

Supplementary TableS1. Zircon U–Pb isotopic data for the Badaguan andesite in the Erguna Block.

SampleNo.	Isotopic ratios								Age estimates (Ma)							
	$^{207}\text{Pb}/^{206}\text{Pb}$		$^{207}\text{Pb}/^{235}\text{U}$		$^{206}\text{Pb}/^{238}\text{U}$		$^{208}\text{Pb}/^{232}\text{Th}$		$^{207}\text{Pb}/^{206}\text{Pb}$		$^{207}\text{Pb}/^{235}\text{U}$		$^{206}\text{Pb}/^{238}\text{U}$		$^{208}\text{Pb}/^{232}\text{Th}$	
	Ratio	1 σ	Ratio	1 σ	Ratio	1 σ	Ratio	1 σ	Age	1 σ	Age	1 σ	Age	1 σ	Age	1 σ
ZRD17-1	0.05027	0.00189	0.16228	0.00588	0.02340	0.00025	0.00696	0.00011	207	64	153	5	149	2	140	2
ZRD17-2	0.05105	0.00234	0.16776	0.00744	0.02382	0.00030	0.00699	0.00013	243	79	157	6	152	2	141	3
ZRD17-3	0.05647	0.00159	0.46892	0.01254	0.06019	0.00059	0.01855	0.00034	471	42	390	9	377	4	372	7
ZRD17-4	0.05752	0.00486	0.20456	0.0168	0.02578	0.00054	0.00836	0.00028	512	145	189	14	154	3	158	6
ZRD17-5	0.05097	0.00214	0.17525	0.00708	0.02492	0.00029	0.00779	0.00013	239	72	164	6	159	2	157	3
ZRD17-6	0.04863	0.00207	0.17354	0.00713	0.02587	0.00030	0.00728	0.00010	130	74	162	6	155	2	147	2
ZRD17-7	0.04983	0.00304	0.16779	0.00993	0.02441	0.00037	0.00830	0.00022	187	107	157	9	155	2	157	4
ZRD17-8	0.05159	0.00208	0.24493	0.00952	0.03442	0.0004	0.00923	0.00020	267	68	222	8	218	2	186	4
ZRD17-9	0.04798	0.00147	0.16517	0.00484	0.02496	0.00024	0.00764	0.00010	98	51	155	4	159	2	154	2
ZRD17-10	0.05945	0.00209	0.19589	0.00659	0.02389	0.00026	0.00740	0.00012	584	54	182	6	152	2	149	2
ZRD17-11	0.07264	0.00159	0.56726	0.01149	0.05664	0.00052	0.01676	0.00026	1004	26	456	7	355	3	336	5
ZRD17-12	0.05600	0.00166	0.45991	0.01302	0.05957	0.0006	0.01710	0.00029	452	45	384	9	373	4	343	6
ZRD17-13	0.05434	0.00092	0.45484	0.00695	0.06071	0.00049	0.01829	0.00017	385	20	381	5	380	3	366	3
ZRD17-14	0.05228	0.00169	0.18417	0.00571	0.02556	0.00026	0.00747	0.00010	298	52	172	5	153	2	150	2
ZRD17-15	0.06013	0.00165	0.48072	0.01253	0.05800	0.00057	0.02107	0.00043	408	78	368	10	361	3	360	3
ZRD17-16	0.05025	0.00327	0.17783	0.01126	0.02568	0.00042	0.00772	0.00019	207	114	166	10	153	3	155	4
ZRD17-17	0.07700	0.00452	0.24332	0.01370	0.02293	0.00041	0.00731	0.00018	907	200	199	17	145	3	149	2
ZRD17-18	0.05129	0.00107	0.24985	0.00793	0.03535	0.00037	0.01120	0.00019	254	54	226	6	224	2	225	4
ZRD17-19	0.15855	0.00187	0.67892	0.00647	0.03108	0.00024	0.02897	0.00020	786	116	223	11	154	2	160	4
ZRD17-20	0.05304	0.00098	0.18000	0.00304	0.02447	0.00020	0.00670	0.00005	346	24	168	3	156	1	145	1
Zr15-1	0.04946	0.00316	0.17018	0.0106	0.02495	0.00038	0.00825	0.00021	170	114	160	9	159	2	156	4
Zr15-2	0.04968	0.00265	0.17244	0.00892	0.02517	0.00034	0.00802	0.00017	180	94	162	8	160	2	161	3
Zr15-3	0.05159	0.00406	0.17573	0.01349	0.02470	0.00046	0.00807	0.00028	267	141	164	12	157	3	152	6
Zr15-4	0.04940	0.00257	0.17029	0.00861	0.02500	0.00034	0.00777	0.00013	167	91	160	7	159	2	156	3
Zr15-5	0.04879	0.00303	0.17150	0.01037	0.02549	0.00038	0.00801	0.00019	138	108	161	9	162	2	161	4
Zr15-6	0.04857	0.00164	0.17089	0.00554	0.02551	0.00026	0.00785	0.00011	127	57	160	5	152	2	158	2
Zr15-7	0.04952	0.00610	0.17693	0.02128	0.02591	0.00072	0.00818	0.00044	173	218	165	18	161	5	155	9
Zr15-8	0.04917	0.00397	0.17680	0.01393	0.02607	0.00050	0.00915	0.00029	156	141	165	12	156	3	154	6
Zr15-9	0.04875	0.00375	0.17845	0.01340	0.02655	0.00048	0.00840	0.00029	136	134	167	12	159	3	159	6
Zr15-10	0.04911	0.00173	0.16995	0.00575	0.02509	0.00027	0.00762	0.00011	153	59	159	5	160	2	153	2
Zr15-11	0.04861	0.00431	0.18230	0.01577	0.02720	0.00055	0.01022	0.00039	129	155	170	14	193	3	206	8
Zr15-12	0.04948	0.00221	0.17644	0.00762	0.02586	0.00031	0.00796	0.00013	171	78	165	7	165	2	160	3
Zr15-13	0.04990	0.00459	0.20039	0.01799	0.02912	0.00063	0.01016	0.00043	190	162	185	15	190	4	204	9
Zr15-14	0.05015	0.00179	0.20705	0.00712	0.02994	0.00032	0.00925	0.00015	172	60	151	6	150	2	156	3
Zr15-15	0.04898	0.00273	0.17816	0.00966	0.02638	0.00037	0.00886	0.00019	147	97	166	8	168	2	178	4
Zr15-16	0.04958	0.00415	0.20531	0.01677	0.03003	0.00059	0.01067	0.00035	175	148	190	14	191	4	215	7
Zr15-17	0.05371	0.00225	0.21294	0.00863	0.02876	0.00035	0.00954	0.00015	359	69	196	7	190	2	192	3
Zr15-18	0.04968	0.00205	0.17503	0.00697	0.02555	0.00030	0.00769	0.00014	180	71	164	6	153	2	155	3
Zr15-19	0.04883	0.0064	0.20483	0.02624	0.03043	0.00089	0.01008	0.00052	140	229	189	22	205	6	203	10
Zr15-20	0.04928	0.00359	0.18470	0.01314	0.02719	0.00047	0.00889	0.00028	161	128	172	11	163	3	159	6

Supplementary Table S2. Major (wt%) and trace element (ppm) data for mafic volcanic rocks in the Erguna Block.

Lithology	mafic volcanic rocks								
Sample	10506	10501	13503	13505	13602	13701	13710	ZR15	RZD17
SiO ₂	57.12	62.55	60.05	53.55	63.68	61.32	56.36	57.25	58.22
TiO ₂	1.08	0.80	0.89	1.45	0.91	1.07	0.90	0.95	0.97
Al ₂ O ₃	19.86	16.75	17.70	19.14	15.49	18.63	19.30	18.70	17.23
Fe ₂ O ₃	4.74	3.37	5.20	7.42	4.96	6.27	5.86	4.50	5.10
MnO	0.10	0.10	0.20	0.21	0.06	0.05	0.11	0.15	0.07
MgO	1.82	2.12	1.85	2.37	1.45	0.53	2.26	1.98	1.35
CaO	2.55	2.51	4.86	4.70	2.75	1.39	4.68	2.57	2.44
Na ₂ O	2.76	5.67	4.90	5.46	3.99	8.20	4.98	3.84	5.55
K ₂ O	2.18	2.03	1.28	1.60	4.23	0.85	1.65	1.45	1.86
P ₂ O ₅	0.30	0.20	0.25	0.33	0.33	0.24	0.27	0.25	0.30
LOI	3.66	1.88	1.79	2.26	1.16	0.87	2.20	0.24	1.15
Total	99.77	99.73	99.70	99.71	99.71	99.83	99.71	99.78	99.86
A/CNK	1.72	1.04	0.97	0.99	0.96	1.10	1.04	1.49	1.10
A/NK	2.88	1.45	1.87	1.79	1.39	1.29	1.93	2.37	1.55
Rb	52.09	30.71	15.91	20.64	126.96	12.73	15.2	35.23	40.23
Ba	626	958	745	630	1023	233	628	678	653
Th	5.56	7.88	3.84	1.95	9.69	2.19	2.29	6.02	5.23
U	1.08	1.68	1.08	0.38	2.01	0.67	0.71	0.98	1.03
Nb	6.26	7.36	4.87	5.61	18.83	3.93	4.30	4.56	6.32
Sr	637	808	1083	897	502	459	857	865	636
Nd	40.81	27.35	24.08	22.01	50.88	24.08	25.59	28.45	26.54
Zr	209.5	208.6	158.8	171.4	297.7	146.6	149.4	165.2	198.2
Hf	4.96	5.67	4.5	5.61	6.87	4.52	4.47	4.96	5.23
La	29.94	27.74	21.29	13.78	57.79	16.85	19.18	28.88	24.56
Ce	56.49	55.66	43.2	32.22	113.5	37.75	38.02	54.35	47.23
Pr	9.63	7.31	6.10	5.02	14.41	5.76	6.22	7.05	6.98
Nd	40.81	27.35	24.08	22.01	50.88	24.08	25.59	28.45	26.54
Sm	7.72	4.90	3.99	4.40	7.64	4.35	4.35	4.55	3.98
Eu	2.02	1.23	1.33	1.38	1.96	1.21	1.52	1.55	1.67
Gd	5.72	4.04	3.55	3.76	7.06	3.82	3.85	4.01	3.58
Tb	0.90	0.58	0.51	0.60	0.90	0.60	0.59	0.58	0.60
Dy	4.25	2.69	2.66	3.26	4.34	3.23	3.05	3.01	3.22
Ho	0.71	0.47	0.49	0.56	0.77	0.58	0.55	0.54	0.41
Er	1.82	1.25	1.26	1.38	2.16	1.47	1.44	1.45	1.33
Tm	0.27	0.19	0.2	0.2	0.35	0.23	0.25	0.24	0.30
Yb	1.63	1.12	1.32	1.34	2.33	1.41	1.44	1.35	1.20
Lu	0.39	0.33	0.31	0.27	0.64	0.29	0.3	0.31	0.28
Y	17.73	13.05	12.7	13.92	19.61	14.12	13.72	13.12	13.25
ΣREE	162.30	134.86	110.29	90.18	264.73	101.63	106.35	136.32	121.88
LREE	146.61	124.19	99.99	78.81	246.18	90.00	94.88	124.83	110.96
HREE	15.69	10.67	10.30	11.37	18.55	11.63	11.47	11.49	10.92
LREE/HREE	9.34	11.64	9.71	6.93	13.27	7.74	8.27	10.86	10.16
LaN/YbN	13.18	17.77	11.57	7.38	17.79	8.57	9.55	15.34	14.68

δEu	0.93	0.85	1.08	1.04	0.82	0.91	1.14	1.11	1.35
δCe	0.82	0.96	0.93	0.95	0.96	0.94	0.85	0.93	0.88
Ba/La	20.93	34.54	35.00	45.73	17.71	13.87	32.76	23.49	26.60
Th/Yb	3.41	7.04	2.91	1.46	4.16	1.55	1.59	4.46	4.36
Rb/Sr	0.08	0.04	0.01	0.02	0.25	0.03	0.02	0.04	0.06
Lu/Yb	0.24	0.29	0.23	0.20	0.27	0.21	0.21	0.23	0.23

Supplementary Table S3. Age and Hf isotopic data of Late Jurassic igneous rocks in the Erguna Massif.

Sample no.	Lithology	t (Ma)	$\epsilon_{\text{Hf}}(t)$	T_{DM1}	T_{DM2}	References
M080-1-01	Trachyandesite	156	3.7 - 8.7	464-685	652-969	Sun et al., 2013
M036-1-01	Andesite	158	3.7 - 6.9	537-664	769-971	Sun et al., 2013
M111-1-01	Trachyte	146	6.4 - 8.2	477-549	676-790	Sun et al., 2013
Db-03-5-1	Granite	153	6.4 - 10.7	387-565	522-794	Sun et al., 2017
M009-1-01	Syenogranite	149	0.7 - 6.2	552-776	801-1155	Wang et al., 2014
M026-1-01	Quartz orthophyre	149	1.6 - 6.1	557-734	809-1094	Wang et al., 2014
M099-1-1	Alkali feldspar granite	151	5.5 - 9.7	418-562	580-847	Wang et al., 2014
11ER22-4	Monzonite	155	0.9 - 3.2	687-768	999-1147	Tang et al., 2015
11ER21-1	Monzonite	155	0.4 - 2.1	738-789	1071-1181	Tang et al., 2015
13ER16-1	Quartz monzonite	155	2.4 - 3.9	748-703	956-1051	Tang et al., 2015
12ER35-1	Quartz monzonite	156	1.0 - 4.7	619-769	906-1142	Tang et al., 2015
13ER48-1	Syenogranite	150	0.7 - 3.5	671-778	970-1156	Tang et al., 2015
12ER2-1	Syenogranite	152	3.8 - 6.9	533-652	759-958	Tang et al., 2015
Z10-27	Granodiorite	149	6.0 - 11.0	363-569	452~735Ma	Shi, 2015
Z11-64	Monzogranite	150	4.4 - 11.0	370-633	455~818Ma	Shi, 2015
Z10-28	Andesite	151	4.7 - 11.3	363-633	441~810	Shi, 2015
Z10-18	Monzogranite	152	4.4 - 9.4	442-638	545~823Ma	Shi, 2015
M007-1-01	Rhyolite	162	4.4 - 6.7	545-658	773-959	Gou et al., 2013
M133-1	Trachyandesite	164	0.7 - 2.3	725-788	1063-1168	Zhao et al., 2013