

## Supplementary Materials

**Table S1.** Mineral compositions and TOC content of the Wufeng–Longmaxi shale in the southern Sichuan Basin, China.

**Table S2.** Concentrations of major element oxides of the Wufeng–Longmaxi shale in the southern Sichuan Basin, China.

**Table S3.** Concentrations of trace elements (in ppm) in the Wufeng–Longmaxi shale in the southern Sichuan Basin, China.

**Table S1.** Mineral compositions and TOC content of the Wufeng–Longmaxi shale in the southern Sichuan Basin, China.

Sample no.	Depth m	Graptolite zone	Quartz %	Calcite %	Dolomite %	Clay minerals %	K feldspar %	Plagioclase %	Pyrite %	TOC %
1	3742.37	LM6-8	44.53	2.08	3.49	42.68	-	4.77	2.46	1.36
2	3743.01	LM6-8	38.28	3.99	17.58	34.61	-	3.62	1.92	1.04
3	3743.48	LM6-8	34.93	3.64	15.51	39.65	-	5.02	1.25	1.36
4	3744.42	LM6-8	39.91	2.89	3.21	47.09	-	4.30	2.60	0.83
5	3745.49	LM6-8	42.71	3.95	2.92	43.90	-	4.61	1.89	1.33
6	3746.4	LM6-8	43.15	2.73	2.91	44.27	-	4.99	1.95	1.52
7	3747.28	LM6-8	40.87	2.47	2.63	46.45	-	5.86	1.72	1.86
8	3748.18	LM6-8	41.55	3.99	6.31	40.24	-	5.87	2.04	1.82
9	3748.86	LM6-8	38.66	3.52	3.98	44.60	-	6.68	2.56	1.33
10	3749.38	LM6-8	40.09	4.31	7.32	40.30	-	5.98	2.01	1.51
11	3750.04	LM6-8	43.10	5.12	4.91	36.16	-	8.34	2.36	1.48
12	3750.71	LM6-8	41.02	3.82	9.10	38.00	-	6.12	1.94	1.65
13	3751.26	LM6-8	41.97	4.67	12.43	33.34	-	5.16	2.43	1.52
14	3752.01	LM6-8	50.53	3.27	3.73	35.42	-	5.45	1.61	2.27
15	3752.67	LM6-8	45.88	2.71	4.40	38.48	-	6.61	1.93	2.08
16	3753.44	LM6-8	40.67	3.65	12.47	35.02	-	6.52	1.67	1.49
17	3754.5	LM6-8	35.87	2.12	2.60	47.38	-	9.56	2.47	1.60
18	3755.28	LM5	27.04	1.86	6.82	53.93	1.11	6.71	2.51	1.55
19	3756.16	LM5	37.94	3.22	6.73	42.50	-	7.14	2.46	1.52
20	3756.87	LM5	35.28	3.74	12.64	35.29	-	11.31	1.75	1.86
21	3757.77	LM5	38.93	5.34	6.98	32.16	2.32	12.08	2.20	1.89
22	3758.59	LM5	36.70	6.77	11.49	31.28	1.73	10.37	1.64	1.60
23	3759.26	LM5	43.93	4.87	3.89	32.10	1.94	11.52	1.75	1.80
24	3759.84	LM5	35.27	7.41	9.25	34.46	1.92	7.95	3.74	2.09
25	3760.6	LM5	35.82	5.96	7.46	35.55	1.76	11.63	1.81	1.51
26	3761.31	LM5	19.95	54.69	17.09	4.04	-	3.81	0.42	1.16
27	3762.27	LM5	44.16	3.46	3.68	34.22	2.36	10.28	1.84	1.90
28	3762.99	LM5	38.25	7.10	6.71	31.43	2.32	11.51	2.67	2.06
29	3763.79	LM5	40.34	7.86	8.04	28.46	2.23	11.59	1.49	1.34
30	3764.44	LM5	38.26	6.08	6.35	34.70	1.25	11.59	1.78	1.53
31	3765.39	LM5	41.96	7.64	5.94	27.96	1.49	12.82	2.19	1.96

32	3766.23	LM5	37.79	6.34	6.03	35.46	1.70	10.74	1.95	2.16
33	3767.01	LM4	40.34	6.34	5.80	34.53	2.03	9.25	1.71	0.92
34	3767.57	LM4	44.77	4.34	4.10	36.11	0.94	8.29	1.45	1.93
35	3768.41	LM4	56.42	1.96	3.82	29.37	-	6.09	2.34	2.13
36	3769.54	LM4	62.68	1.90	4.27	24.99	-	3.44	2.73	2.55
37	3770.45	LM4	54.03	1.79	3.82	30.83	1.15	5.74	2.64	3.02
38	3771.34	LM4	47.49	1.84	3.31	37.83	-	5.50	4.02	2.58
39	3772.22	LM4	56.28	2.47	2.74	30.66	-	4.65	3.19	3.45
40	3772.64	LM4	60.27	3.82	7.15	21.58	1.27	3.05	2.85	2.90
41	3773.67	LM4	64.67	2.34	4.21	21.94	1.23	3.91	1.70	3.45
42	3774.7	LM4	50.13	1.94	4.75	34.89	0.94	4.98	2.37	3.40
43	3775.36	LM4	68.92	2.67	4.78	18.71	-	3.12	1.81	2.46
44	3776.05	LM4	6.91	-	-	81.39	-	10.67	1.04	3.70
45	3776.96	LM4	62.72	5.67	7.28	19.55	-	2.58	2.19	3.35
46	3777.72	LM4	67.50	3.99	9.05	14.79	0.83	2.56	1.27	3.25
47	3778.66	LM4	63.38	5.57	5.33	19.10	-	3.18	3.43	3.39
48	3779.13	LM2-3	67.22	5.48	9.17	14.25	-	2.28	1.60	3.11
49	3779.9	LM2-3	54.47	8.84	12.32	17.72	-	3.74	2.91	4.52
50	3780.45	LM2-3	62.10	8.46	19.13	7.45	-	1.63	1.23	3.33
51	3781.45	LM2-3	30.51	2.04	4.68	49.21	-	3.42	10.14	2.71
52	3781.9	LM2-3	63.32	8.76	10.39	13.38	-	2.17	1.97	1.86
53	3782.72	LM2-3	29.25	6.66	40.63	18.35	-	2.67	2.44	3.54
54	3783.72	LM1	52.08	11.36	14.18	19.66	-	2.09	0.62	2.69
55	3784.33	LM1	71.76	0.74	6.44	17.19	0.64	2.03	1.20	3.45
56	3784.53	LM1	63.49	4.04	14.24	15.09	-	2.39	0.75	1.45
57	3785.13	LM1	42.76	5.70	12.26	34.36	-	3.65	1.25	3.06
58	3785.78	LM1	54.20	7.23	5.44	29.97	-	2.15	1.01	2.69
59	3786.28	WF4	39.38	4.66	15.49	35.41	-	4.16	0.90	1.79
60	3787.19	WF3	35.40	8.48	21.50	29.66	-	3.42	1.54	1.01
61	3788.2	WF3	29.46	13.70	8.55	41.71	0.81	4.96	0.81	0.34
62	3789.18	WF3	29.79	12.59	11.71	39.26	0.67	5.13	0.84	0.47
63	3789.56	WF3	34.33	10.40	3.16	44.61	1.01	5.20	1.28	0.42
64	3789.8	WF2	37.20	11.83	6.05	38.85	-	6.07	-	0.15
65	3790.98	WF2	45.47	9.27	5.34	33.71	-	6.21	-	0.10
66	3791.34	WF2	54.54	8.58	3.58	28.97	-	4.33	-	0.05
67	3791.52	WF2	34.94	12.43	8.27	40.09	-	4.28	-	0.12

68	3791.92	WF2	23.41	37.48	2.16	30.38	0.77	5.79	-	0.10
69	3792.3	WF2	14.79	72.17	0.44	10.25	-	2.35	-	0.10
Average			43.94	7.48	7.94	32.56	0.50	5.91	2.07	1.91

**Table S2.** Concentrations of major element oxides of the Wufeng–Longmaxi shale in the southern Sichuan Basin, China.

Sample no.	Depth	Graptolite zone	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	CaO %	Fe <sub>2</sub> O <sub>3T</sub> %	K <sub>2</sub> O %	MgO %	MnO %	Na <sub>2</sub> O %	P <sub>2</sub> O <sub>5</sub> %	TiO <sub>2</sub> %	LOI %	K <sub>2</sub> O/Na <sub>2</sub> O	SiO <sub>2</sub> /Al <sub>2</sub> O <sub>3</sub>	CIA	ICV
1	3742.37	LM6-8	60.52	15.81	2.16	5.37	3.75	2.57	0.03	0.78	0.1	0.55	8.28	4.81	3.83	70.44	1.10
2	3743.01	LM6-8	55.53	13.78	5.5	5.29	3.44	3.65	0.06	0.68	0.09	0.5	11.31	5.06	4.03	69.77	1.41
3	3743.48	LM6-8	54.78	14.28	5.09	5.61	3.62	3.61	0.06	0.69	0.1	0.51	11.17	5.25	3.84	69.73	1.38
4	3744.42	LM6-8	59.86	15.42	2.51	5.34	3.86	2.67	0.03	0.76	0.11	0.57	8.79	5.08	3.88	69.74	1.15
5	3745.49	LM6-8	55.52	14.37	4.81	5.67	3.58	3.33	0.06	0.69	0.1	0.52	10.86	5.19	3.86	70.01	1.32
6	3746.4	LM6-8	57.43	14.73	3.98	5.12	3.75	3.16	0.05	0.68	0.09	0.53	9.99	5.51	3.90	70.02	1.25
7	3747.28	LM6-8	59.45	16.38	2.18	5.54	3.97	2.77	0.03	0.72	0.1	0.55	8.28	5.51	3.63	71.04	1.10
8	3748.18	LM6-8	60.61	15.57	2.15	5.63	3.73	2.58	0.03	0.8	0.11	0.55	8.22	4.66	3.89	69.98	1.13
9	3748.86	LM6-8	59.32	14.93	3.28	5.35	3.7	2.83	0.04	0.81	0.1	0.57	9.01	4.57	3.97	69.09	1.21
10	3749.38	LM6-8	58.84	15.75	2.92	5.46	3.89	2.82	0.03	0.78	0.09	0.55	8.62	4.99	3.74	69.88	1.16
11	3750.04	LM6-8	58.62	14.36	3.89	5.2	3.51	3.02	0.04	0.75	0.1	0.52	9.9	4.68	4.08	69.59	1.25
12	3750.71	LM6-8	59.13	15	3.13	5.35	3.46	2.78	0.04	0.87	0.11	0.55	9.24	3.98	3.94	69.39	1.19
13	3751.26	LM6-8	58.71	14.57	3.55	5.43	3.61	3.01	0.04	0.82	0.1	0.57	9.54	4.40	4.03	68.77	1.27
14	3752.01	LM6-8	61.76	14.55	2.28	5	3.56	2.39	0.03	0.79	0.11	0.55	8.71	4.51	4.24	69.25	1.13
15	3752.67	LM6-8	64.36	13.61	2.31	4.36	3.39	2.23	0.03	0.7	0.1	0.52	8.32	4.84	4.73	69.47	1.11
16	3753.44	LM6-8	61.23	14.31	3.01	5.02	3.51	2.77	0.04	0.81	0.09	0.53	8.62	4.33	4.28	68.85	1.22
17	3754.5	LM6-8	58.02	15.62	3.09	5.62	3.78	3	0.04	0.97	0.1	0.6	8.84	3.90	3.71	68.17	1.24
18	3755.28	LM5	51.57	13.6	6.65	5.88	3.36	4.43	0.08	0.95	0.1	0.56	12.78	3.54	3.79	66.76	1.67
19	3756.16	LM5	58.8	13.6	5.05	4.58	3.01	2.81	0.04	1.41	0.12	0.59	9.54	2.13	4.32	63.24	1.38
20	3756.87	LM5	54.95	14.91	4.72	5.52	3.56	3.28	0.05	1.17	0.11	0.63	10.65	3.04	3.69	65.91	1.37
21	3757.77	LM5	57.06	15.53	3.97	5.27	3.69	3.03	0.04	1.06	0.11	0.59	9.54	3.48	3.67	67.46	1.25
22	3758.59	LM5	58.57	13.94	4.91	4.59	3.17	2.84	0.04	1.36	0.11	0.59	9.6	2.33	4.20	63.79	1.36
23	3759.26	LM5	58.47	13	5.91	4.19	3.03	2.78	0.04	1.23	0.12	0.56	10.35	2.46	4.50	63.93	1.37
24	3759.84	LM5	57.98	13.28	5.79	4.35	3.12	2.93	0.05	1.26	0.11	0.58	10.41	2.48	4.37	63.81	1.40
25	3760.6	LM5	57.88	14.21	5.25	4.51	3.34	2.92	0.04	1.24	0.11	0.6	9.76	2.69	4.07	64.84	1.33
26	3761.31	LM5	56.78	17.08	3.84	4.96	3.89	2.83	0.04	1.18	0.14	0.56	8.44	3.30	3.32	67.82	1.13
27	3762.27	LM5	55.14	13.96	5.99	5.11	3.43	3.3	0.07	1.08	0.11	0.6	11.04	3.18	3.95	65.74	1.42
28	3762.99	LM5	59.02	13.15	5.11	4.52	3.19	2.72	0.04	0.99	0.1	0.55	10.42	3.22	4.49	66.18	1.32
29	3763.79	LM5	58.41	13.18	5.29	4.96	3	2.62	0.04	1.3	0.11	0.58	10.08	2.31	4.43	63.63	1.38
30	3764.44	LM5	59.03	13.34	5.37	4.5	3.03	2.71	0.04	1.27	0.11	0.58	9.75	2.39	4.43	64.11	1.35
31	3765.39	LM5	58.9	13.57	4.73	4.76	3.13	2.63	0.04	1.28	0.1	0.59	9.78	2.45	4.34	64.08	1.34
32	3766.23	LM5	59.93	13.02	4.39	5.09	3.03	2.43	0.04	1.13	0.1	0.57	10.17	2.68	4.60	65.02	1.32
33	3767.01	LM4	36.01	14.1	1.18	26.46	3.19	1.37	0.02	0.68	0.06	0.27	16.34	4.69	2.55	71.22	1.87
34	3767.57	LM4	64.8	12.38	3.02	4.64	2.77	1.95	0.03	0.99	0.09	0.48	8.71	2.80	5.23	66.41	1.20
35	3768.41	LM4	53.21	10.43	1.6	16.32	2.33	1.48	0.03	0.69	0.08	0.38	13.35	3.38	5.10	68.49	1.87

36	3769.54	LM4	70.47	9.63	2.13	3.46	2.31	1.68	0.03	0.72	0.09	0.39	8.78	3.21	7.32	66.39	1.24
37	3770.45	LM4	62.86	12.38	3.24	3.96	2.96	2.24	0.03	0.92	0.1	0.51	10.31	3.22	5.08	66.49	1.23
38	3771.34	LM4	54.13	16.58	1.91	8.52	3.99	2.23	0.04	0.82	0.08	0.54	10.95	4.87	3.26	70.23	1.14
39	3772.22	LM4	58.59	13.32	1.9	7.79	3.23	1.99	0.03	0.84	0.11	0.5	11.68	3.85	4.40	68.00	1.28
40	3772.64	LM4	66.84	11.49	2.01	4.27	2.82	1.57	0.02	0.73	0.09	0.41	9.51	3.86	5.82	67.78	1.11
41	3773.67	LM4	66.41	9.17	3.6	3.97	2.15	1.81	0.03	0.59	0.15	0.35	11.65	3.64	7.24	68.21	1.30
42	3774.7	LM4	72.65	8.46	2.26	2.57	2.01	1.33	0.02	0.53	0.08	0.31	9.61	3.79	8.59	68.31	1.11
43	3775.36	LM4	61.75	13.58	2.3	4.24	3.36	2.17	0.03	0.83	0.1	0.51	10.82	4.05	4.55	68.05	1.13
44	3776.05	LM4	67.49	6.33	6.02	2.42	1.43	2.45	0.04	0.41	0.11	0.24	12.72	3.49	10.66	68.58	1.75
45	3776.96	LM4	68.09	8.34	4.83	2.54	1.89	1.91	0.03	0.52	0.09	0.3	11.45	3.63	8.16	68.92	1.28
46	3777.72	LM4	67.54	8.05	5.27	2.9	1.99	1.87	0.04	0.54	0.1	0.32	11.39	3.69	8.39	67.16	1.37
47	3778.66	LM4	68.18	7.6	4.87	2.86	1.71	1.86	0.03	0.48	0.09	0.28	11.73	3.56	8.97	68.87	1.37
48	3779.13	LM2-3	65.69	8.47	4.71	3.96	2	1.81	0.03	0.56	0.09	0.33	11.86	3.57	7.76	67.85	1.37
49	3779.9	LM2-3	67.31	7.25	5.89	2.6	1.68	1.97	0.03	0.5	0.07	0.28	12.32	3.36	9.28	67.64	1.46
50	3780.45	LM2-3	59.92	8.32	7.69	3.8	2.05	2.72	0.04	0.59	0.1	0.34	13.97	3.47	7.20	66.64	1.68
51	3781.45	LM2-3	70.48	6.24	6.09	1.91	1.41	1.95	0.03	0.47	0.07	0.24	10.91	3.00	11.29	66.98	1.54
52	3781.9	LM2-3	45.11	20.04	2.56	12.17	4.78	2.08	0.05	0.64	0.06	0.31	11.91	7.47	2.25	73.32	1.04
53	3782.72	LM2-3	57.79	6.7	10.56	2.73	1.51	3.75	0.05	0.48	0.09	0.26	15.69	3.15	8.63	67.55	2.23
54	3783.72	LM1	61.8	9.29	7.44	3.13	2.29	2.24	0.04	0.49	0.12	0.34	12.76	4.67	6.65	69.39	1.32
55	3784.33	LM1	57.8	8.08	9.38	2.4	2.15	3	0.06	0.41	0.09	0.41	16.1	5.24	7.15	68.70	1.67
56	3784.53	LM1	71.7	8.22	2.36	2.91	1.89	1.75	0.03	0.48	0.1	0.31	10.05	3.94	8.72	69.37	1.26
57	3785.13	LM1	67.2	6.95	6.03	2.6	1.82	2.67	0.06	0.42	0.09	0.3	11.82	4.33	9.67	67.43	1.77
58	3785.78	LM1	56	12.16	6.25	3.57	3.27	3.13	0.06	0.56	0.1	0.48	14.03	5.84	4.61	69.28	1.34
59	3786.28	WF4	62.45	10.68	6.31	3.26	2.8	2.46	0.06	0.44	0.22	0.43	10.65	6.36	5.85	70.42	1.26
60	3787.19	WF3	53.69	13.29	6.79	4.22	3.49	4.04	0.09	0.68	0.09	0.55	12.6	5.13	4.04	68.81	1.49
61	3788.2	WF3	50.25	10.66	10.91	4.69	2.83	4.27	0.22	0.59	0.29	0.49	14.7	4.80	4.71	68.02	1.86
62	3789.18	WF3	48.96	14.08	9.7	5.14	3.63	3.35	0.13	0.8	0.1	0.64	13.16	4.54	3.48	68.18	1.38
63	3789.56	WF3	47.4	13.05	10.72	5.46	3.28	3.69	0.19	0.8	0.08	0.61	14.36	4.10	3.63	67.82	1.54
64	3789.8	WF2	54.62	15.67	5.88	5.57	4.12	2.93	0.11	0.85	0.07	0.7	9.28	4.85	3.49	68.32	1.23
65	3790.98	WF2	54.51	13.42	8.32	4.46	3.39	3.09	0.15	0.84	0.06	0.66	10.79	4.04	4.06	67.56	1.36
66	3791.34	WF2	59.16	13.14	6.32	4.53	3.33	2.66	0.11	0.79	0.05	0.62	8.98	4.22	4.50	67.90	1.28
67	3791.52	WF2	63.89	12.03	5.06	4.44	2.97	2.36	0.09	0.69	0.06	0.53	7.76	4.30	5.31	68.65	1.26
68	3791.92	WF2	54.92	14.38	7.61	4.23	3.74	2.92	0.14	0.77	0.05	0.59	10.25	4.86	3.82	68.57	1.23
69	3792.3	WF2	41.64	11.96	18.53	3.31	3.03	2.17	0.14	0.75	0.05	0.54	17.48	4.04	3.48	67.51	1.19
Average			59.09	12.58	4.99	5.09	3.05	2.64	0.05	0.80	0.10	0.49	10.88	4.03	5.14	67.95	1.35
PAAS			62.8	18.9	1.3	7.2	3.7	-	2.2	1.2	0.16	1	-	3.08	3.32	70.36	0.90
NASC			64.8	16.9	3.63	-	3.97	2.86	0.06	1.14	-	0.7	-	-	-	-	-

**Table S3.** Concentrations of trace elements (in ppm) in the Wufeng–Longmaxi shale in the southern Sichuan Basin, China.

Elem ent	Sample no.																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Li	45.4	41.4	38.4	44.45	40.9	40.96	46.5	43.26	44.6	45.0	39.8	43.3	43.3	41.62	39.33	40.08	40.54	38.21	36.25	35.99	37.92	38.22	35.61	34.44
Be	3.12	2.97	3.03	3.28	3.00	3.12	3.30	2.97	2.93	3.26	2.93	2.92	3.01	3.05	2.98	2.86	2.93	2.76	2.68	3.17	3.26	2.78	2.62	2.59
Sc	12.2	11.5	6.43	10.58	10.5	8.15	11.0	10.87	12.5	12.1	10.3	12.2	11.1	10.08	10.22	11.05	12.04	12.36	8.71	10.09	10.64	10.69	8.68	7.79
V	128	136	134	163.5	127	144.9	144	130.6	134	132	120	123	136	127.1	111.4	132.7	138.5	114.0	116.0	138.1	155.9	126.6	92.00	108.0
Cr	76.2	71.7	61.0	73.82	66.5	64.61	76.0	73.01	81.5	73.6	66.3	73.0	75.9	69.73	66.73	68.18	73.67	78.75	59.68	69.10	71.78	65.61	56.57	60.82
Mn	173	434	361	173.0	384	275.0	173	157.7	219	203	253	207	239	149.6	139.3	219.4	211.9	515.2	252.3	257.9	219.2	253.9	257.2	264.0
Co	15.9	13.7	13.5	15.32	14.1	13.77	15.1	15.10	15.4	15.0	14.7	15.7	15.0	15.76	13.54	14.54	15.37	13.07	12.74	14.56	14.61	13.24	12.00	12.30
Ni	53.3	65.0	66.6	79.75	57.9	66.49	72.9	63.91	70.1	56.6	50.4	55.9	67.4	49.17	38.67	62.53	68.63	65.00	59.65	73.67	79.98	66.17	37.86	58.11
Cu	54.2	45.7	51.3	59.13	51.9	48.56	51.7	51.12	50.4	53.1	49.2	52.3	49.2	53.73	51.61	50.56	53.49	42.65	34.98	49.95	50.38	40.18	33.53	36.16
Zn	104	255	103	206.5	101	95.47	127	105.2	85.2	72.4	91.7	100	140	97.50	70.13	99.73	115.5	113.0	92.45	86.62	308.4	96.67	46.49	87.08
Ga	19.9	19.1	16.8	19.27	18.3	18.14	19.8	19.20	20.3	20.9	17.9	19.6	18.6	18.42	17.79	18.22	19.23	18.35	16.48	17.84	18.84	18.64	16.06	15.76
Rb	95.7	139	45.1	48.96	75.7	47.75	61.2	57.90	114	97.1	80.5	123	89.7	61.76	114.4	103.8	118.8	152.3	66.63	52.97	53.27	115.9	75.21	73.00
Sr	107	172	131	96.65	144	116.4	100	96.82	132	124	119	126	122	99.15	103.1	116.5	119.3	187.2	144.2	118.6	107.6	157.5	153.8	147.1
Y	21.2	23.1	19.7	21.55	23.1	22.05	20.3	20.34	22.4	22.5	21.0	22.6	21.9	21.69	23.61	24.64	22.08	26.36	27.65	27.24	25.03	28.71	26.55	26.00
Zr	93.4	90.7	86.9	90.27	81.5	90.39	84.7	88.45	101	119	94.0	105	106	105.9	104.2	104.2	121.8	88.41	223.3	181.8	172.9	210.2	186.7	201.7
Nb	14.0	13.6	12.2	12.93	11.9	13.01	13.1	12.75	15.6	16.6	12.8	13.5	13.2	14.36	14.49	12.31	12.91	12.53	13.56	14.54	14.80	14.09	13.19	12.79
Sn	3.68	3.51	3.30	3.55	3.20	3.37	3.52	3.46	3.31	3.56	3.27	3.23	3.31	3.37	3.02	3.43	3.15	2.87	2.90	3.26	3.18	3.14	2.84	2.79
Cs	9.91	11.8	8.90	8.03	10.5	9.42	8.76	8.19	11.5	10.8	10.0	11.3	10.3	8.47	10.83	10.43	10.95	10.97	8.32	8.96	8.96	9.86	8.48	8.47
Ba	2564	2908	2020	2490	2654	2191	2603	2373	2736	2734	2443	2631	2428	2458	2570	2459	2527	2646	1931	1803	2045	2287	1799	1649
La	35.4	39.2	22.5	30.67	32.2	27.10	34.0	33.49	39.4	38.7	33.5	37.9	35.8	34.28	35.67	34.61	38.35	42.93	32.57	33.70	36.15	41.45	34.38	31.92
Ce	73.4	77.3	59.5	68.36	68.9	64.68	72.9	69.60	81.0	81.5	70.2	74.5	72.8	72.06	65.84	69.50	76.19	80.83	73.32	71.58	73.90	84.41	77.54	73.09
Pr	8.21	8.70	6.05	7.52	7.68	6.87	7.93	7.80	8.98	8.91	7.80	8.58	8.25	8.11	7.98	7.72	8.64	9.51	8.13	8.32	8.65	9.63	8.50	7.93
Nd	29.4	31.0	23.1	27.81	28.6	25.78	28.8	28.48	32.4	32.2	28.8	31.3	29.6	29.71	29.04	27.77	30.91	34.50	31.29	31.17	32.12	35.56	32.10	29.58
Sm	5.53	5.84	4.82	5.36	5.82	5.07	5.25	5.36	5.99	5.74	5.55	5.97	5.49	5.61	5.56	5.20	5.56	6.56	6.35	6.21	6.15	6.71	6.56	5.75
Eu	1.33	1.43	1.16	1.26	1.33	1.21	1.16	1.21	1.32	1.27	1.22	1.32	1.20	1.25	1.21	1.14	1.21	1.41	1.29	1.28	1.23	1.39	1.33	1.18
Gd	4.85	5.26	4.44	4.89	5.22	4.68	4.65	4.83	5.18	4.98	4.84	5.33	4.85	5.09	5.11	4.77	4.96	6.00	5.81	5.65	5.52	6.18	6.04	5.29
Tb	0.83	0.82	0.72	0.75	0.79	0.70	0.69	0.71	0.75	0.73	0.71	0.77	0.72	0.74	0.76	0.73	0.71	0.84	0.87	0.86	0.80	0.89	0.85	0.79
Dy	4.03	4.31	3.84	4.07	4.33	3.99	3.84	3.92	4.28	4.22	3.96	4.29	4.07	4.13	4.35	4.32	3.99	4.71	5.00	4.89	4.53	5.08	4.83	4.54
Ho	0.91	0.93	0.83	0.86	0.90	0.85	0.79	0.79	0.86	0.87	0.81	0.86	0.84	0.83	0.88	0.92	0.81	0.96	1.01	1.00	0.94	1.06	0.96	0.94
Er	2.44	2.54	2.31	2.43	2.59	2.43	2.30	2.22	2.49	2.57	2.34	2.48	2.46	2.43	2.54	2.65	2.37	2.79	2.97	2.89	2.75	3.09	2.81	2.81
Tm	0.44	0.42	0.38	0.40	0.41	0.37	0.35	0.33	0.36	0.38	0.33	0.36	0.37	0.36	0.38	0.39	0.35	0.41	0.44	0.43	0.40	0.44	0.41	0.40
Yb	2.30	2.28	2.15	2.27	2.42	2.25	2.12	2.09	2.26	2.43	2.14	2.29	2.33	2.25	2.34	2.45	2.22	2.68	2.72	2.73	2.60	2.85	2.61	2.61
Lu	0.43	0.40	0.36	0.37	0.39	0.34	0.33	0.32	0.35	0.37	0.33	0.35	0.36	0.34	0.35	0.37	0.34	0.42	0.42	0.42	0.39	0.43	0.40	0.39
Hf	6.66	2.95	2.81	2.88	2.61	2.87	2.61	2.81	2.94	3.63	2.84	3.13	3.27	3.27	3.15	3.09	3.50	2.66	6.43	5.20	4.63	6.15	5.33	5.79
Ta	3.27	1.77	1.15	1.17	1.12	1.04	1.04	1.02	1.06	1.19	0.99	1.03	1.02	1.09	1.14	0.94	0.99	0.93	1.00	1.07	1.02	1.00	0.95	0.95
Ph	24.6	19.0	16.4	17.66	26.1	20.45	20.4	22.50	24.1	25.0	23.5	26.2	21.6	24.32	23.06	22.74	23.57	21.72	18.59	21.47	20.31	22.04	18.89	17.61
Th	18.0	15.5	11.3	14.06	14.4	13.06	14.0	14.10	15.7	15.7	14.5	15.3	14.9	14.32	13.39	14.30	15.35	15.89	14.80	15.09	14.86	16.32	14.53	14.51
U	8.58	6.88	7.04	9.83	8.21	7.17	7.14	6.94	6.89	6.80	6.01	6.92	6.50	7.41	6.10	6.09	7.27	7.84	7.45	9.05	8.95	8.48	5.05	6.44

ΣREF	169	180	132	157.0	161	146.3	165	161.1	185	184	162	176	169	167.1	162.0	162.5	176.6	194.5	172.1	171.1	176.1	199.1	179.3	167.2
I/H	9.45	9.65	7.80	8.79	8.49	8.37	9.96	9.60	10.2	10.1	9.52	9.55	9.58	9.34	8.70	8.79	10.21	9.34	7.95	8.07	8.82	8.94	8.48	8.41
Eu/E	0.79	0.79	0.77	0.75	0.74	0.76	0.72	0.73	0.72	0.73	0.72	0.72	0.71	0.72	0.69	0.70	0.70	0.69	0.65	0.66	0.65	0.66	0.65	0.65
Ce/Ce	1.04	1.01	1.23	1.08	1.05	1.14	1.07	1.04	1.04	1.06	1.05	0.99	1.02	1.04	0.94	1.02	1.01	0.96	1.08	1.03	1.01	1.02	1.09	1.11
LaN/Y	10.3	11.6	7.07	9.11	8.99	8.12	10.8	10.80	11.7	10.7	10.5	11.1	10.3	10.27	10.28	9.52	11.65	10.80	8.07	8.32	9.36	9.81	8.88	8.25
Zr/Sc	7.65	7.89	13.5	8.53	7.70	11.09	7.67	8.14	8.09	9.86	9.13	8.58	9.60	10.51	10.20	9.43	10.12	7.15	25.63	18.02	16.25	19.66	21.50	25.88
Th/Sc	1.48	1.35	1.76	1.33	1.37	1.60	1.27	1.30	1.26	1.29	1.42	1.25	1.34	1.42	1.31	1.29	1.27	1.29	1.70	1.50	1.40	1.53	1.67	1.86
Elem	Sample no.																							
ent	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Li	35.7	43.7	31.9	32.47	33.8	35.17	37.5	33.23	18.4	33.4	26.7	30.9	32.6	26.72	30.15	25.84	24.36	26.00	29.85	22.11	22.54	23.75	22.55	23.52
Be	2.82	3.03	2.89	2.65	2.57	2.60	2.75	2.60	2.28	2.54	1.97	2.01	2.70	3.32	2.88	2.37	2.12	1.97	3.04	1.43	1.88	2.13	1.85	2.23
Sc	9.68	8.62	8.84	8.63	8.90	8.28	11.0	8.99	7.19	9.54	8.61	8.44	9.66	10.86	11.21	9.44	8.00	7.20	8.63	5.44	6.48	7.47	6.50	6.91
V	117	114	116	122.4	111	115.2	134	121.7	54.8	114	101	118	168	164.1	163.7	142.0	168.7	173.4	180.7	164.7	180.4	163.2	184.3	182.3
Cr	60.9	47.7	60.5	57.86	57.0	57.28	66.6	58.37	23.9	54.8	53.4	47.9	63.1	49.87	65.26	54.36	46.78	42.86	63.21	33.61	41.14	41.31	41.35	43.97
Mn	249	210	403	222.7	237	246.4	234	205.6	122	159	111	140	195	230.5	131.7	119.0	167.1	108.4	140.2	245.1	152.0	213.2	146.1	138.3
Co	12.9	10.6	14.8	13.19	13.0	13.07	13.2	14.38	8.39	12.7	13.0	11.6	13.3	13.51	15.75	12.25	12.71	9.65	14.97	8.05	9.59	10.48	10.15	12.61
Ni	57.7	50.8	51.3	57.09	62.9	58.68	72.5	67.65	45.6	60.2	62.5	56.4	76.3	76.56	73.04	63.57	92.41	92.75	90.87	93.57	99.94	82.29	103.4	97.38
Cu	37.8	33.9	52.4	44.16	41.0	39.49	43.2	48.92	48.3	44.2	66.9	46.5	54.1	50.68	76.73	56.90	65.75	49.28	68.43	40.90	47.57	52.22	53.75	66.72
Zn	110	110	68.8	96.42	80.1	82.86	83.1	72.52	172	164	45.6	120	92.0	112.9	76.11	84.21	141.6	87.86	226.7	68.49	103.4	56.81	139.4	72.38
Ga	17.3	18.0	16.9	15.91	16.0	16.24	17.9	15.92	14.9	15.5	13.0	12.9	16.3	19.29	17.29	14.31	11.81	10.90	15.99	8.19	9.95	11.03	9.71	11.19
Rh	85.1	46.9	85.8	62.51	65.6	81.72	145	62.72	105	94.7	113	109	128	113.2	137.9	129.6	101.7	95.26	47.99	67.09	80.72	93.34	80.12	94.74
Sr	146	108	148	124.5	135	143.3	153	116.6	86.7	114	87.1	99.4	127	108.1	108.1	103.0	118.1	90.87	86.20	135.3	126.3	153.7	134.0	144.2
Y	23.3	23.2	24.4	25.03	23.8	24.58	26.7	23.29	14.4	22.8	19.0	23.2	28.5	20.18	28.08	20.07	31.07	21.00	21.89	23.95	20.62	23.62	20.92	22.09
Zr	177	173	143	148.3	189	173.8	180	144.6	109	133	75.7	81.1	144	124.3	100.1	79.41	81.84	64.55	104.1	57.71	62.93	64.66	61.06	71.92
Nb	13.0	12.0	13.3	12.51	12.5	13.24	13.0	12.45	5.74	11.6	8.86	9.49	12.0	11.01	11.68	9.94	8.79	7.37	11.92	5.98	7.13	7.93	7.10	8.25
Sn	3.06	5.60	2.85	2.76	2.75	2.75	2.90	2.68	3.31	2.82	2.14	2.29	2.74	3.45	2.66	2.57	1.87	1.80	2.90	1.32	1.48	1.75	1.53	1.66
Cs	9.39	8.29	9.90	8.66	8.02	8.71	10.2	8.17	9.54	8.84	7.86	7.66	10.1	12.28	11.19	9.43	7.44	6.75	7.83	4.42	5.94	6.48	5.55	6.56
Ba	2004	2450	2053	1727	1779	1879	2343	1891	1452	2133	2077	2054	2301	3128	2511	2333	1902	1862	2061	1532	1695	1817	1674	1811
La	33.6	30.5	31.7	31.12	31.8	33.45	40.7	30.38	16.3	33.6	28.9	29.7	38.7	26.85	40.39	33.76	34.52	27.12	28.84	23.26	25.45	28.60	25.94	29.21
Ce	76.2	64.8	73.2	69.07	69.5	72.97	78.8	63.19	34.8	67.4	55.1	57.8	75.7	51.31	76.79	63.50	64.70	51.80	58.23	44.46	47.44	52.97	49.55	54.52
Pr	8.35	7.73	7.84	7.66	7.77	8.09	9.04	7.31	4.18	7.73	6.39	6.84	8.70	6.26	9.04	7.31	7.54	6.14	6.89	5.51	5.66	6.23	5.76	6.47
Nd	31.5	29.2	29.3	29.20	29.1	30.33	32.4	27.73	15.4	28.4	23.1	25.5	31.8	22.97	33.45	26.01	28.47	22.90	25.66	21.33	21.16	23.49	21.47	23.68
Sm	6.14	5.92	5.75	5.70	5.70	5.82	5.94	5.44	3.06	5.40	4.36	5.03	5.95	4.47	6.52	4.76	5.64	4.46	4.96	4.43	4.03	4.53	4.07	4.50
Eu	1.25	1.09	1.24	1.17	1.16	1.21	1.29	1.14	0.68	1.13	0.94	1.10	1.28	1.04	1.34	1.01	1.32	0.95	1.09	1.01	0.91	1.01	0.93	1.00
Gd	5.39	5.41	5.16	5.29	5.06	5.29	5.56	4.99	2.91	5.00	3.90	4.80	5.49	4.06	5.88	4.23	5.77	4.18	4.57	4.49	3.86	4.44	4.00	4.33
Th	0.76	0.78	0.76	0.77	0.74	0.76	0.79	0.71	0.45	0.72	0.56	0.70	0.80	0.60	0.84	0.61	0.83	0.61	0.67	0.64	0.56	0.64	0.58	0.61
Dv	4.28	4.39	4.40	4.46	4.21	4.28	4.60	4.07	2.68	4.06	3.25	4.08	4.69	3.50	4.73	3.48	4.78	3.47	3.86	3.64	3.21	3.68	3.28	3.47
Ho	0.86	0.88	0.91	0.90	0.85	0.88	0.95	0.82	0.54	0.81	0.66	0.81	0.96	0.72	0.95	0.70	0.98	0.70	0.79	0.74	0.66	0.76	0.66	0.71
Er	2.52	2.50	2.70	2.64	2.51	2.59	2.75	2.41	1.61	2.39	1.87	2.33	2.84	2.07	2.74	2.07	2.82	1.98	2.32	2.13	1.89	2.21	1.89	2.02
Tm	0.37	0.37	0.39	0.40	0.36	0.38	0.40	0.35	0.24	0.35	0.27	0.33	0.41	0.30	0.39	0.29	0.39	0.29	0.34	0.29	0.27	0.32	0.27	0.28
Yb	2.37	2.32	2.59	2.51	2.32	2.43	2.52	2.27	1.46	2.22	1.69	2.06	2.67	1.93	2.45	1.93	2.47	1.74	2.19	1.86	1.72	2.04	1.61	1.76

Li	0.36	0.35	0.40	0.38	0.35	0.36	0.38	0.34	0.21	0.33	0.25	0.31	0.39	0.28	0.36	0.29	0.37	0.27	0.33	0.28	0.26	0.31	0.24	0.26
Hf	5.22	5.73	4.13	4.36	5.36	4.92	5.03	4.18	5.03	3.75	2.18	2.26	4.19	5.10	2.78	2.18	2.18	1.83	2.95	1.51	1.69	1.82	1.63	1.97
Ta	1.02	1.54	0.98	0.89	0.94	0.93	0.96	0.92	1.11	0.82	0.65	0.64	0.82	1.21	0.82	0.68	0.56	0.50	0.82	0.40	0.49	0.55	0.47	0.56
Pb	19.9	16.7	25.3	17.79	18.8	17.85	19.3	20.63	21.7	20.0	30.9	18.1	18.0	27.77	26.75	21.36	19.37	14.44	18.84	11.74	11.07	16.27	13.92	18.87
Th	15.4	20.9	13.8	13.10	14.4	13.87	15.6	13.31	22.7	13.3	10.6	10.5	13.1	18.56	13.86	11.56	9.46	8.85	10.99	6.78	8.47	9.08	7.93	9.45
U	6.90	7.71	9.86	7.58	7.43	7.19	8.76	7.98	9.23	8.11	7.13	7.84	9.75	10.78	13.44	8.96	15.65	11.90	11.59	12.44	13.25	13.85	15.72	15.77
ΣREF	174	156	166	161.2	161	168.8	186	151.1	84.6	159	131	141	180	126.3	185.8	149.9	160.6	126.6	140.7	114.0	117.0	131.2	120.2	132.8
L/H	9.29	8.20	8.61	8.30	8.85	8.95	9.38	8.47	7.39	9.06	9.55	8.18	8.90	8.39	9.14	10.0	7.72	8.56	8.33	7.11	8.42	8.12	8.59	8.88
Eu/E	0.66	0.59	0.70	0.65	0.66	0.67	0.69	0.67	0.70	0.66	0.70	0.68	0.68	0.75	0.66	0.69	0.71	0.67	0.70	0.69	0.71	0.69	0.70	0.69
Ce/Ce	1.09	1.02	1.12	1.08	1.06	1.07	0.99	1.02	1.01	1.01	0.98	0.98	0.99	0.95	0.97	0.97	0.97	0.97	0.99	0.95	0.95	0.96	0.98	0.95
LaN/Y	9.57	8.88	8.26	8.37	9.24	9.27	10.9	9.03	7.55	10.2	11.5	9.71	9.77	9.39	11.14	11.82	9.41	10.49	8.89	8.42	9.99	9.44	10.84	11.21
Zr/Sc	18.3	20.1	16.2	17.18	21.2	21.00	16.3	16.08	15.1	13.9	8.79	9.61	14.9	11.45	8.93	8.41	10.23	8.97	12.06	10.61	9.71	8.66	9.40	10.40
Th/Sc	1.60	2.43	1.56	1.52	1.62	1.68	1.41	1.48	3.16	1.40	1.24	1.25	1.36	1.71	1.24	1.22	1.18	1.23	1.27	1.25	1.31	1.22	1.22	1.37

Elem ent	Sample no.																				Aver	PAA	NAS	
	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	age	S	C
Li	23.3	22.4	21.7	14.83	18.2	24.56	23.9	26.88	28.6	28.9	39.5	39.3	38.2	47.45	46.62	53.32	49.54	48.11	50.07	46.70	37.98	34.93	-	-
Be	1.91	2.46	1.55	3.89	1.72	2.40	2.51	1.92	1.80	3.25	2.60	2.92	2.43	3.06	2.82	3.48	2.64	2.72	2.35	3.13	2.45	2.67	-	-
Sc	6.00	7.44	4.99	6.81	4.81	8.34	4.28	7.35	7.20	11.5	9.18	9.62	7.69	9.94	8.68	11.47	9.05	9.26	10.27	10.46	8.15	9.12	16	15
V	161	227	158	173.4	236	175.7	151	292.6	97.4	292	148	138	89.7	121.4	120.8	107.0	81.25	86.68	87.52	71.43	88.04	139.1	96	130
Cr	40.0	47.4	32.7	26.07	38.3	80.76	65.1	73.88	58.7	72.2	58.8	60.7	54.6	68.49	69.81	63.62	53.03	51.66	52.66	42.48	49.25	58.96	110	125
Mn	155	197	167	284.3	304	218.7	350	189.3	381	388	401	573	1553	909.6	1350	694.1	1026	759.3	642.2	939.4	970.4	333.0	-	-
Co	10.6	11.6	7.25	7.83	7.32	12.41	7.76	9.46	6.97	8.54	8.02	13.3	10.3	16.36	17.33	19.03	11.62	12.61	15.80	13.14	9.59	12.69	23	26
Ni	107	114	92.2	87.91	111	98.16	64.4	103.1	64.0	89.3	45.4	52.8	39.6	54.71	54.77	62.69	37.95	43.62	50.12	45.87	35.22	67.93	55	58
Cu	53.3	74.4	40.5	48.24	42.4	84.92	59.2	108.1	92.0	116	62.4	87.7	50.6	92.27	80.10	106.1	48.98	53.07	74.26	47.04	53.35	56.11	50	-
Zn	117	82.7	62.5	41.10	514	88.70	192	282.5	279	132	76.6	119	187	178.2	156.2	122.1	153.2	63.08	143.6	790.5	121.0	133.0	85	-
Ga	9.67	12.0	9.08	17.38	9.02	12.10	11.0	9.72	9.21	13.9	14.1	16.5	14.8	18.47	17.89	18.94	16.53	15.68	15.31	17.42	16.44	15.74	-	-
Rb	77.9	97.7	64.6	79.77	69.1	100.9	94.8	89.04	85.2	115	126	152	134	133.2	116.4	58.36	131.8	60.06	118.3	72.75	113.5	92.56	160	125
Sr	147	182	148	80.43	188	163.5	184	72.11	124	135	155	189	258	271.9	252.2	154.2	248.9	182.3	193.5	224.4	293.9	141.9	200	142
Y	15.2	24.5	15.3	17.43	26.3	23.44	31.5	22.03	25.1	31.8	29.7	30.9	29.9	27.00	27.22	25.51	24.38	21.14	18.55	33.47	25.23	23.83	-	-
Zr	29.8	84.8	74.8	136.0	80.4	70.62	129	69.58	65.3	132	100	137	107	129.3	125.6	139.5	134.9	122.9	109.0	267.4	196.9	117.7	210	200
Nb	7.16	8.91	15.2	8.36	6.14	11.02	15.8	6.99	7.25	12.3	13.0	12.3	12.8	17.20	14.10	21.10	14.94	15.08	15.54	33.92	27.41	12.59	1.9	13
Sn	1.52	1.77	1.74	3.57	1.30	2.57	1.78	1.68	1.63	2.66	2.66	3.18	2.49	3.18	2.78	5.39	3.12	3.02	2.88	3.77	2.97	2.83	-	-
Cs	5.35	6.69	4.17	8.93	4.50	6.45	5.98	5.36	5.02	8.77	7.26	9.47	7.52	9.54	8.69	8.55	9.18	7.47	7.96	8.93	8.32	8.52	-	-
Ba	1563	1833	1416	1525	1457	1527	1646	1444	1321	1776	1664	1974	1832	2210	2087	1646	1804	1183	1785	1613	2176	2042	650	636
La	24.3	31.5	25.3	17.27	26.9	38.51	35.8	27.51	24.9	32.4	36.8	38.1	33.2	43.15	41.17	35.85	41.63	31.98	34.79	38.73	42.81	32.96	38.2	31
Ce	44.6	58.4	45.6	36.22	50.9	82.93	73.8	52.52	45.4	61.2	72.8	86.8	81.5	107.4	98.76	95.41	99.28	91.12	80.31	124.2	97.67	69.78	79.6	67
Pr	5.40	6.92	5.43	4.60	6.12	9.52	8.32	6.24	5.55	7.36	8.21	8.74	8.16	10.40	9.55	8.77	9.62	8.15	7.30	11.88	9.42	7.72	8.83	-
Nd	19.9	25.4	19.7	17.07	23.3	35.22	30.6	23.45	20.6	26.5	31.2	31.9	31.9	38.81	35.49	32.53	34.44	30.27	25.69	44.82	33.20	28.52	33.9	27
Sm	3.72	4.92	3.82	3.19	4.50	6.67	5.73	4.77	4.21	5.22	7.15	6.39	7.32	7.55	7.07	6.39	6.28	5.68	4.74	8.51	6.14	5.51	5.55	5.6
Eu	0.83	1.09	0.80	0.71	0.99	1.17	1.20	0.91	0.89	1.07	1.58	1.30	1.62	1.49	1.42	1.19	1.20	1.04	0.95	1.66	1.40	1.18	1.08	1.2
Gd	3.40	4.73	3.65	2.88	4.58	5.92	5.69	4.73	4.35	5.04	7.46	6.18	7.49	6.77	6.66	5.68	5.60	4.95	4.21	7.06	5.73	5.09	4.66	5.2

Th	0.46	0.67	0.50	0.45	0.65	0.80	0.83	0.67	0.67	0.79	1.09	0.95	1.07	0.96	0.97	0.83	0.81	0.70	0.60	1.07	0.85	0.75	0.77	-
Dv	2.53	3.77	2.69	2.74	3.84	4.40	4.95	3.88	3.90	4.76	5.88	5.69	5.88	5.43	5.50	4.73	4.63	4.00	3.45	6.26	4.89	4.23	4.68	-
Ho	0.50	0.78	0.52	0.60	0.79	0.88	1.04	0.76	0.81	1.05	1.09	1.18	1.12	1.09	1.09	0.95	0.92	0.81	0.68	1.30	0.99	0.86	0.99	-
Er	1.43	2.23	1.44	1.91	2.32	2.38	3.08	2.10	2.31	3.16	2.89	3.54	3.08	3.05	3.09	2.79	2.67	2.35	2.00	3.73	2.81	2.49	2.85	-
Tm	0.20	0.32	0.21	0.30	0.33	0.34	0.44	0.30	0.32	0.48	0.39	0.52	0.44	0.45	0.43	0.41	0.39	0.34	0.29	0.53	0.41	0.36	0.41	-
Yb	1.24	2.04	1.25	1.96	2.03	2.18	2.68	1.89	2.11	3.23	2.41	3.44	2.77	2.94	2.75	2.66	2.47	2.24	1.91	3.28	2.54	2.30	2.82	3.1
Lu	0.19	0.30	0.18	0.29	0.30	0.34	0.39	0.29	0.31	0.49	0.37	0.52	0.43	0.44	0.41	0.40	0.37	0.33	0.28	0.46	0.37	0.35	0.43	0.46
Hf	0.79	2.21	1.59	7.41	2.11	1.42	2.79	1.89	1.78	3.54	2.66	3.79	2.96	3.53	3.45	3.86	3.77	3.46	3.05	5.54	4.23	3.46	5	6.3
Ta	0.47	0.59	0.40	1.35	0.43	0.60	1.12	0.53	0.48	0.82	0.75	0.88	0.86	1.20	0.98	1.51	1.07	1.04	1.19	1.43	1.43	0.96	-	1.1
Pb	13.2	19.7	10.6	33.69	11.4	16.93	11.0	22.38	12.5	18.4	19.5	36.4	34.9	65.22	40.96	64.74	42.22	26.22	49.06	121.0	24.58	24.40	-	-
Th	7.98	9.81	6.78	17.03	7.34	10.37	6.90	8.43	7.50	12.7	10.6	12.3	11.1	14.09	12.91	16.94	14.46	14.34	14.23	14.78	12.24	13.09	14.6	12.3
U	14.7	19.2	13.2	15.45	26.9	10.54	8.42	9.80	5.38	9.21	3.24	2.98	2.96	3.27	2.95	2.47	2.25	2.30	2.02	2.74	2.29	8.50	3.1	3
ΣREF	108	143	111	90.19	127	191.2	174	130.0	116	152	179	195	186	229.9	214.3	198.6	210.3	183.9	167.1	253.4	209.2	162.1	184.7	140.5
I/H	9.93	8.65	9.65	7.10	7.61	10.09	8.14	7.90	6.88	7.05	7.32	7.87	7.36	9.88	9.26	9.75	10.7	10.7	11.47	9.70	10.26	8.87	9.49	15.05
Eu/E	0.71	0.69	0.66	0.72	0.67	0.57	0.64	0.59	0.64	0.64	0.66	0.63	0.67	0.64	0.63	0.60	0.62	0.60	0.65	0.65	0.72	0.68	0.65	0.68
Ce/Ce	0.94	0.95	0.94	0.98	0.95	1.04	1.03	0.96	0.93	0.95	1.01	1.14	1.19	1.22	1.20	1.30	1.19	1.36	1.21	1.39	1.17	1.05	1.04	-
La/Y	13.2	10.4	13.6	5.94	8.97	11.91	9.01	9.83	7.97	6.76	10.3	7.48	8.08	9.89	10.09	9.07	11.39	9.61	12.31	7.95	11.36	9.79	9.13	6.74
Zr/Sc	4.97	11.4	14.9	19.97	16.7	8.47	30.2	9.47	9.09	11.5	10.9	14.3	13.9	13.01	14.47	12.16	14.91	13.27	10.61	25.56	24.17	13.24	13.13	13.33
Th/Sc	1.33	1.32	1.36	2.50	1.53	1.24	1.61	1.15	1.04	1.11	1.16	1.28	1.45	1.42	1.49	1.48	1.60	1.55	1.39	1.41	1.50	1.45	0.91	0.82