Table S1. Major, trace and rare earth concentrations of the whole-rock samples collected from the Yuejin--II area.

Sample number	ZKII-05-53	ZKII-05-151.5	ZKII-05-165.5	ZKII-05-168	ZKII-05-188.5	ZKII-05-223	ZKII-05-243	ZKII-05-251	ZKII-05-262.6	ZKII-05-267.5	ZKII-05-273.5	ZKII-05-278.1	ZKII-05-286	ZKII-05-296	ZKII-05-302	ZKII-05-306	ZKII-05-313	ZKII-05-318.5	ZKII-05-330	ZKII-05-336	ZKII-05-344	ZKII-05-352.5	ZKII-05-356.5	ZKII-05-363	ZKII-05-394.5	ZKII-05-406	ZKII-05-418	ZKII-05-425	ZKII-05-435	ZKII-05-447	ZKII-05-454.5
Rock type	Mudstone	Siltstone	Silty mudstone	Silty mudstone	Mudstone	Silty mudstone	Silty mudstone	Mudstone	Mudstone	Mudstone	Mudstone	Siltstone	Mudstone	Silty mudstone	Mudstone	Mudstone	Mudstone	Silty mudstone	Mudstone	Mudstone	Mudstone	Mudstone	Mudstone	Muddy siltstone	Mudstone	Mudstone	Silty mudstone	Mudstone	Mudstone	Mudstone	Mudstone
Major elements (wt.%)																															
$SiO_{2(wt\%)}$	42.84	54.44	48.53	48.18	54.13	40.27	50.04	57.68	71.22	63.16	53.50	39.87	55.56	55.52	51.26	49.78	58.19	37.64	59.22	49.98	56.16	59.82	51.00	58.80	57.46	65.04	60.47	42.93	55.63	53.59	55.28
TiO_2	0.53	0.62	0.58	0.50	0.65	0.48	0.58	0.67	0.41	0.74	0.67	0.23	0.63	0.66	0.62	0.62	0.60	0.36	0.70	0.58	0.72	0.69	0.60	0.66	0.68	0.78	0.73	0.57	0.67	0.63	0.67
Al_2O_3	11.02	12.96	10.82	9.75	12.78	8.78	10.73	11.96	13.23	13.63	12.33	7.71	11.73	12.13	11.32	11.19	10.85	7.60	12.46	10.51	13.08	12.34	10.86	12.78	12.29	14.31	12.89	10.45	11.70	10.96	12.02
Fe_2O_3	2.80	4.47	2.69	1.94	2.79	2.43	3.51	2.65	1.32	3.71	2.91	1.05	2.79	2.36	2.94	2.29	2.53	1.84	3.72	1.77	2.70	3.04	3.08	3.92	2.82	4.12	3.29	2.67	2.50	2.52	2.34
FeO	1.81	1.64	1.63	1.48	1.92	1.24	1.31	1.89	0.83	1.85	2.00	0.60	1.63	2.02	1.90	1.86	1.51	0.68	1.55	2.73	1.74	1.61	1.58	1.34	1.56	1.48	1.66	2.24	1.96	1.77	2.23
MnO	0.10	0.06	0.08	0.09	0.08	0.23	0.11	0.06	0.03	0.06	0.09	0.10	0.07	0.07	0.08	0.17	0.08	0.48	0.08	0.15	0.07	0.07	0.24	0.06	0.08	0.05	0.06	0.20	0.08	0.09	0.09
MgO	2.88	2.78	2.80	2.27	2.86	2.10	2.65	2.85	1.24	2.95	2.21	1.09	2.39	2.88	4.24	3.15	2.81	1.59	2.39	1.98	2.29	2.11	1.94	2.20	1.97	2.74	2.47	7.74	2.53	4.03	2.58
CaO	17.13	8.11	14.12	16.85	9.52	22.06	14.02	7.35	1.80	2.10	11.68	25.58	10.28	8.64	8.88	12.47	7.96	24.79	6.61	13.39	8.20	7.12	14.48	7.00	9.00	1.10	5.62	11.72	9.45	9.58	8.27
Na_2O	1.66	2.04	1.95	1.94	2.24	1.83	2.08	2.69	3.95	2.99	2.16	1.96	2.34	2.46	2.60	2.29	2.50	1.61	2.20	2.15	2.60	2.27	1.89	2.20	2.61	2.42	2.28	1.63	2.07	2.15	2.54
K_2O	2.38	2.92	2.39	2.20	2.86	1.90	2.27	2.54	3.18	2.91	2.58	1.90	2.46	2.52	2.34	2.30	2.29	1.68	2.57	2.19	2.70	2.60	2.27	2.74	2.63	2.98	2.71	2.20	2.41	2.29	2.48
P_2O_5	0.12	0.15	0.13	0.13	0.15	0.13	0.15	0.17	0.10	0.18	0.16	0.08	0.16	0.16	0.15	0.15	0.14	0.10	0.17	0.15	0.17	0.17	0.15	0.16	0.17	0.17	0.17	0.13	0.16	0.14	0.16
LOI	16.53	9.63	14.10	14.51	9.80	18.42	12.41	9.30	2.59	5.51	9.48	19.77	9.77	10.36	13.42	13.54	10.37	21.56	8.16	14.10	9.38	7.98	11.74	7.98	8.57	4.65	7.46	17.28	10.62	12.04	11.10
Total	99.80	99.82	99.82	99.84	99.78	99.87	99.86	99.81	99.90	99.79	99.77	99.94	99.81	99.78	99.75	99.81	99.83	99.93	99.83	99.68	99.81	99.82	99.83	99.84	99.84	99.84	99.81	99.76	99.78	99.79	99.76
Mg#	75.92	77.05	77.29	75.24	74.69	77.04	80.03	74.92	74.74	75.95	68.64	78.25	74.39	73.85	81.55	77.04	78.66	82.24	75.34	58.96	72.28	72.19	70.86	76.48	71.44	78.57	74.67	87.25	71.89	81.85	69.62
Trace elements (ppm)																															
Sc	11.80	13.70	11.70	10.30	14.00	10.20	12.40	12.60	6.63	15.10	13.60	5.59	12.30	13.00	12.80	14.30	11.10	8.74	14.00	13.00	15.00	12.50	12.40	13.20	12.60	15.20	13.80	16.20	13.70	13.40	13.60
V	78.10	98.20	70.80	58.80	98.00	61.20	93.90	83.10	95.20	162.00	85.10	26.20	76.90	88.50	78.80	77.50	77.20	50.10	86.60	71.10	92.30	80.10	72.30	96.40	79.20	110.00	99.60	125.00	87.20	84.10	90.40
Cr	60.60	76.10	60.90	51.20	71.00	49.60	67.30	69.90	66.10	145.00	67.40	23.20	61.80	69.80	66.00	64.50	82.90	52.80	73.30	58.10	81.30	68.20	67.80	70.60	59.50	132.00	129.00	74.90	65.80	66.10	65.80
Co	13.00	21.80	12.80	11.20	14.00	15.90	12.50	12.30	5.53	15.00	14.00	6.95	12.50	14.60	12.80	13.40	10.10	12.10	11.90	11.00	12.70	10.60	12.00	11.00	9.92	14.20	13.40	13.80	14.00	13.00	12.80
Ni	32.60	56.50	32.90	27.30	37.00	32.20	32.00	33.00	14.20	41.20	37.00	15.70	31.80	35.60	34.20	33.10	28.60	24.50	36.30	30.00	33.30	30.10	32.70	31.00	26.50	41.10	36.20	34.90	33.30	31.20	32.10
Cu	25.70	33.70	22.50	17.40	30.10	18.80	25.10	27.90	12.70	29.30	27.70	9.59	24.60	27.40	27.80	23.50	25.70	33.60	24.00	20.50	28.40	29.00	23.90	26.80	26.20	31.80	27.40	26.20	25.80	25.80	29.40
Zn	72.30	98.80	69.40	56.60	80.60	57.80	65.70	74.10	35.20	89.30	77.30	23.50	69.80	76.00	76.20	71.70	59.30	39.30	79.00	67.20	82.90	93.70	66.90	74.20	67.70	86.50	79.20	69.80	73.40	67.00	77.00

Ga	14.80	17.00	14.20	12.30	17.10	11.20	13.90	14.90	14.60	18.50	15.80	8.76	14.60	15.70	15.10	14.50	13.90	9.97	16.20	13.60	16.60	15.70	13.70	16.40	15.50	18.50	16.50	14.00	15.10	13.60	15.40
Rb	98.60	115.00	94.40	84.40	110.00	72.90	88.40	96.30	108.00	122.00	102.00	73.90	95.20	100.00	98.70	90.80	91.90	69.70	104.00	88.90	105.00	103.00	88.90	111.00	103.00	108.00	109.00	87.40	94.50	85.60	97.50
Sr	470.00	245.00	303.00	331.00	226.00	267.00	274.00	295.00	236.00	240.00	312.00	518.00	364.00	283.00	444.00	405.00	327.00	351.00	272.00	274.00	268.00	246.00	291.00	265.00	288.00	204.00	235.00	641.00	284.00	356.00	284.00
Y	21.70	34.60	24.00	23.00	27.40	22.60	28.60	27.50	23.20	33.50	28.10	14.50	25.00	26.60	25.40	27.40	24.60	25.60	28.30	28.60	29.80	25.20	29.30	27.70	25.20	27.30	26.70	39.00	26.70	28.20	27.60
Zr	124.00	153.00	171.00	153.00	184.00	145.00	168.00	233.00	184.00	245.00	192.00	74.20	209.00	199.00	184.00	177.00	189.00	148.00	224.00	213.00	220.00	220.00	197.00	222.00	249.00	249.00	254.00	184.00	211.00	216.00	193.00
Nb	12.50	14.40	13.50	11.70	15.40	11.20	12.90	15.20	11.60	18.20	14.80	5.61	14.00	15.00	14.30	13.90	13.00	9.20	16.00	13.30	16.20	15.40	14.00	15.40	15.50	17.20	16.70	13.30	14.70	13.70	14.60
Ba	463.00	461.00	445.00	421.00	567.00	1320.00	751.00	4270.00	863.00	2350.00	656.00	1120.00	620.00	446.00	691.00	462.00	471.00	498.00	452.00	475.00	567.00	520.00	404.00	472.00	3390.00	1620.00	438.00	444.00	740.00	1680.00	5140.00
Hf	3.31	3.81	4.09	3.61	4.38	3.40	3.94	5.52	4.33	5.77	4.53	1.70	4.95	4.68	4.32	4.13	4.45	3.30	5.28	4.97	5.38	5.18	4.59	5.26	5.81	5.82	6.26	4.21	4.94	5.33	4.58
Ta	0.80	0.88	0.81	0.72	0.90	0.65	0.83	0.89	0.85	1.12	0.90	0.37	0.84	0.86	0.84	0.78	0.76	0.56	0.94	0.77	0.92	0.89	0.82	0.90	0.94	0.99	1.04	0.78	0.86	0.82	0.85
Pb	20.30	20.10	16.40	14.40	18.50	16.80	19.70	16.30	19.10	21.20	17.80	11.50	16.10	16.30	17.30	17.00	13.10	12.40	19.60	17.10	18.00	15.00	16.60	16.20	15.20	19.70	18.80	18.20	17.90	16.20	19.30
Th	11.20	11.30	10.30	8.59	11.40	7.84	9.04	10.70	7.82	14.80	10.70	4.13	9.79	10.10	9.72	9.67	8.81	6.88	11.40	9.75	11.30	10.30	9.56	11.40	11.60	11.70	13.20	9.85	10.20	9.33	10.50
U	17.80	3.44	2.33	4.41	2.18	46.00	11.00	3.16	7.90	309.00	5.98	34.90	48.50	5.96	2.27	3.74	1.88	4.09	1.82	1.60	53.70	1.74	1.75	1.83	7.51	7.19	2.74	35.50	2.67	2.27	10.20
La	29.80	44.60	29.80	28.20	33.40	27.30	31.80	32.80	21.80	42.20	33.10	15.70	29.90	32.20	29.80	33.10	29.00	25.00	32.70	32.40	35.10	31.00	34.40	32.80	33.20	41.30	35.80	41.80	35.20	29.80	33.60
Ce	57.30	81.80	57.00	53.50	63.00	51.60	61.50	63.90	39.10	81.20	63.00	27.80	56.70	62.60	57.20	63.80	55.40	46.20	64.40	63.30	66.50	60.90	64.50	63.90	61.90	72.20	70.30	66.60	63.40	58.30	64.60
Pr	6.85	9.74	6.92	6.47	7.87	6.17	7.34	7.79	5.42	9.72	7.80	3.55	7.08	7.61	7.06	7.72	6.82	5.63	7.88	7.63	8.24	7.36	7.92	7.85	7.71	9.88	8.56	9.55	8.31	7.21	8.00
Nd	25.00	35.60	25.40	23.60	29.00	22.50	27.10	29.00	19.90	35.10	28.40	13.20	26.10	27.90	26.00	28.20	25.10	20.90	29.20	28.20	30.30	27.10	29.00	28.80	28.30	36.10	31.30	36.60	30.40	27.00	29.30
Sm	4.66	6.79	4.89	4.50	5.60	4.33	5.29	5.52	4.15	6.72	5.54	2.53	5.03	5.48	5.04	5.41	4.82	3.94	5.78	5.45	5.91	5.15	5.57	5.56	5.43	6.76	5.98	7.13	5.88	5.32	5.72
Eu	0.95	1.37	0.97	0.93	1.13	1.12	1.10	2.26	1.00	1.78	1.16	0.82	1.08	1.08	1.10	1.10	0.97	0.86	1.18	1.11	1.20	1.08	1.14	1.12	1.82	1.66	1.17	1.48	1.30	1.54	2.58
Gd	4.06	6.27	4.21	3.96	4.88	4.03	4.66	5.49	3.52	5.89	4.86	2.46	4.46	4.63	4.44	4.72	4.16	3.60	4.94	4.72	5.02	4.41	4.93	4.85	5.19	5.65	5.30	6.55	5.26	4.98	5.94
Tb	0.66	1.05	0.70	0.66	0.81	0.63	0.80	0.80	0.63	0.96	0.80	0.38	0.74	0.79	0.74	0.78	0.69	0.62	0.84	0.78	0.85	0.74	0.83	0.80	0.77	0.88	0.83	1.13	0.85	0.82	0.82
Dy	3.81	5.91	4.05	3.81	4.62	3.65	4.53	4.60	3.70	5.54	4.58	2.21	4.16	4.45	4.16	4.42	3.95	3.51	4.80	4.56	4.88	4.21	4.75	4.66	4.32	4.81	4.78	6.46	4.72	4.71	4.63
Ho	0.74	1.14	0.79	0.73	0.89	0.70	0.89	0.90	0.74	1.10	0.90	0.43	0.81	0.88	0.82	0.88	0.77	0.71	0.94	0.91	0.96	0.83	0.93	0.90	0.83	0.90	0.92	1.27	0.93	0.93	0.90
Er	2.16	3.16	2.28	2.08	2.58	1.97	2.53	2.61	2.06	3.17	2.64	1.20	2.37	2.49	2.36	2.44	2.25	2.02	2.70	2.55	2.70	2.40	2.65	2.59	2.40	2.51	2.66	3.63	2.60	2.72	2.62
Tm	0.33	0.46	0.34	0.32	0.40	0.30	0.40	0.40	0.32	0.48	0.40	0.19	0.37	0.37	0.36	0.37	0.34	0.32	0.42	0.39	0.42	0.36	0.40	0.40	0.37	0.39	0.41	0.55	0.40	0.42	0.40
Yb	2.26	3.22	2.38	2.19	2.76	2.12	2.70	2.73	2.23	3.27	2.72	1.35	2.42	2.56	2.52	2.61	2.36	2.15	2.87	2.73	2.91	2.47	2.79	2.79	2.52	2.71	2.87	3.68	2.67	2.82	2.73
Lu	0.36	0.49	0.37	0.34	0.44	0.34	0.45	0.44	0.35	0.53	0.44	0.21	0.40	0.41	0.39	0.42	0.38	0.35	0.45	0.44	0.46	0.40	0.44	0.44	0.42	0.42	0.45	0.58	0.42	0.44	0.44
ΣREE	138.94	201.60	140.10	131.29	157.38	126.76	151.09	159.24	104.92	197.66	156.34	72.03	141.62	153.45	141.99	155.97	137.01	115.81	159.10	155.17	165.45	148.41	160.25	157.46	155.18	186.17	171.33	187.01	162.34	147.01	162.28
Al_2O_3/SiO_2	0.26	0.24	0.22	0.20	0.24	0.22	0.21	0.21	0.19	0.22	0.23	0.19	0.21	0.22	0.22	0.22	0.19	0.20	0.21	0.21	0.23	0.21	0.21	0.22	0.21	0.22	0.21	0.24	0.21	0.20	0.22
CaOmol	0.31	0.14	0.25	0.30	0.17	0.39	0.25	0.13	0.03	0.04	0.21	0.46	0.18	0.15	0.16	0.22	0.14	0.44	0.12	0.24	0.15	0.13	0.26	0.12	0.16	0.02	0.10	0.21	0.17	0.17	0.15
Na_2Omol	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.06	0.05	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.04
Al_2O_3m	0.11	0.13	0.11	0.10	0.13	0.09	0.11	0.12	0.13	0.13	0.12	0.08	0.12	0.12	0.11	0.11	0.11	0.07	0.12	0.10	0.13	0.12	0.11	0.13	0.12	0.14	0.13	0.10	0.11	0.11	0.12

ol																															
K_2Omol	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.03
CaOcor mol	0.30	0.14	0.25	0.30	0.17	0.39	0.25	0.13	0.03	0.03	0.20	0.45	0.18	0.15	0.15	0.22	0.14	0.44	0.11	0.24	0.14	0.12	0.25	0.12	0.16	0.02	0.10	0.21	0.16	0.17	0.14
CaO*m ol	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.02	0.04	0.03	0.03	0.03	0.04
CIA	57.82	56.76	54.58	52.66	54.98	52.08	53.57	50.76	50.50	54.33	55.47	47.55	53.10	52.85	50.52	52.75	50.34	51.65	55.43	52.67	53.26	54.55	55.59	55.60	51.80	61.92	55.26	57.44	55.40	53.43	52.12
CN mol	0.05	0.07	0.06	0.06	0.07	0.06	0.07	0.09	0.09	0.08	0.07	0.06	0.08	0.08	0.08	0.07	0.08	0.05	0.07	0.07	0.08	0.07	0.06	0.07	0.08	0.05	0.07	0.05	0.07	0.07	0.08
$CIA_{K\text{-}corrected}$	59.17	58.30	55.56	53.49	56.13	52.50	54.04	50.86	51.46	54.99	56.14	48.19	53.43	53.08	50.41	52.89	50.34	52.15	55.98	52.90	53.51	55.13	56.28	56.50	52.10	63.69	55.94	58.49	55.94	53.79	52.20
Zr/Sc	10.51	11.17	14.62	14.85	13.14	14.22	13.55	18.49	27.75	16.23	14.12	13.27	16.99	15.31	14.38	12.38	17.03	16.93	16.00	16.38	14.67	17.60	15.89	16.82	19.76	16.38	18.41	11.36	15.40	16.12	14.19
Th/Sc	0.95	0.82	0.88	0.83	0.81	0.77	0.73	0.85	1.18	0.98	0.79	0.74	0.80	0.78	0.76	0.68	0.79	0.79	0.81	0.75	0.75	0.82	0.77	0.86	0.92	0.77	0.96	0.61	0.74	0.70	0.77
La/Th	2.66	3.95	2.89	3.28	2.93	3.48	3.52	3.07	2.79	2.85	3.09	3.80	3.05	3.19	3.07	3.42	3.29	3.63	2.87	3.32	3.11	3.01	3.60	2.88	2.86	3.53	2.71	4.24	3.45	3.19	3.20
Sr/Ba	1.02	0.53	0.68	0.79	0.40	0.20	0.36	0.07	0.27	0.10	0.48	0.46	0.59	0.63	0.64	0.88	0.69	0.70	0.60	0.58	0.47	0.47	0.72	0.56	0.08	0.13	0.54	1.44	0.38	0.21	0.06
U/Th	1.59	0.30	0.23	0.51	0.19	5.87	1.22	0.30	1.01	20.88	0.56	8.45	4.95	0.59	0.23	0.39	0.21	0.59	0.16	0.16	4.75	0.17	0.18	0.16	0.65	0.61	0.21	3.60	0.26	0.24	0.97
V/Cr	1.29	1.29	1.16	1.15	1.38	1.23	1.40	1.19	1.44	1.12	1.26	1.13	1.24	1.27	1.19	1.20	0.93	0.95	1.18	1.22	1.14	1.17	1.07	1.37	1.33	0.83	0.77	1.67	1.33	1.27	1.37
Ni/Co	2.51	2.59	2.57	2.44	2.64	2.03	2.56	2.68	2.57	2.75	2.64	2.26	2.54	2.44	2.67	2.47	2.83	2.02	3.05	2.73	2.62	2.84	2.73	2.82	2.67	2.89	2.70	2.53	2.38	2.40	2.51
Fe^{2+}/Fe^{3+}	0.72	0.41	0.67	0.85	0.76	0.57	0.41	0.79	0.70	0.55	0.76	0.64	0.65	0.95	0.72	0.90	0.66	0.41	0.46	1.71	0.72	0.59	0.57	0.38	0.61	0.40	0.56	0.93	0.87	0.78	1.06
Sr/Cu	18.29	7.27	13.47	19.02	7.51	14.20	10.92	10.57	18.58	8.19	11.26	54.01	14.80	10.33	15.97	17.23	12.72	10.45	11.33	13.37	9.44	8.48	12.18	9.89	10.99	6.42	8.58	24.47	11.01	13.80	9.66
FeO/Mn O	19.05	25.63	21.73	16.26	25.60	5.39	11.91	32.59	29.64	30.83	22.47	6.06	23.62	29.28	22.89	10.94	18.88	1.42	19.87	18.20	26.77	23.33	6.58	20.94	19.50	31.49	26.77	11.20	25.13	19.89	25.93