

Table S1 The rare earth elements contents (ppm) of the Jiujialu Formation ore-bearing rock series from the Lindai bauxite deposit, central Guizhou Province.

Sample	LD-01	LD-02	LD-03	LD-04	LD-05	LD-06	LD-07	LD-08	LD-09	LD-10
Y	48.10	47.80	52.80	62.40	70.20	155.0	76.00	117.5	116.0	117.0
La	88.40	99.20	155.0	414.0	491.0	242.0	234.0	275.0	284.0	174.5
Ce	145.5	167.5	340.0	924.0	1120	462.0	502.0	598.0	592.0	347.0
Pr	14.70	17.40	27.70	80.30	108.0	51.10	52.70	54.80	60.90	31.20
Nd	42.70	48.90	80.70	236.0	370.0	196.0	217.0	202.0	238.0	93.50
Sm	5.20	5.60	8.80	24.50	41.10	34.80	50.70	36.90	47.90	14.00
Eu	0.90	1.10	1.30	3.10	5.50	6.00	10.10	6.90	8.70	2.90
Gd	5.40	6.00	6.10	10.90	16.00	26.90	44.70	31.60	42.10	14.00
Tb	1.20	1.20	1.40	1.80	2.30	3.90	4.70	4.40	5.40	2.60
Dy	8.40	8.60	9.80	11.70	13.50	25.20	20.10	23.60	26.60	17.80
Ho	2.00	2.00	2.40	2.60	2.80	4.90	3.30	4.30	4.50	4.20
Er	6.30	6.30	7.40	8.30	8.40	12.80	8.20	11.30	11.70	13.40
Tm	1.00	1.00	1.20	1.30	1.40	1.80	1.20	1.70	1.70	2.20
Yb	7.00	6.80	8.90	8.90	9.00	11.80	8.70	10.60	11.10	15.10
Lu	1.10	1.10	1.40	1.50	1.40	1.80	1.30	1.60	1.70	2.40
ΣREE	329.7	372.7	652.0	1729	2190	1081	1159	1263	1336	734.7
ΣLREE	297.3	339.7	613.4	1681	2135	991.9	1067	1174	1232	663.1
ΣHREE	32.40	33.00	38.60	46.90	54.70	89.20	92.20	88.90	104.7	71.60
ΣLREE/ ΣHREE	9.19	10.29	15.89	35.85	39.03	11.12	11.57	13.20	11.77	9.26
(La/Yb) _N	9.06	10.50	12.49	33.25	39.31	14.77	19.32	18.61	18.44	8.32

(La/Sm) _N	11.00	11.35	11.40	10.91	7.71	4.49	2.98	4.81	3.83	8.05
(Gd/Yb) _N	0.63	0.73	0.56	1.01	1.48	1.89	4.26	2.47	3.15	0.77
Eu/Eu [*]	0.52	0.57	0.50	0.49	0.55	0.57	0.63	0.60	0.58	0.63
Ce/Ce [*]	0.90	0.91	1.18	1.16	1.14	0.97	1.06	1.12	1.05	1.07

Table S1 (continued)

Sample	LD-11	LD-12	LD-13	LD-14	LD-15	LD-16	LD-17	LD-18	LD-19
Y	304.0	137.5	109.5	217.0	146.0	144.0	89.20	82.30	12.00
La	248.0	316.0	289.0	335.0	376.0	249.0	181.5	93.00	3.10
Ce	514.0	538.0	513.0	548.0	705.0	513.0	337.0	233.0	9.00
Pr	55.80	80.00	68.30	90.40	94.30	64.60	41.50	26.80	1.00
Nd	235.0	303.0	265.0	370.0	369.0	268.0	146.5	124.5	4.20
Sm	75.70	50.80	49.10	71.20	65.80	62.70	20.60	36.50	1.20
Eu	16.30	9.20	8.80	13.30	12.10	11.80	3.80	6.70	0.30
Gd	81.00	37.20	37.80	58.30	50.30	48.50	16.40	27.30	1.70
Tb	10.80	5.00	5.00	7.60	6.40	5.60	2.60	3.20	0.30
Dy	58.40	27.20	25.50	40.30	32.80	28.70	15.70	15.60	2.00
Ho	11.10	5.40	4.70	8.10	6.00	5.50	3.40	3.10	0.40
Er	30.00	15.80	13.10	23.20	16.90	15.50	10.30	8.60	1.10
Tm	4.10	2.40	2.00	3.40	2.50	2.20	1.60	1.20	0.20
Yb	25.70	16.40	13.20	22.20	16.50	14.70	10.60	8.40	1.00
Lu	3.80	2.50	2.00	3.40	2.50	2.10	1.60	1.30	0.20

ΣREE	1370	1409	1296	1594	1756	1292	792.9	589.2	25.7
ΣLREE	1145	1297	1193	1428	1622	1169	730.9	520.4	18.8
ΣHREE	224.9	111.9	103.2	166.4	133.9	122.7	62.10	68.70	6.90
ΣLREE/ ΣHREE	5.09	11.59	11.56	8.58	12.12	9.53	11.78	7.58	2.75
(La/Yb) _N	6.92	13.82	15.76	10.82	16.35	12.19	12.34	7.99	2.20
(La/Sm) _N	2.11	4.02	3.80	3.04	3.69	2.56	5.69	1.64	1.68
(Gd/Yb) _N	2.61	1.88	2.38	2.17	2.52	2.74	1.29	2.70	1.42
Eu/Eu [*]	0.63	0.62	0.60	0.61	0.62	0.63	0.60	0.62	0.66
Ce/Ce [*]	1.03	0.81	0.86	0.76	0.89	0.97	0.92	1.13	1.22

Data from [Luo et al. \(2022\)](#). $\Sigma\text{REE} = \Sigma\text{LREE} + \Sigma\text{HREE}$; $\Sigma\text{LREE} = \Sigma(\text{La-Eu})$; $\Sigma\text{HREE} = \Sigma(\text{Gd-Lu})$; $\text{Ce/Ce}^* = (2\text{Ce/Ce}_N)/(\text{La/La}_N + \text{Pr/Pr}_N)$; $\text{Eu/Eu}^* = (2\text{Eu/Eu}_N)/(\text{Sm/Sm}_N + \text{Gd/Gd}_N)$; $(\text{La/Yb})_N = (\text{La/La}_N)/(\text{Yb/Yb}_N)$; $(\text{La/Sm})_N = (\text{La/La}_N)/(\text{Sm/Sm}_N)$; $(\text{Gd/Yb})_N = (\text{Gd/Gd}_N)/(\text{Yb/Yb}_N)$; N: normalization of chondrite, normalization factors are from [Sun and McDonough \(1989\)](#).

References

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Table S2 EDS microanalyses of the monazite and xenotime in the Lindai bauxite deposit, central Guizhou Province.

Mineral	detrital monazite					authigenic monazite			
wt%	Spot 1	Spot 2	Spot 3	Spot 4	Spot 5	Spot 6	Spot 7	Spot 8	Spot 9
O	29.18	28.92	30.47	28.17	27.36	27.23	26.68	29.14	29.12
Si	0.93	–	–	–	–	–	–	–	–
Al	–	–	–	–	–	–	–	–	–
Ti	–	–	–	–	–	–	–	–	–
Ca	0.19	0.42	–	1.28	–	–	–	–	–
K	–	–	–	–	–	–	–	–	–
La	18.77	11.77	10.66	13.08	16.45	12	13.11	14.47	10.23
Ce	31.01	27.45	29.4	25.12	29.92	30.34	27.91	28.88	31.96
Nd	–	10.78	11.85	10.82	8.28	12.3	15.61	10.59	12.81
P	15.1	16.38	15.92	15.73	15.09	17.53	16.68	16.31	15.88
Y	–	–	–	–	–	–	–	–	–
Gd	–	–	–	–	–	–	–	–	–
Dy	–	–	–	–	–	–	–	–	–
Er	–	–	–	–	–	–	–	–	–
Yb	–	–	–	–	–	–	–	–	–
Th	4.83	4.28	1.69	5.79	2.91	0.61	–	0.61	–
U	–	–	–	–	–	–	–	–	–

“–” = absent or below the detection limit of EDS.

Table S2 (continued)

Mineral	detrital xenotime						authigenic xenotime		
wt%	Spot 10	Spot 11	Spot 12	Spot 13	Spot 14	Spot 15	Spot 16	Spot 17	Spot 18
O	36.32	34.68	41.29	38.43	48.65	44.42	49.2	40.66	34.15
Si	–	–	–	–	2.72	–	–	3.77	–
Al	–	–	5.47	14.51	7.66	10.26	24.07	7.27	–
Ti	–	–	–	–	–	–	0.49	–	–
Ca	–	–	–	–	–	–	–	–	–
K	–	–	–	–	0.69	–	–	0.67	–
La	–	–	–	–	–	–	–	–	–
Ce	–	–	–	–	–	–	–	–	–
Nd	–	–	–	–	–	–	–	–	–
P	18.82	18.36	16.11	11.44	11.97	13.61	7.45	13.88	17.51
Y	35.05	34.9	32.85	24.64	24.39	28.32	15.33	26.92	34.84
Gd	2.64	2.28	0.26	2.29	–	–	0.36	0.75	2.35
Dy	7.17	–	2.39	6.07	2.64	2.58	2.17	4.35	6.86
Er	–	3.64	1.63	2.62	1.28	–	0.45	1.74	4.3
Yb	–	6.13	–	–	–	–	–	–	–
Th	–	–	–	–	–	–	0.49	–	–
U	–	–	–	–	–	0.8	–	–	–

“–” = absent or below the detection limit of EDS.