

Table S3 Whole-rock major and trace element data of the LP and XP in the western section of the North Qinling Orogen

Sample	Liqiao pluton														
	TS19001 /DH1	TS1900 1/DH3	TS19001 /DH4	TS1900 2/DH1	TS1900 3/DH1	TS1900 4/DH1	TS1900 4/DH2	TS19005 /DH1	TS1900 5/DH2	TS1900 5/DH3	TS1900 6/DH1	TS1900 6/DH2	TS1900 7/DH1	TS1900 7/DH2	TS1900 7/DH3
Majorelement(wt.%)															
SiO ₂	73.07	73.53	74.61	73.80	75.05	76.45	72.23	72.50	71.09	74.57	72.44	74.47	71.59	74.85	73.48
TiO ₂	0.25	0.23	0.19	0.24	0.19	0.25	0.16	0.29	0.22	0.25	0.26	0.23	0.28	0.18	0.30
Al ₂ O ₃	14.09	13.53	13.56	13.85	13.34	12.15	14.70	13.57	15.26	13.07	13.94	13.12	14.24	13.67	13.94
Fe ₂ O _{3T}	1.73	1.53	1.28	1.48	1.28	1.38	0.90	1.70	1.20	1.43	1.53	1.21	1.77	1.03	1.63
MnO	0.07	0.07	0.06	0.06	0.04	0.06	0.04	0.07	0.05	0.05	0.05	0.05	0.06	0.03	0.04
MgO	0.50	0.47	0.37	0.45	0.37	0.42	0.30	0.54	0.48	0.54	0.40	0.33	0.55	0.30	0.49
CaO	1.55	1.56	1.34	1.26	1.27	1.13	1.07	1.55	1.39	1.29	1.07	1.02	1.33	1.16	1.17
Na ₂ O	4.00	3.92	3.58	3.97	3.48	3.27	4.05	3.98	4.07	3.67	4.22	3.87	4.06	4.01	4.00
K ₂ O	4.56	4.45	4.68	4.29	4.67	4.78	5.70	4.60	5.76	4.35	5.02	4.95	5.05	4.02	4.62
P ₂ O ₅	0.09	0.09	0.08	0.09	0.08	0.10	0.08	0.13	0.10	0.11	0.09	0.07	0.12	0.07	0.14
LOI	0.48	0.57	0.50	0.74	0.54	0.41	0.66	0.82	0.58	0.89	0.68	0.79	1.01	0.97	0.94
TOTAL	100.39	99.95	100.25	100.23	100.31	100.40	99.89	99.75	100.20	100.22	99.70	100.11	100.06	100.29	100.75
Na ₂ O+K ₂ O	8.56	8.37	8.26	8.26	8.15	8.05	9.75	8.58	9.83	8.02	9.24	8.82	9.11	8.03	8.62
Na ₂ O/K ₂ O	0.88	0.88	0.76	0.93	0.75	0.68	0.71	0.87	0.71	0.84	0.84	0.78	0.80	1.00	0.87
A/CNK	0.98	0.96	1.01	1.03	1.02	0.96	0.99	0.95	0.99	1.00	0.97	0.97	0.98	1.05	1.02
σ	2.44	2.29	2.16	2.22	2.07	1.94	3.25	2.50	3.44	2.04	2.90	2.47	2.90	2.02	2.44
Mg#	40.25	41.72	40.25	41.47	40.25	41.50	43.72	42.54	48.25	46.81	37.86	38.86	42.00	40.43	41.20
Traceelement(ppm)															
Ti	1498	1378	1138	1438	1138	1498	959	1737	1318	1498	1558	1378	1677	1078	1797

Sample	Liqiao pluton														
	TS19001	TS1900	TS19001	TS1900	TS1900	TS1900	TS1900	TS19005	TS1900	TS1900	TS1900	TS1900	TS1900	TS1900	TS1900
	/DH1	1/DH3	/DH4	2/DH1	3/DH1	4/DH1	4/DH2	/DH1	5/DH2	5/DH3	6/DH1	6/DH2	7/DH1	7/DH2	7/DH3
P	393	393	349	393	349	436	349	567	436	480	393	305	524	305	611
K	37853	36939	38849	35611	38766	39679	47316	38185	47814	36109	41671	41090	41920	33370	38351
Li	33.03	36.42	33.40	23.57	17.80	25.75	13.47	25.95	18.78	19.46	10.26	6.36	15.76	8.99	11.22
Be	5.28	5.52	4.22	5.91	4.00	4.18	5.36	5.48	4.06	5.24	4.58	3.66	5.53	4.76	4.71
Sc	3.83	3.34	2.73	3.38	2.57	2.30	1.84	2.79	2.43	3.23	2.48	2.16	3.03	1.61	1.89
V	24.3	19.0	19.1	21.7	17.6	19.0	13.1	23.0	19.2	22.9	19.0	14.4	25.2	17.8	27.3
Cr	4.21	4.06	4.16	4.02	4.36	4.75	2.89	4.92	5.36	4.83	4.25	5.92	5.18	5.46	7.27
Co	2.32	3.38	1.92	1.95	1.88	1.81	1.29	2.31	2.00	2.41	1.70	1.35	2.21	1.37	2.31
Ni	1.85	1.64	1.52	1.72	1.60	2.26	1.59	2.89	2.91	3.13	1.59	1.22	2.18	1.05	2.48
Cu	3.81	79.43	4.69	5.29	4.34	3.23	1.93	2.67	8.13	5.15	17.48	5.11	2.32	3.48	8.00
Zn	41	38	33	40	33	35	27	44	30	35	35	34	33	21	29
Ga	20.6	19.6	17.6	20.1	18.1	15.7	18.5	19.9	17.3	16.8	18.3	16.1	19.1	17.4	18.0
Rb	215	220	267	207	191	227	262	198	202	210	163	159	162	169	165
Sr	358	335	314	323	301	325	343	341	575	420	397	276	399	353	360
Y	13.48	11.89	10.34	13.43	11.10	15.04	8.12	16.99	10.67	12.72	19.49	17.62	11.37	8.58	11.67
Zr	245	220	178	231	185	203	143	221	183	210	248	211	236	154	253
Nb	22.5	22.4	16.5	20.6	16.4	29.4	19.7	34.0	17.4	21.1	38.5	34.7	26.3	17.4	23.3
Mo	0.27	8.36	1.90	0.68	0.29	0.32	0.18	0.42	0.44	0.26	0.30	0.30	0.32	0.22	0.40
Cd	0.04	0.05	<0.000	0.05	0.00	0.02	<0.000	0.00	<0.000	0.01	0.05	0.02	0.04	<0.000	0.12
In	0.02	0.04	0.02	0.04	0.02	0.02	0.01	0.02	0.01	0.02	0.04	0.02	0.02	0.02	0.02
Cs	1.84	2.12	2.53	1.53	1.85	2.39	2.86	1.54	1.77	2.29	1.29	1.28	1.39	1.87	1.71
Ba	884	807	876	891	698	764	1027	705	1877	1209	826	715	1308	688	1177

Sample	Liqiao pluton														
	TS19001	TS1900	TS19001	TS1900	TS1900	TS1900	TS1900	TS19005	TS1900	TS1900	TS1900	TS1900	TS1900	TS1900	TS1900
	/DH1	1/DH3	/DH4	2/DH1	3/DH1	4/DH1	4/DH2	/DH1	5/DH2	5/DH3	6/DH1	6/DH2	7/DH1	7/DH2	7/DH3
La	66.35	63.67	47.65	53.97	52.36	57.77	52.70	76.20	44.80	56.44	108.25	95.34	68.10	66.79	75.30
Ce	116.70	111.02	85.11	102.34	93.45	108.06	87.20	138.40	83.81	105.35	201.29	168.78	119.26	107.82	130.23
Pr	11.89	11.27	8.83	10.41	9.57	11.62	8.35	14.04	9.06	10.88	19.97	16.76	12.27	10.05	13.20
Nd	36.54	33.76	26.99	31.77	28.97	36.15	24.19	42.56	28.64	34.58	58.57	47.40	37.29	27.89	39.28
Sm	4.99	4.62	3.77	4.64	4.00	5.25	3.05	6.04	4.17	4.99	7.31	6.38	5.05	3.39	5.23
Eu	1.11	0.99	0.92	1.05	0.89	1.10	0.87	1.13	1.33	1.26	1.28	1.09	1.27	0.90	1.29
Gd	4.62	4.21	3.41	4.25	3.67	4.65	2.84	5.31	3.59	4.29	6.57	5.64	4.40	3.21	4.63
Tb	0.48	0.44	0.37	0.46	0.39	0.51	0.28	0.58	0.40	0.48	0.70	0.61	0.45	0.31	0.47
Dy	2.25	1.98	1.76	2.25	1.86	2.53	1.33	2.83	1.86	2.27	3.33	2.91	2.02	1.38	2.09
Ho	0.44	0.39	0.34	0.43	0.35	0.49	0.25	0.55	0.35	0.42	0.62	0.56	0.37	0.27	0.38
Er	1.37	1.19	1.06	1.31	1.10	1.51	0.82	1.68	1.06	1.28	1.99	1.75	1.15	0.85	1.18
Tm	0.20	0.17	0.15	0.20	0.16	0.22	0.12	0.24	0.14	0.18	0.29	0.25	0.16	0.12	0.16
Yb	1.43	1.21	1.04	1.41	1.12	1.49	0.88	1.73	0.99	1.21	1.89	1.77	1.15	0.93	1.10
Lu	0.23	0.19	0.17	0.22	0.17	0.23	0.14	0.26	0.15	0.18	0.26	0.25	0.18	0.15	0.17
Hf	6.68	5.56	4.78	5.99	4.78	5.60	3.98	6.12	4.58	5.60	6.75	5.91	6.14	4.40	6.54
Ta	1.75	1.51	1.14	1.39	1.16	2.16	1.39	2.48	1.25	1.48	2.73	2.51	1.79	1.13	1.51
Pb	41	39	44	36	39	42	46	42	37	43	50	47	39	35	38
Bi	0.03	0.06	0.07	0.04	0.05	0.09	0.10	0.05	0.07	0.15	0.08	0.08	0.05	0.07	0.05
Th	47	37	35	33	36	61	45	70	20	26	72	85	39	54	40
U	4.04	5.68	7.60	2.71	3.62	5.61	3.54	8.53	2.32	4.02	9.10	5.97	5.45	6.24	3.94
δ Eu	0.70	0.67	0.77	0.71	0.70	0.67	0.89	0.60	1.03	0.81	0.55	0.54	0.81	0.82	0.79
δ Ce	0.93	0.92	0.93	0.98	0.94	0.95	0.91	0.95	0.95	0.96	0.97	0.94	0.92	0.90	0.92

Sample	Liqiao pluton														
	TS19001	TS1900	TS19001	TS1900	TS1900	TS1900	TS1900	TS19005	TS1900	TS1900	TS1900	TS1900	TS1900	TS1900	TS1900
	/DH1	1/DH3	/DH4	2/DH1	3/DH1	4/DH1	4/DH2	/DH1	5/DH2	5/DH3	6/DH1	6/DH2	7/DH1	7/DH2	7/DH3
REE	249	235	182	215	198	232	183	292	180	224	412	349	253	224	275
LREE	238	225	173	204	189	220	176	278	172	214	397	336	243	217	265
HREE	11.02	9.78	8.30	10.53	8.82	11.63	6.66	13.18	8.54	10.31	15.65	13.74	9.88	7.22	10.18
LREE/H REE	21.56	23.04	20.88	19.39	21.46	18.91	26.48	21.12	20.12	20.71	25.35	24.44	24.62	30.03	25.99
(La/Yb) _N	31.28	35.48	30.89	25.81	31.52	26.14	40.38	29.70	30.51	31.45	38.61	36.32	39.92	48.42	46.15
(La/Sm) _N	8.36	8.67	7.95	7.32	8.23	6.92	10.87	7.94	6.76	7.11	9.32	9.40	8.48	12.39	9.06
(Gd/Yb) _N	2.61	2.81	2.65	2.43	2.64	2.52	2.60	2.48	2.93	2.86	2.81	2.57	3.09	2.79	3.40
<i>TZr:Zirc</i> <i>onsatura</i> <i>tiontemp</i> <i>eratures</i>	817	806	794	819	799	804	770	804	788	808	817	805	811	786	825
Table S3 (continued)															
Sample	Xianping pluton														
	TS19013/	TS19013/	TS19014/	TS19014/	TS19014/	TS19014/	TS19014/	TS19015/	TS19015/	TS19016/	TS19017/	TS19018/	TS19019/		
	DH1	DH2	DH1	DH2	DH3	DH4	DH1	DH1	DH2	DH1	DH1	DH1	DH1		
Major element (wt.%)															
SiO ₂	74.91	74.23	73.92	75.75	77.38	75.85	75.52	75.19	75.98	74.72	75.44	78.28			
TiO ₂	0.04	0.05	0.07	0.09	0.09	0.14	0.10	0.08	0.10	0.08	0.16	0.15			
Al ₂ O ₃	14.14	14.07	13.83	13.03	12.16	12.59	13.34	13.45	12.81	13.31	13.18	11.27			
Fe ₂ O _{3T}	0.56	0.68	0.88	1.08	1.18	1.91	1.08	0.88	1.20	1.00	1.66	1.46			
MnO	0.05	0.07	0.05	0.06	0.06	0.08	0.05	0.05	0.06	0.05	0.07	0.06			

Sample	Xianping pluton											
	TS19013/	TS19013/	TS19014/	TS19014/	TS19014/	TS19014/	TS19015/	TS19015/	TS19016/	TS19017/	TS19018/	TS19019/
	DH1	DH2	DH1	DH2	DH3	DH4	DH1	DH2	DH1	DH1	DH1	DH1
MgO	0.13	0.13	0.13	0.15	0.15	0.21	0.18	0.15	0.19	0.18	0.25	0.26
CaO	0.88	0.93	0.86	1.01	0.90	0.99	1.06	0.83	1.03	0.99	0.96	0.98
Na ₂ O	4.02	4.39	3.90	3.85	3.66	3.59	3.66	3.66	3.75	3.82	3.61	3.26
K ₂ O	5.34	4.98	5.04	4.66	4.10	4.13	4.62	5.18	4.54	4.73	4.62	3.57
P ₂ O ₅	0.02	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.04	0.03	0.06	0.06
LOI	0.53	0.55	1.24	0.63	0.53	0.57	0.57	0.43	0.45	0.48	0.66	0.69
TOTAL	100.62	100.10	99.95	100.34	100.25	100.11	100.21	99.93	100.15	99.39	100.67	100.04
Na ₂ O+K ₂ O	9.36	9.37	8.94	8.51	7.76	7.72	8.28	8.84	8.29	8.55	8.23	6.83
Na ₂ O/K ₂ O	0.75	0.88	0.77	0.83	0.89	0.87	0.79	0.71	0.83	0.81	0.78	0.91
A/CNK	1.01	0.98	1.03	0.99	1.01	1.03	1.03	1.02	0.99	1.01	1.04	1.02
σ	2.75	2.81	2.58	2.21	1.75	1.81	2.11	2.43	2.08	2.30	2.09	1.32
Mg#	35.11	30.82	25.61	24.45	22.85	20.40	27.98	28.43	26.95	29.55	25.98	29.33
Traceelement(ppm)												
Ti	240	300	419	539	539	839	599	479	599	479	959	899
P	87	87	131	131	175	218	131	131	175	131	262	262
K	44327	41339	41837	38683	34034	34283	38351	42999	37687	39264	38351	29635
Li	25.80	39.89	14.82	18.59	10.18	37.41	12.52	7.72	39.28	21.74	22.43	13.41
Be	9.00	10.92	6.53	6.25	6.47	6.74	7.14	6.29	6.74	7.32	6.71	6.30
Sc	1.55	1.87	1.74	1.87	2.08	2.69	1.70	1.08	1.54	1.35	2.39	2.35
V	1.99	1.78	2.51	2.62	2.75	4.28	3.01	2.36	3.59	2.99	4.57	4.86
Cr	1.82	1.56	2.65	1.66	1.56	1.60	5.36	2.92	2.08	1.42	1.74	4.79
Co	0.39	0.39	0.52	0.65	0.72	1.04	0.76	0.59	0.78	0.64	1.21	1.20
Ni	0.38	0.26	0.33	0.33	0.32	0.87	0.55	0.40	0.40	0.36	0.49	0.66

Sample	Xianping pluton											
	TS19013/	TS19013/	TS19014/	TS19014/	TS19014/	TS19014/	TS19015/	TS19015/	TS19016/	TS19017/	TS19018/	TS19019/
	DH1	DH2	DH1	DH2	DH3	DH4	DH1	DH2	DH1	DH1	DH1	DH1
Cu	1.34	0.89	0.87	1.01	0.94	1.39	1.33	1.17	1.01	0.96	1.14	1.16
Zn	19.5	25.8	23.8	31.0	29.9	42.0	29.9	20.8	32.5	24.8	41.2	39.1
Ga	22.0	22.9	20.0	19.9	19.5	21.9	20.1	17.5	19.5	19.1	18.6	16.3
Rb	477	443	324	289	270	303	281	300	282	289	241	189
Sr	41	39	46	53	43	47	56	50	50	53	74	74
Y	42	38	28	31	41	41	32	20	30	26	28	29
Zr	91	85	106	128	126	146	136	110	169	146	178	187
Nb	46	41	41	54	62	65	40	35	52	37	37	38
Mo	0.23	0.26	0.22	0.24	0.33	0.59	0.41	0.38	0.22	0.24	0.57	0.71
Cd	0.22	0.36	0.06	0.23	0.24	0.28	0.23	0.23	0.29	0.22	0.35	0.31
In	0.07	0.07	0.05	0.05	0.05	0.09	0.06	0.03	0.04	0.06	0.05	0.05
Cs	5.86	6.89	2.21	2.22	1.84	3.38	2.00	2.07	3.03	2.55	2.43	2.12
Ba	180	162	239	267	159	185	207	224	201	214	271	206
La	12.17	17.71	24.59	17.74	30.14	29.98	32.28	18.42	31.11	28.58	42.24	44.17
Ce	26.72	37.44	51.94	36.81	63.03	67.43	68.66	37.31	67.50	61.61	83.51	90.49
Pr	2.97	4.21	5.81	4.16	6.79	6.89	7.96	4.29	7.47	6.68	9.47	10.07
Nd	10.98	15.34	20.90	15.39	24.35	24.78	27.10	15.21	26.30	23.37	30.99	32.95
Sm	3.23	3.91	4.66	3.94	5.87	5.77	5.97	3.45	5.85	4.94	5.91	6.12
Eu	0.31	0.31	0.38	0.40	0.36	0.37	0.49	0.38	0.41	0.44	0.54	0.52
Gd	3.97	4.31	4.59	4.23	6.23	5.85	5.88	3.53	5.64	4.55	5.52	5.71
Tb	0.84	0.80	0.75	0.81	1.11	1.03	0.93	0.58	0.94	0.74	0.82	0.87
Dy	6.11	5.43	4.70	5.39	7.02	6.64	5.40	3.59	5.69	4.40	4.76	5.13
Ho	1.41	1.23	1.03	1.21	1.54	1.46	1.11	0.76	1.23	0.93	1.00	1.06

Sample	Xianping pluton											
	TS19013/	TS19013/	TS19014/	TS19014/	TS19014/	TS19014/	TS19015/	TS19015/	TS19016/	TS19017/	TS19018/	TS19019/
	DH1	DH2	DH1	DH2	DH3	DH4	DH1	DH2	DH1	DH1	DH1	DH1
Er	4.79	4.06	3.28	3.93	4.79	4.57	3.31	2.31	3.85	2.97	3.05	3.29
Tm	0.83	0.71	0.53	0.65	0.77	0.74	0.51	0.36	0.60	0.48	0.49	0.52
Yb	5.99	5.20	3.69	4.50	5.17	5.12	3.50	2.53	4.19	3.44	3.37	3.60
Lu	0.94	0.82	0.58	0.69	0.78	0.78	0.55	0.38	0.63	0.55	0.54	0.55
Hf	3.91	3.50	3.98	4.58	4.47	5.36	4.65	3.92	5.98	5.40	5.50	5.79
Ta	6.40	7.46	3.21	4.02	4.44	5.14	3.49	2.80	3.30	3.17	3.37	3.24
Pb	59	57	46	52	45	57	49	48	48	46	44	37
Bi	0.11	0.43	0.10	0.09	0.10	0.08	0.12	0.18	0.10	0.09	0.12	0.16
Th	27	29	38	38	49	55	49	37	51	50	55	56
U	8.71	9.21	6.87	8.55	9.70	10.12	7.39	6.54	8.15	7.09	6.99	8.39
δ Eu	0.26	0.23	0.25	0.30	0.18	0.19	0.25	0.33	0.22	0.28	0.28	0.26
δ Ce	1.04	1.01	1.01	1.00	1.02	1.09	1.00	0.98	1.03	1.04	0.97	1.00
REE	81	101	127	100	158	161	164	93	161	144	192	205
LREE	56	79	108	78	131	135	142	79	139	126	173	184
HREE	24.9	22.6	19.2	21.4	27.4	26.2	21.2	14.0	22.8	18.1	19.6	20.7
LREE/HREE	2.27	3.50	5.65	3.66	4.76	5.16	6.72	5.63	6.09	6.96	8.83	8.89
(La/Yb) _N	1.37	2.30	4.49	2.66	3.93	3.95	6.22	4.91	5.01	5.60	8.45	8.27
(La/Sm) _N	2.37	2.85	3.32	2.83	3.23	3.27	3.40	3.36	3.35	3.64	4.50	4.54
(Gd/Yb) _N	0.53	0.67	1.00	0.76	0.97	0.92	1.36	1.13	1.09	1.07	1.32	1.28
<i>TZr:Zirconsaturation temperatures</i>	738	729	752	765	768	782	774	755	790	778	798	807