $_2$ $_3$ (... %) ... (...) ... (1 ... %) ... $_2$ (... %) ... 1% ... 1 ...

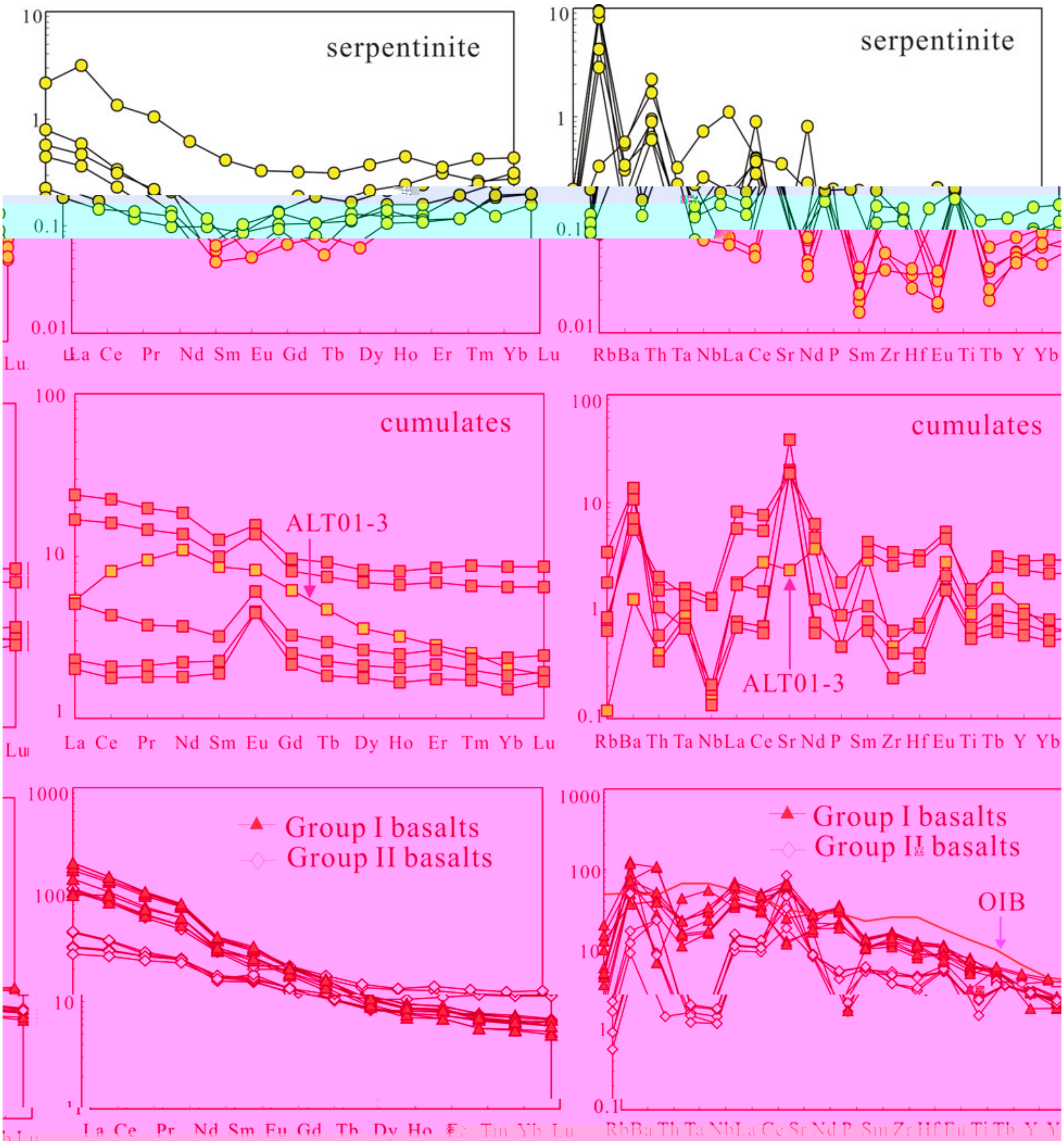
... 1 (... 1) ... (... 6). ... (3 ... 103 11 ...) ... (5 ... 11 ...) (... 1). ... (> 12 %) ... $_2$ ... $_2$ ... 1 ... (...) (e. ...) ... $_2$ $_3$, ... $_2$ $_3$ ... $_2$, ... % ... % ... 1 ... (...) ... (...) ... (... 1). ... 1 ... (...), ... 1 ... 1 ... (..., 2014 ... 1 ... & ... , 1 ...).

... $_2$ ... 45. ... % ... 51.2 %, ... 1 ... % ... $_2$ $_3$ (3.24 ... 4.6 %), ... $_2$ $_3$ (1 .3 ... 1 .6 %, ... 1 ... 2013 ... 01-3), ... (.54 ... 15.42 %), ... $_2$ (0.12 ... 0.34 %), ... $_2$ (2. 1 ... .3 %, ... 1 ... 2013 ... 01-3) ... $_2$ (0.11 ... 0.46 %) ... (... 1).



e 6. ... *et al.* 200 ...

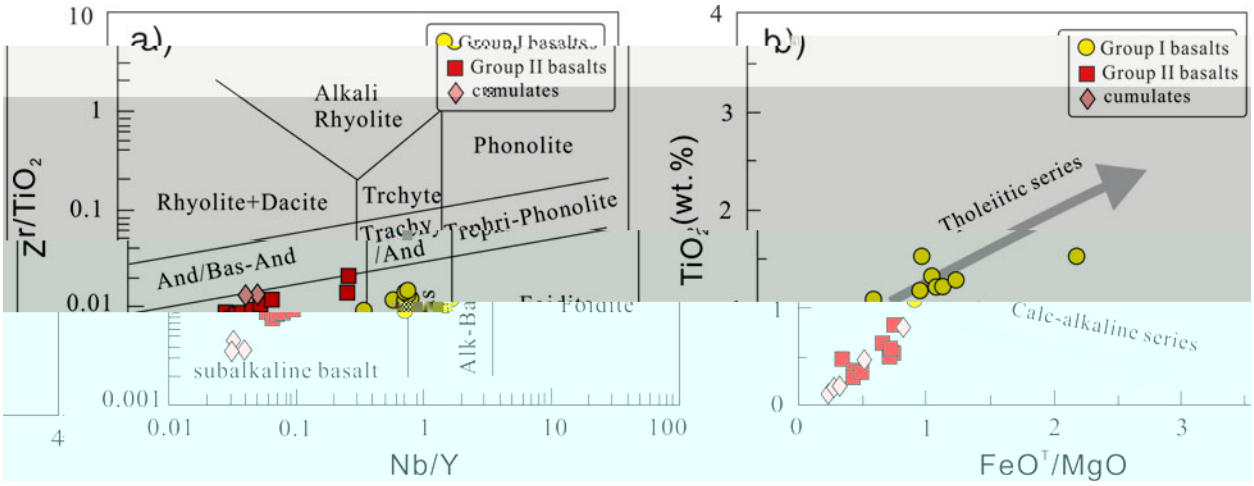
4.c.2. Basalts



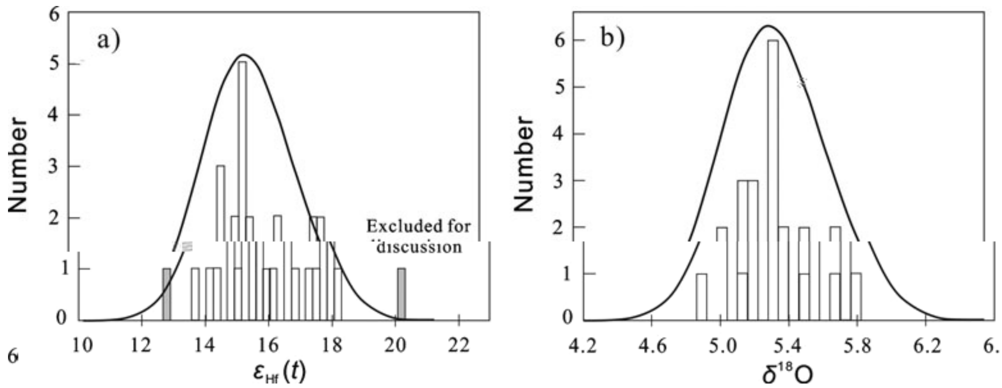
(= 0. 0 1.14) ... (= 1.02 1.21) ... 0.44 ... 0. ... (~0.11).

4.

(0.0024 0.0452) ... (0. 04030 0. 0536), ... (0. 04015 0. 05111, 2013 03. 1). ... 0.0 ... 0.13 4 ... 0.512 0 ... 0.512 3 ... ε (t) ... +6.3 ... + .5 (2013 03. 1 ... +1.).


a)
Group I basalts
Group II basalts
cumulates
Alkali Rhyolite
Phonolite
Rhyolite+Dacite
Trchyte
Trachy /And
Tephri-Phonolite
And/Bas-And
Foidite
subalkaline basalt
Alk-Ba
Zr/TiO2
Nb/Y
b)
Group I basalts
Group II basalts
cumulates
Tholeiitic series
Calc-alkaline series
TiO2 (wt.%)
FeO^T/MgO

[illegible]


a)
Number
Excluded for discussion
εHf(t)
b)
Number
δ18O

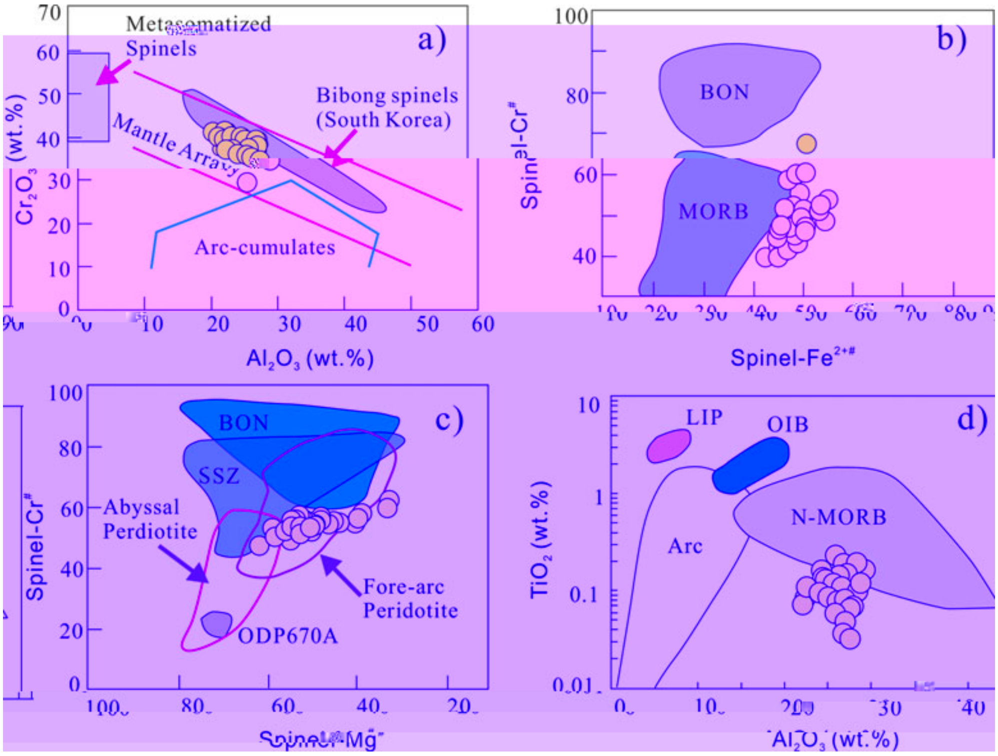
[illegible]

[illegible]

5. [illegible]

5.a. [illegible]

[illegible]

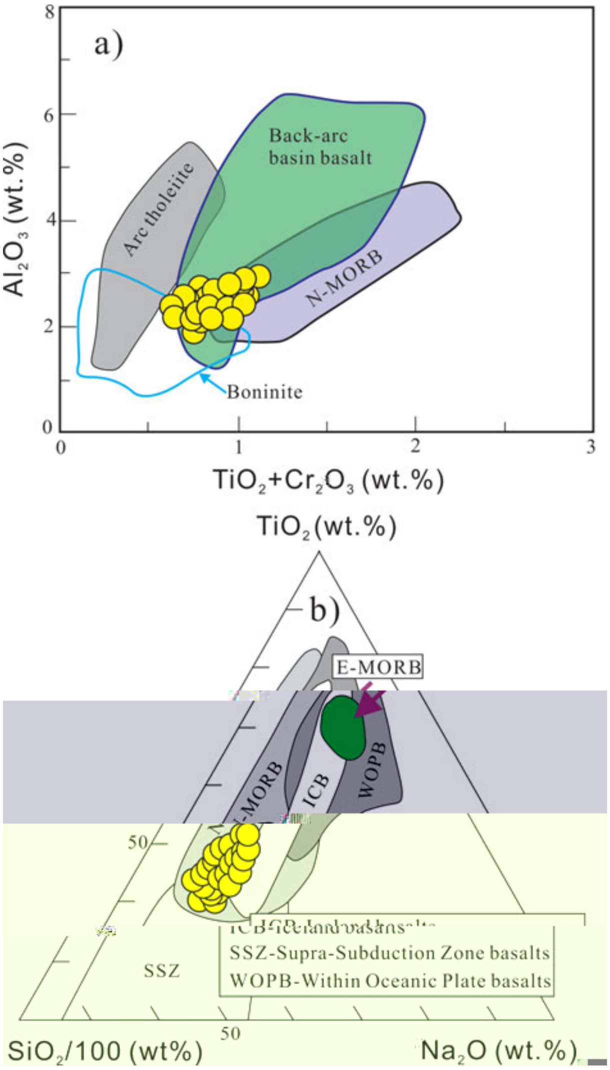


[illegible] 10. [illegible] & [illegible], 2000). [illegible] (100 [illegible] /([illegible] + [illegible])) [illegible] e^{2+} [illegible] (100 [illegible] e^{2+}/(e^{2+} + [illegible])) [illegible] & [illegible], 2001). [illegible] (100 [illegible] /([illegible] + [illegible])) [illegible] (100 [illegible] /([illegible] + e)) [illegible] et al. [illegible] 5). [illegible] & [illegible], 2001). [illegible]

[illegible] (500 [illegible]) [illegible] et al. 2003, [illegible] et al. 2015 [illegible] (430 [illegible] 400 [illegible]) [illegible] et al. 200[illegible] b, 2014 [illegible] (3[illegible] 0 350 [illegible]) [illegible] et al. 2003, [illegible] et al. 2006).

5.b. [illegible]

[illegible] & [illegible], 2002 [illegible] et al. 2010).



e 11. (... e) (a) Al_2O_3 ... TiO_2+ Cr_2O_3 ... (b) ... SiO_2/100 ... 1% ... 11 ...

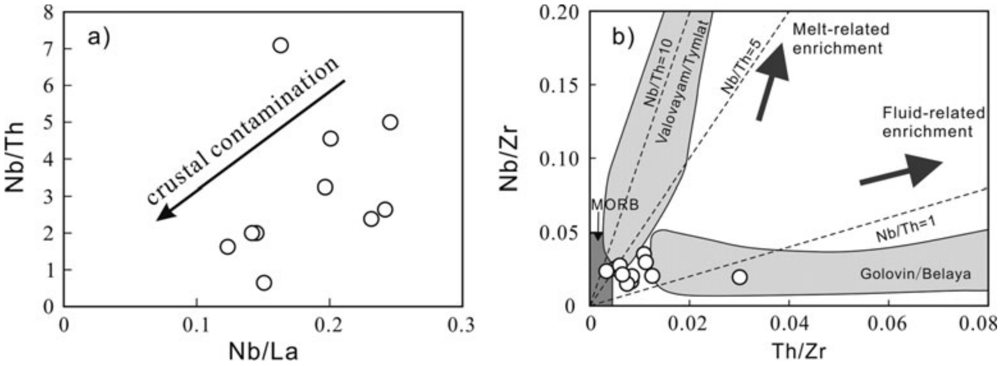
... 1% ... (... . 11). ... $_2$/100 ... 11 ... (... . 11). ...

... (... . 12), ... 1 ... % ... (... . 12). ... 1% ... *et al.* (2002) ... 1 ... % ...

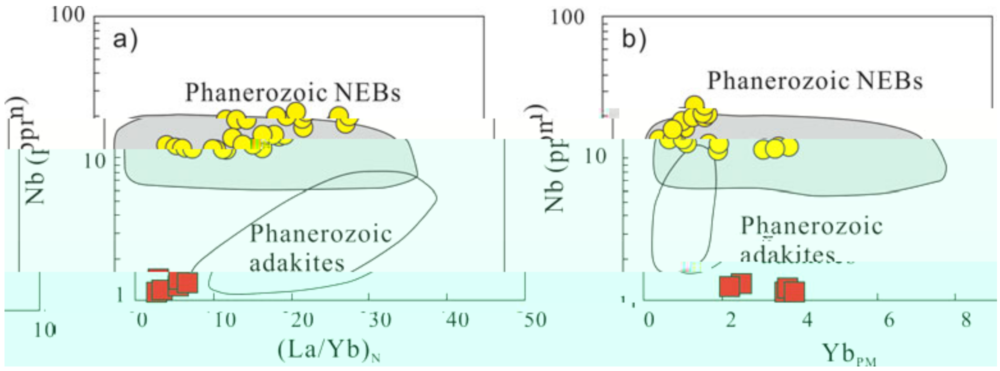
5.c. P... D... a ba...

... (11 24 11 ... e 15 11), $_2$ $_5$ (0.4 0.6 %) ... (11 15, ... 1 60) ... 1 2 ... 2001) (... . 13). ... (1) ... (2) ... 2002 ... 1 2 ... 1 3 ... *et al.* 1 6).

... 200 ... *et al.* 2011). ... (0. 04120 0. 06133) ... ε (*t*) ... (+1. + .5). ... (3.44 20.4) ... (1.51 2.54) ... 1 6). ... *et al.* 1 6 ... 1 6). ... 2000). ... 1 2 ... *et al.* 1 6). ... *et al.* (200) ...



[illegible] 12. [illegible]



[illegible] 13. [illegible]

[illegible] ε(t) (1. [illegible] .5) [illegible] (0. [illegible] 04120 [illegible] 0. [illegible] 06133) [illegible] 2). [illegible] ε(t) [illegible] 2, [illegible] (< 0.3), [illegible] 2002). [illegible] (0. [illegible] 1.0), [illegible] (0.1 [illegible] 0.2) [illegible] (0.6 [illegible] 1.0) [illegible] 6). [illegible] 14). [illegible]

[illegible] 14). [illegible]

5. [illegible]

[illegible] (416 [illegible] et al. 2014 [illegible] et al. 2015), [illegible] (503 [illegible] 4 [illegible] 5 [illegible] et al. 2003 [illegible] et al. 2015 [illegible] (400 [illegible]) [illegible] et al. 2014), [illegible]

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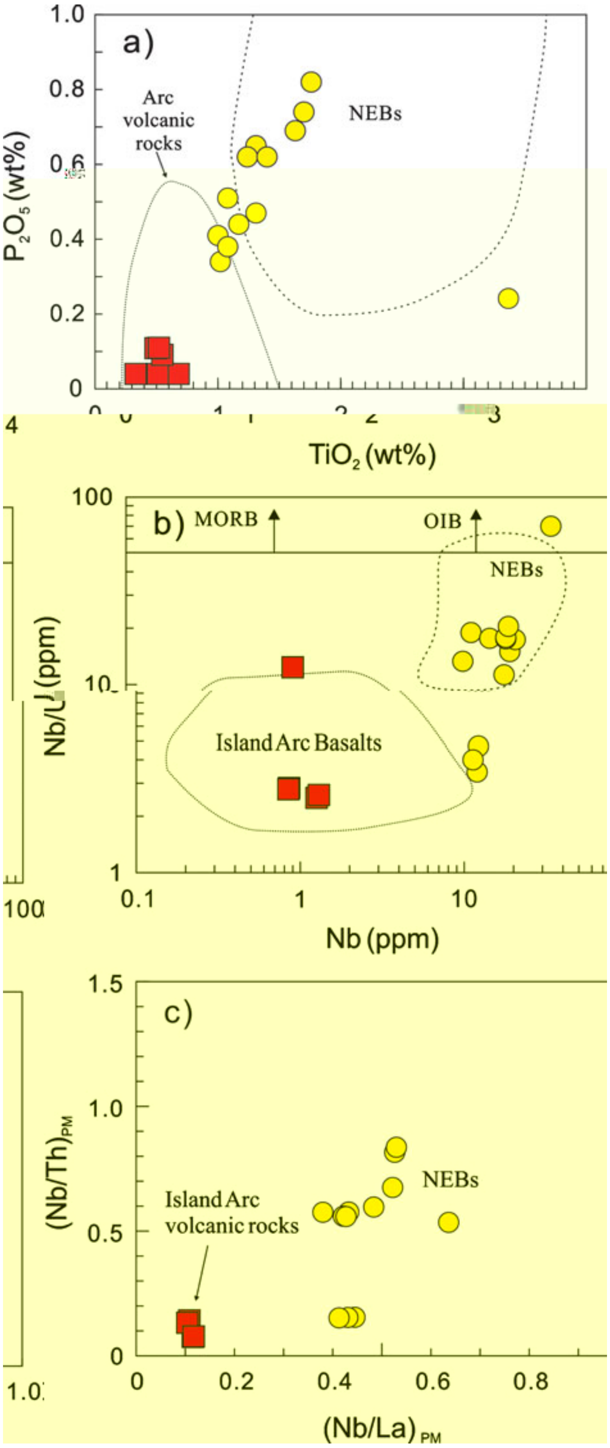


Figure 14. ... *et al.* (1... 5) ...

... *et al.* (2015) ...

400 3 0 ...

... 460 3 5 ... *c.* 400 ... *et al.* 2006, 200..., ... *et al.* 200..., ... *et al.* 200..., ... *et al.* 200..., 200..., ... *et al.* 2012, ... *et al.* 2015). ...

... 2002 ... *et al.* 200...). ...

... *et al.* 2015).

... 5. ...), ... 2 ...

... 15). ... *et al.* (200..., 200... b) ...

... *et al.* 200...).

... 200..., ... *et al.* 2013).

... 15).

(1) ... (*c.* 500 ...), ...

... 15 ...).

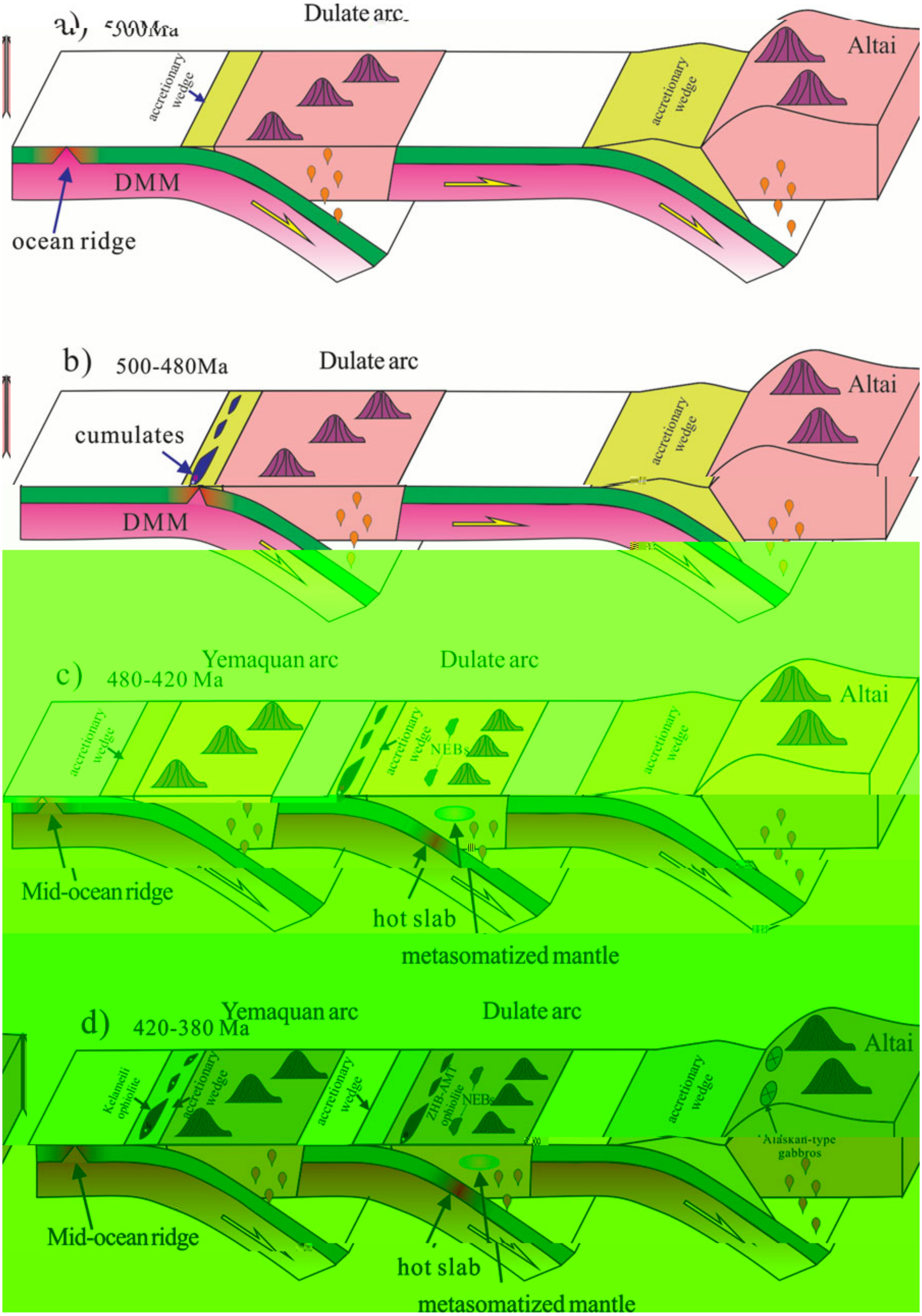
(2) ... (500 4 0 ...), ...

... 15 ...).

(3) ... (4 0 420 ...), ... (45 ... *et al.* 2015) ...

(440 ... *et al.* 2014) ...

... 15 ...).


a)
Dulate arc
Altai
accretionary wedge
accretionary wedge
DMM
ocean ridge
b) 500-480Ma
Dulate arc
Altai
cumulates
accretionary wedge
DMM
c) 480-420 Ma
Yemaquan arc
Dulate arc
Altai
accretionary wedge
accretionary wedge
NEBs
accretionary wedge
Mid-ocean ridge
hot slab
metasomatized mantle
d) 420-380 Ma
Yemaquan arc
Dulate arc
Altai
Kelameili ophiolite
accretionary wedge
accretionary wedge
ZHB-AMT ophiolite
NEBs
accretionary wedge
Alaskan-type gabbros
Mid-ocean ridge
hot slab
metasomatized mantle

e 15. ([illegible] e) [illegible]

(4) [illegible] (420 3 0 [illegible]) ([illegible] *et al.* 2014 [illegible] *et al.* 2015). [illegible] 15 [illegible] (400 3 0 [illegible]). [illegible]

6. C[illegible]

(1) [illegible] ~4 5 [illegible] *c.* 400 [illegible]

(2) [illegible]

(3) [illegible]

Ac[illegible] 305 [illegible] (2011 06 03-01).

S[illegible] a[illegible] a[illegible]a

[illegible] /10.101 / 0016 56 16000042.

R[illegible]

[illegible] 1 4. [illegible] *Chemical Geology* **113**, 1 1 204.

[illegible] 2001. [illegible] *Journal of Petrology* **42**, 22 302.

[illegible] 200 [illegible] 11 [illegible] *Lithos* **97**, 2 1 [illegible]

[illegible] 2002. [illegible] 11 [illegible] *Geology* **30**, 0 10.

[illegible] 200 [illegible] *Earth Accretionary Systems in Space and Time* [illegible], 11. 1 36. [illegible] 31 [illegible]

[illegible] 2002. [illegible] *Geological Magazine* **139**, 1 13.

[illegible] 1 3. [illegible] *Geological Society of America Bulletin* **105**, 15 3 [illegible]

[illegible] 1 [illegible] *Ophiolites.* [illegible] 220 11.

[illegible] 1 3. [illegible] *Geology* **21**, 54 50.

[illegible] 1 2. [illegible] *Journal of Geological Society, London* **149**, 56 [illegible]

[illegible] 1 4. [illegible] *Contributions to Mineralogy and Petrology* **86**, 54 6.

[illegible] 2003. [illegible] (2) [illegible] *Ophiolites in Earth History* [illegible], 11. 43 6 [illegible] 21 [illegible]

[illegible] 2011. [illegible] *Geological Society of America Bulletin* **123**, 3 411.

[illegible] 2015. [illegible] *Chinese Journal of Geology* **50**, 140 54 ([illegible]).

[illegible] 2000. [illegible] *Contributions to Mineralogy and Petrology* **140**, 2 3 5.

[illegible] 1 1. [illegible] *Lithos* **27**, 25 [illegible]

2011. *Geological Bulletin of China* **30**, 150 13.

2011. *Geochimica et Cosmochimica Acta* **75**, 504 2.

2001. *Nature* **410**, 6 1.

2002. *Chemical Geology* **182**, 22 35.

Journal of Geophysical Research: Solid Earth (1978–2012) **101**, 11 31.

2000. *Contributions to Mineralogy and Petrology* **139**, 20 26.

2012. *Geological Bulletin of China* **31**, 126

2014. *Chinese Science Bulletin (Chinese Version)* **59**, 2213 22.

2000. *Transactions of the Royal Society of Edinburgh: Earth Sciences* **91**, 1 1 3.

Journal of Petrology **31**, 6 1.

2003. *Earth Science Frontier* **10**, 43 56.

2001. *Journal of Petrology* **42**, 655 1.

Nature **380**, 23 40.

2000. *Tectonophysics* **326**, 255 6.

2010*a*. *Lithos* **114**, 1 15.

2004. *Geological Magazine* **141**, 225 31.

2010*b*. *Geostandards and Geoanalytical Research* **34**, 11 34.

2013. *Chinese Science Bulletin* **58**, 464 54.

Lithos **113**, 2 4 1.

2010. *Chinese Science Bulletin* **55**, 1535 46.

2003. *User's Manual for Isoplot 3.00: A Geochronological Toolkit for Microsoft Excel.* 4, 3 11.

2015. *Gondwana Research*, 2015. 10.1016/ .2015.04.004.

American Journal of Science **274**, 32 355.

Geology **23**, 51 4.

Structure of Ophiolites and Dynamics of Oceanic Lithosphere. 36 11.

Journal of Petrology **38**, 104 4.

200 *a*. *Acta Petrologica Sinica* **25**, 16 24.

200 *b*. *Acta Petrologica Sinica* **25**, 14 4 1.

200 . *Acta Petrologica Sinica* **23**, 162 34.

2002. *Proceedings of the Ocean Drilling Program, Scientific Results, vol. 176* 11. 1 60.

[illegible] 200[illegible]. [illegible] *Chinese Science Bulletin* **14**, 21[illegible]6[illegible]1.

[illegible] 2010. [illegible] *Lithos* **117**, 1[illegible]20[illegible].

[illegible] 200[illegible]. [illegible] *Journal of Asian Earth Sciences* **30**, 666[illegible]5.

[illegible] 200[illegible]. [illegible] *Lithos* **100**, 14[illegible]4[illegible].

[illegible] 2014. [illegible] *Elements* **10**, 101[illegible].

[illegible] 2001. [illegible] *Contribution to Mineralogy and Petrology* **141**, 36[illegible]52.

[illegible] 2013. [illegible] *Gondwana Research* **24**, 3[illegible]2[illegible]411.

[illegible] 1[illegible]6. [illegible] (~11[illegible]). *Journal of Petrology* **37**, 6[illegible]3[illegible]26.

[illegible] 2013. [illegible] *Precambrian Research* **231**, 301[illegible]24.

[illegible] 2012. [illegible] *Precambrian Research* **192**[illegible]**195**, 1[illegible]0[illegible]20[illegible].

[illegible] 1[illegible]1. [illegible] *Philosophical Transactions of the Royal Society of London* **335**, 3[illegible]2.

[illegible] 1[illegible]5. [illegible] *Nature* **377**, 5[illegible]5[illegible]600.

[illegible] 1[illegible]3. [illegible] *Nature* **364**, 2[illegible]30[illegible].

[illegible] 2014. [illegible] (~440[illegible]) [illegible] *Lithos* **206**[illegible]**207**, 234[illegible]51.

[illegible] 2002. [illegible] *Reviews of Geophysics* **40**, 3-1[illegible]3-3[illegible].

[illegible] 200[illegible]. [illegible] *Science in China Series D – Earth Sciences* **52**, 1345[illegible]5[illegible].

[illegible] *Magmatism in the Ocean Basin* [illegible] 11.52[illegible]4[illegible] [illegible] 42.

[illegible] 200[illegible]. [illegible] *Chemical Geology* **247**, 352[illegible]3.

[illegible] 200[illegible]. [illegible] *Acta Petrologica Sinica* **23**, 1[illegible]33[illegible]44 [illegible].

[illegible] *Contributions to Mineralogy and Petrology* **133**, 1[illegible]11.

[illegible] 2006. [illegible] *Journal of Geology* **114**, [illegible]35[illegible]51.

[illegible] 200[illegible]. [illegible] *Lithos* **110**, 35[illegible]2.

[illegible] 2012. [illegible] *Earth-Science Reviews* **113**, 303[illegible]41.

[illegible] *Chemical Geology* **20**, 325[illegible]43.

[illegible] 2002. [illegible] *Journal of Geology* **110**, [illegible]1[illegible]3[illegible].

[illegible] 2006. [illegible] *Geology in China* **33**, 4[illegible]6[illegible]6 [illegible].

[illegible] 2014. [illegible]? *Geoscience Frontiers* **5**, 525[illegible]36.

[illegible] 200[illegible]. [illegible] *Journal of Asian Earth Sciences* **32**, 102[illegible]1[illegible].

[illegible] 2013. [illegible] *Gondwana Research* **23**, 1316[illegible]41.

[illegible] 2004. [illegible] *Journal of Geological Society, London* **161**, 33[illegible]42.

[illegible] & [illegible] 200[illegible] *a*. [illegible] *International Journal of Earth Sciences* **98**, 11[illegible] 21[illegible].

[illegible] & [illegible] 200[illegible] *b*. [illegible] *American Journal of Sciences* **309**, 221[illegible] 0.

[illegible] 1[illegible] 3. *Regional Geology of the Xinjiang Uygur Autonomous Region*. [illegible] 11. 2 145 ([illegible]).

[illegible] & [illegible] 2015. [illegible] *Journal of Asian Earth Sciences* **113**, 5[illegible].

[illegible] & [illegible] 2012. [illegible] *Gondwana Research* **21**, 246 65.

[illegible] & [illegible] 200[illegible]. [illegible] *Chemical Geology* **242**, 22 3[illegible].

[illegible] & [illegible] 2006. [illegible] *Acta Geologica Sinica* **80**, 254 63 ([illegible]).

[illegible] & [illegible] 2003. [illegible] *Chinese Science Bulletin* **48**, 2231 5.

[illegible] & [illegible] 2013. [illegible] *Lithos* **179**, 263 4.

[illegible] & [illegible] 2012. [illegible] *Journal of Asian Earth Sciences* **52**, 11 33.

[illegible] & [illegible] 200[illegible]. [illegible] *Acta Petrologica Sinica* **24**, 1054 5 ([illegible]).

[illegible] & [illegible] 1[illegible]6. [illegible] *Annual Review of Earth and Planetary Sciences* **14**, 4 3 5 1.