Table S1. Whole-rock geochemistry of granite samples (major elements in wt. % and trace elements in ppm).
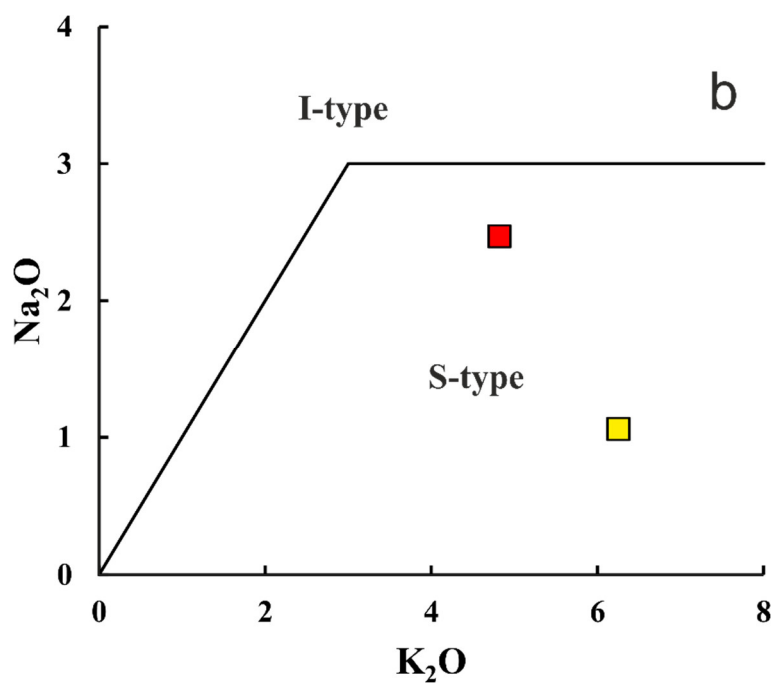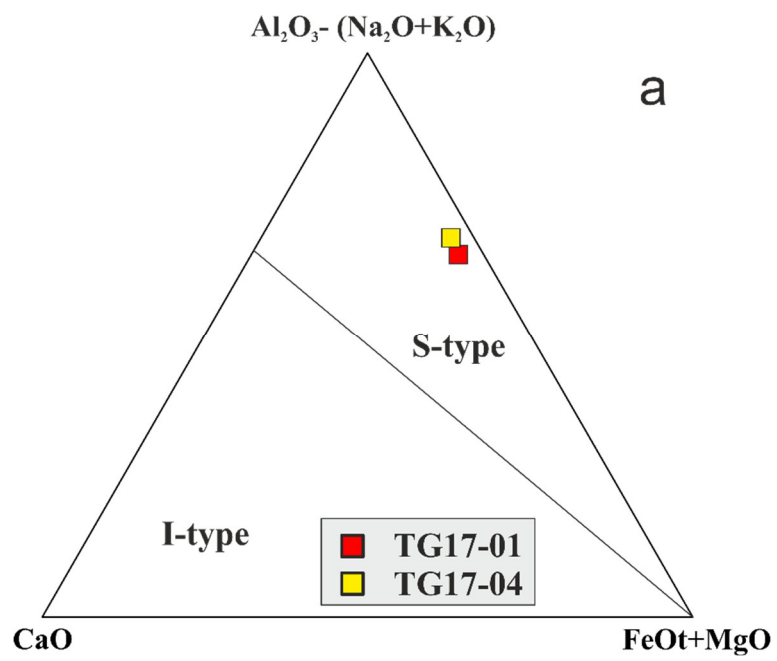
Sample Name	TG17-01	TG17-04
SiO_2	73.42	75.34
TiO_2	0.2	0.12
Al_2O_3	13.23	12.76
Fe_2O_3	1.1	0.85
FeO	0.86	0.72
MnO	0.011	0.08
MgO	1.08	0.89
CaO	0.36	0.29
Na_2O	1.06	2.47
K_2O	6.25	4.82
P_2O_5	0.23	0.2
H_2O	0.59	0.36
LOI	1.23	1.14
A/CNK	1.44	1.30
Cr	8.54	8.24
Ni	6.44	3.85
Co	162.20	172.10
Sc	13.86	5.01
V	37.95	13.29
Cu	5.07	7.41
Pb	13.19	14.71
Zn	29.69	19.99
Bi	0.71	0.34
Sn	16.42	45.76
W	628.10	858.20
Sb	0.66	0.23
Rb	332.40	265.30
Cs	8.49	7.06
Ba	207.90	106.70
Sr	18.25	13.83
Tl	1.51	1.19
Ga	20.03	18.32
Li	19.81	14.70
Ta	1.75	1.87
Nb	13.20	9.24
Hf	4.12	3.60
Zr	141.10	101.90
Ti	1406.00	1019.00
Y	39.12	42.97
Th	28.25	30.95
Be	3.24	2.04
P	618.70	591.80
Mn	85.84	76.76

a

Al$_2$O$_3$- (Na$_2$O+K$_2$O)

S-type

I-type

■	TG17-01
■	TG17-04

CaO

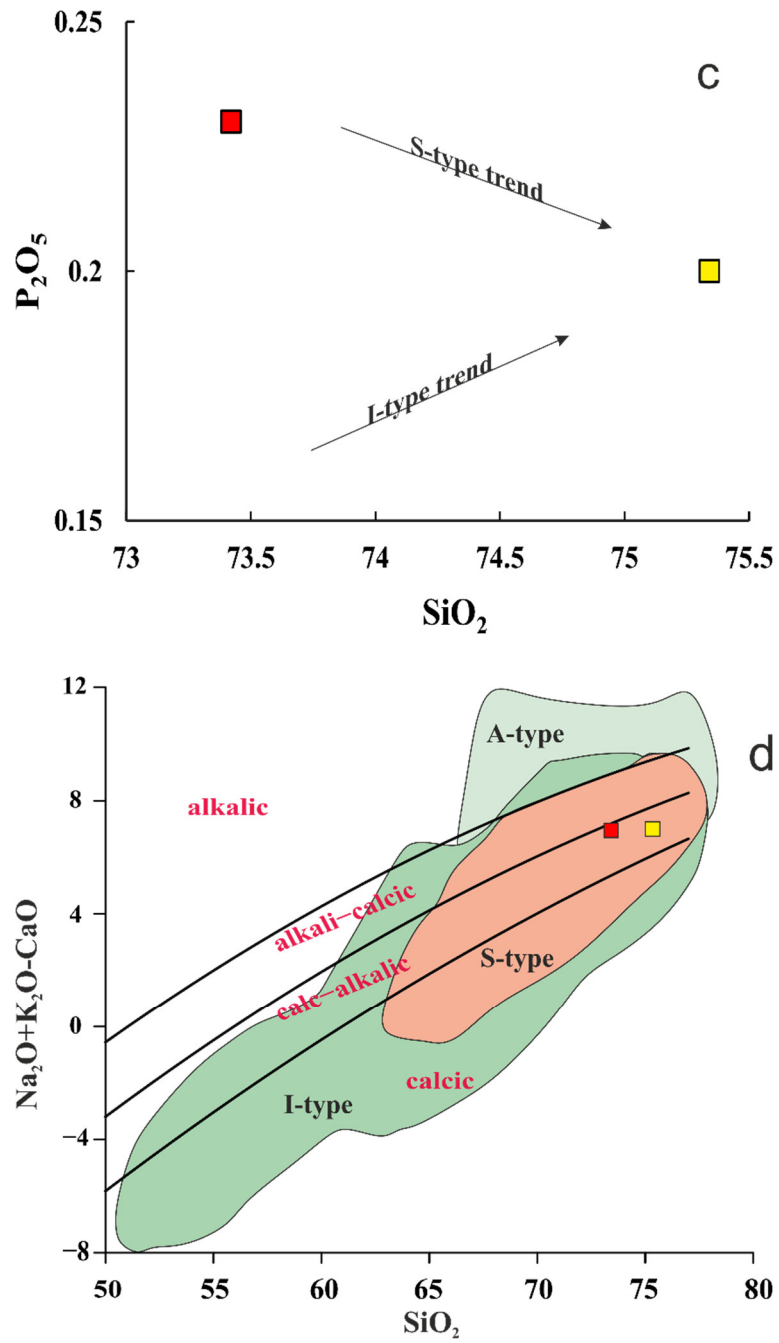FeOt+MgO

b

Na$_2$O

I-type

S-type

K$_2$O

Figure S1. Various chemical discrimination diagrams for granites of Lesser Garhwal Himalaya. (a) A–C–F diagram [29] Chappell and White 1992). (b) Na2O versus K2O diagram [30] (c) SiO2 versus P2O5 diagram [29] (d) SiO2 versus Na2O +K2O–CaO diagrams (the data for composition fields is from Lachlan Fold Belt)[31].
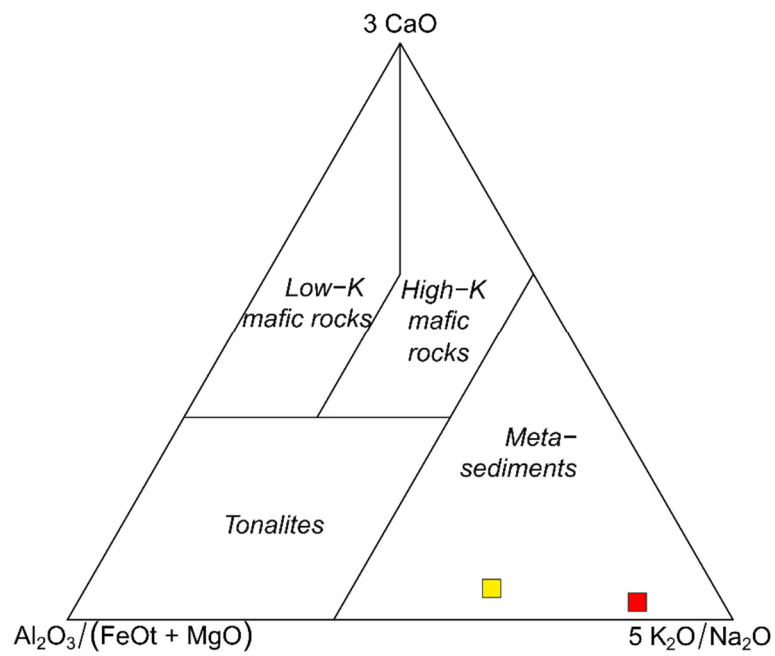
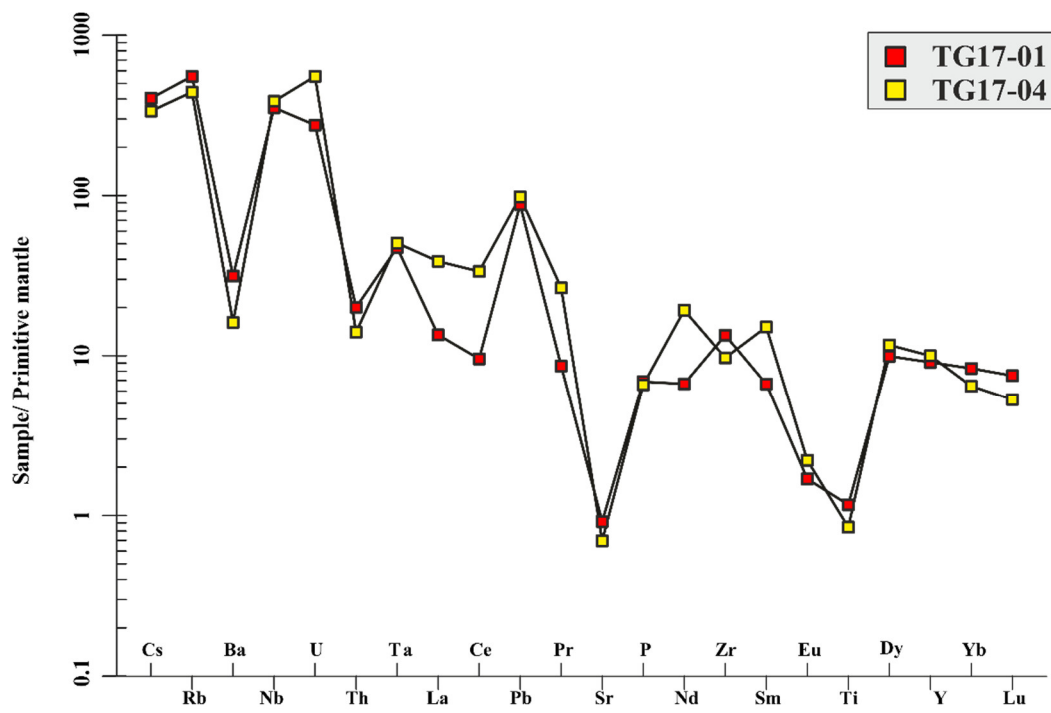**Figure S2.** Source discrimination diagram for granites after [32].

Figure S3. Primitive mantle-normalized trace elements patterns of the granites [33].
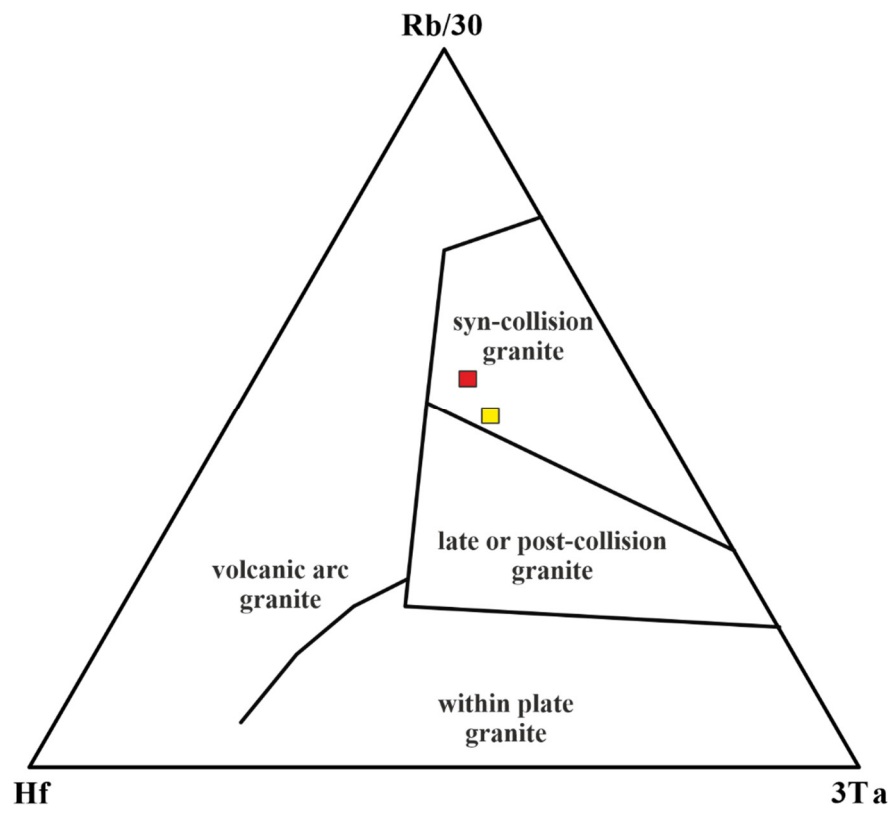
Figure S4. Hf-Rb-Ta discrimination diagram [34].

Table S2. Average content (610av, 612av, 614av) and standard deviation (SD) of trace elements in reference materials NIST SRM 610, 612, 614 (#610, #612, #614) during measurements. The accepted maintenance of trace elements in reference materials #610, #612, #614 on [42].

	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Ti	Y
610av	458.39	448.75	430.66	431.76	450.71	462.40	419.94	443.68	427.36	450.13	426.14	420.71	461.56	435.37	436.50	451.18
SD	11.7	12	11.6	11.6	11.1	12.1	10.1	11.4	11.2	11.3	10.3	11	10.9	11.3	14.19	7.9
#610	457	448	430	431	451	461	444	443	427	449	426	420	445	435	434	450
612av	36.46	36.95	35.51	34.74	36.56	35.44	34.58	36.67	34.17	37.16	35.32	34.99	38.65	35.61	37.90	36.93
SD	2.6	2.8	2.5	2.8	2.6	2.7	2.9	2.8	2.8	2.8	3	2.9	2.8	2.8	3.3	2.7
#612	35.8	38.7	37.2	35.9	38.1	35	36.7	36	36	38	38	38	39.2	36.9	44	38
614av	0.57	0.61	0.57	0.62	0.57	0.64	0.58	0.57	0.55	0.61	0.53	0.54	0.55	0.56	2.37	0.61
SD	0.05	0.06	0.05	0.1	0.1	0.05	0.09	0.06	0.09	0.06	0.05	0.06	0.09	0.04	0.5	0.1
#614	0.72	0.81	0.76	0.74	0.75	0.76	0.75	0.73	0.74	0.74	0.74	0.73	0.77	0.73	3.4	0.8

Table S3 Calculations of REE and Y in TG17-01 granites, based on data on their concentrations in Paleoproterozoic zircons.

	D_1	D_2	Zr_{av}	Gr_{c1}	Gr_{c2}	Granite01
Y	149	66	7701	51.68	116.68	39.12
La		0.95	9		9.30	8.75
Ce	2.5	1.6	32	12.65	19.76	16.02
Pr		1.3	8		6.44	2.19
Nd	8.5	1.9	72	8.47	37.87	8.33
Sm	16		84	5.24		2.70
Eu	8.5	13	1	0.08	0.05	0.26
Gd	30	28	259	8.63	9.25	4.10
Tb			87			
Dy	100		842	8.42		6.69
Ho		86	246		2.87	1.45
Er	214		907	4.24		4.11
Tm			166			
Yb	345	83	1421	4.12	17.11	3.67
Lu	445	105	239	0.54	2.27	0.51
Th	41	13	514	12.54	39.54	28.25
U	167	20	2147	12.86	107.35	5.50

$D_i = C^{zr}_i / C^m_i$

D_1 = D Zr/melt - Experimentally determined zircon/melt partition coefficient for element (i) at 800 °C, 20 Kbar [50]

D_2 = D Zr/melt - Experimentally determined zircon/melt partition coefficient at 800°C, 2 Kbar [83]

Zr_{av} - average concentration elements in zircons from sample TG17-01 (tabl. 2)

Gr_{c1} - calculated concentration elements (i) in granite: $C^{Grc1}_i = C^{Zr}_i /D_1$

Gr_{c2} - calculated concentration elements (i) in granite: $C^{Grc2}_i = C^{Zr}_i /D_2$

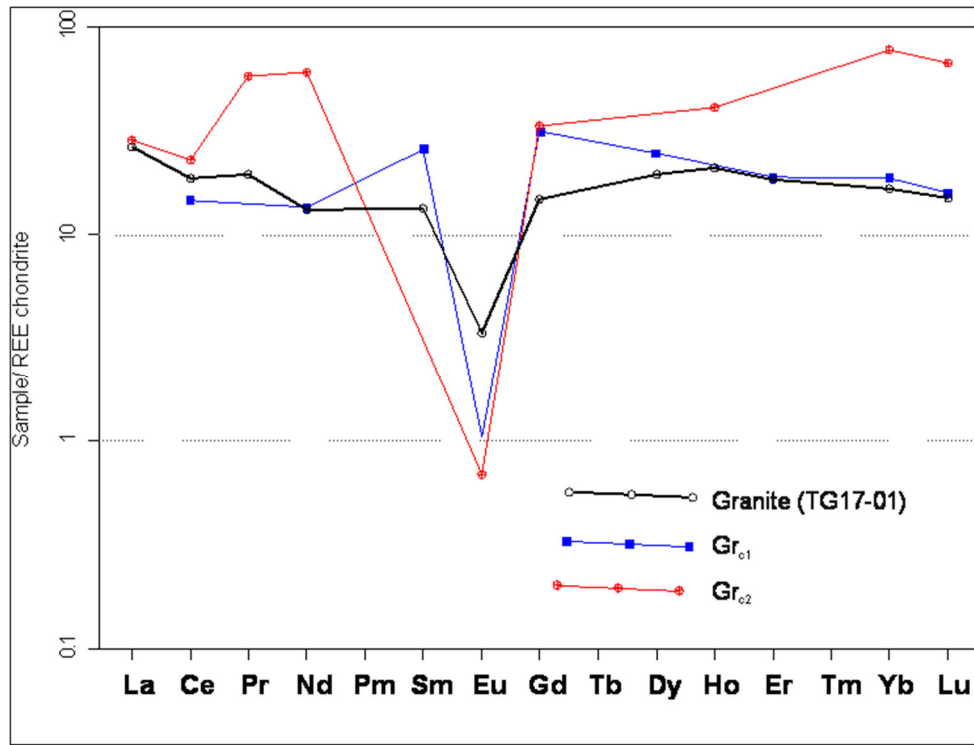Granite01 - natural concentration of elements in granite TG17-01

Figure S5. Chondrite-normalized [46] REE concentrations in granite TG17-01 and calculated REE concentrations based on zircon/melt partition coefficient for element Gr$_{c1}$ [50] and Gr$_{c2}$ [83].

Table S4. Calculations of REE and Y concentrations in TG17-04 Granites, based on data on their concentrations in Paleo-proterozoic zircons.

	D$_1$	D$_2$	Zr$_{av1800}$	Gr2$_{c1}$	Gr2$_{c2}$	Granite04
Y	149	66	4122.66	27.67	62.46	42.97
La		0.95	4.87		5.13	25.18
Ce	2.5	1.6	26.50	10.60	16.56	56.30
Pr		1.3	2.88		2.22	6.74
Nd	8.5	1.9	18.15	2.13	9.55	24.06
Sm	16		24.79	1.55		6.14
Eu	8.5	13	6.25	0.73	0.48	0.34
Gd	30	28	123.78	4.13	4.42	6.40
Tb			47.10			1.24
Dy	100		442.13	4.42		7.86
Ho		86	130.89		1.52	1.36
Er	214		501.75	2.34		3.98
Tm			96.31			0.53
Yb	345	83	847.78	2.46	10.21	2.84
Lu	445	105	143.99	0.32	1.37	0.36
Th	41	13	267.81	6.53	20.60	30.95

U	167	20	1329.68	7.96	66.48	11.08

$D_i = C^{zr}_i / C^m_i$

D_1 = D Zr/melt - Experimentally determined zircon/melt partition coefficient for element (i) at 800 °C, 20 Kbar [50]

Zr_{av1800} - average concentration of elements in 1.8 Ga zircons from sample TG17-04 (tabl. 2))

Gr_{c1} - calculated concentration elements (i) in granite: $C^{Grc1}_i = C^{Zr}_i / D_1$

Gr_{c2} - calculated concentration elements (i) in granite: $C^{Grc2}_i = C^{Zr}_i / D_2$

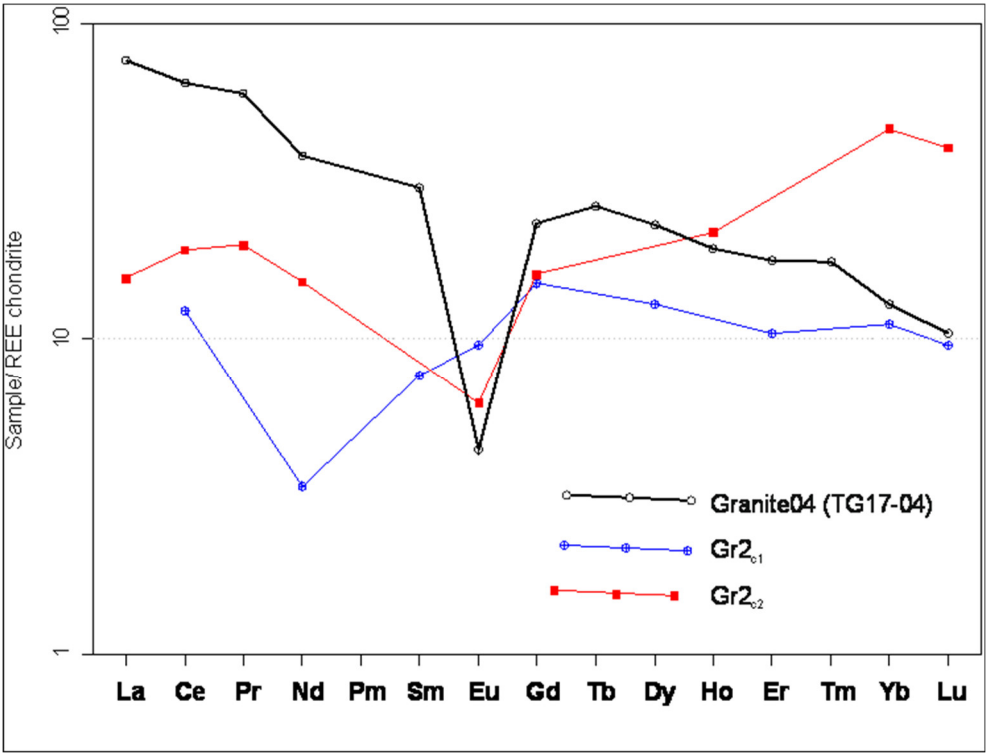Granite04 - natural concentration of elements in granite TG17-04

Figure S6. Chondrite-normalized [46] REE concentrations in granite TG17-04 and calculated REE concentrations based on zircon/melt partition coefficient for element Gr_{c1} [50] and Gr_{c2} [83].