Table S1. Results of U-Pb dating by zircons from the Baishangtang rhyolite and the Zhangfangshan granodiorite.

Spot no.	Th/U	Isotopic ratios				Ages (Ma)			
		$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ	$^{207}Pb/^{235}U$	±1σ	$^{206}Pb/^{238}U$	±1σ
GQ-LW-01	1.15	0.30990	0.00771	0.04318	0.00053	274	6	273	3
GQ-LW-02	0.61	0.31082	0.00860	0.04313	0.00074	275	7	272	5
GQ-LW-03	0.59	0.47696	0.00875	0.06323	0.00065	396	6	395	4
GQ-LW-04	0.69	0.30683	0.00636	0.04319	0.00055	272	5	273	3
GQ-LW-05	0.46	0.30766	0.00694	0.04309	0.00060	272	5	272	4
GQ-LW-06	0.69	0.31792	0.00864	0.04314	0.00057	280	7	272	4
GQ-LW-07	0.58	0.48182	0.01063	0.06323	0.00074	399	7	395	5
GQ-LW-08	0.95	0.29884	0.00786	0.04321	0.00059	265	6	273	4
GQ-LW-09	1.13	0.31517	0.00896	0.04323	0.00066	278	7	273	4
GQ-LW-10	0.94	0.30229	0.00749	0.04293	0.00051	268	6	271	3
GQ-LW-11	0.74	0.31384	0.00780	0.04304	0.00061	277	6	272	4
GQ-LW-12	1.03	0.30241	0.00679	0.04317	0.00042	268	5	272	3
GQ-LW-13	0.62	0.30347	0.00794	0.04325	0.00055	269	6	273	3
GQ-LW-14	0.68	0.31267	0.00749	0.04311	0.00061	276	6	272	4
GQ-LW-15	0.69	0.30598	0.00548	0.04322	0.00047	271	4	273	3
GQ-LW-16	0.47	0.30608	0.00579	0.04319	0.00052	271	5	273	3
GQ-LW-17	0.64	0.30975	0.00738	0.04310	0.00045	274	6	272	3
GQ-LW-18	1.11	0.31393	0.00792	0.04324	0.00064	277	6	273	4
ZN-HG-01	0.51	0.33622	0.00566	0.04659	0.00057	294	4	294	4
ZN-HG-02	0.44	0.32241	0.00585	0.04526	0.00056	284	4	285	3
ZN-HG-03	0.46	0.33008	0.00569	0.04575	0.00057	290	4	288	4
ZN-HG-04	0.57	0.32701	0.00532	0.04566	0.00056	287	4	288	3
ZN-HG-05	0.45	0.33010	0.00777	0.04613	0.00059	290	6	291	4
ZN-HG-06	0.65	0.33416	0.00485	0.04602	0.00056	293	4	290	3
ZN-HG-07	0.45	0.32905	0.00444	0.04571	0.00056	289	3	288	3
ZN-HG-08	0.48	0.33059	0.00601	0.04568	0.00057	290	5	288	4
ZN-HG-09	0.48	0.33458	0.00475	0.04719	0.00058	293	4	297	4
ZN-HG-10	0.56	0.33431	0.00666	0.04564	0.00057	293	5	288	4

ZN-HG-11	0.56	0.32335	0.00444	0.04534	0.00055	284	3	286	3
ZN-HG-12	0.47	0.32449	0.00413	0.04507	0.00055	285	3	284	3
ZN-HG-13	0.50	0.32302	0.00638	0.04515	0.00057	284	5	285	4
ZN-HG-14	0.49	0.32403	0.00597	0.04559	0.00057	285	5	287	4
ZN-HG-15	0.45	0.33681	0.00789	0.04673	0.00060	295	6	294	4

Table S2. Whole-rock major (wt.%) and trace element (ppm) analyses of the Zhangfangshan granodiorites and the Baishantang bimodal volcanic rocks.

	22ZF-33	**22ZF-30**	**22ZF-31**	**22ZF-29**	**22ZF-32**	**22ZF-34**	**17GQ-LW-01**	**17GQ-LW-02**	**17GQ-LW-03**	**17GQ-LW-04**	**17GQ-LW-05**	**17GQ-LW-06**
	granodiorite	**granodiorite**	**granodiorite**	**granodiorite**	**granodiorite**	**granodiorite**	**rhyolite**	**rhyolite**	**rhyolite**	**rhyolite**	**rhyolite**	**rhyolite**
SiO_2	64.78	67.12	66.96	69.14	69.21	67.58	75.51	75.87	75.52	75.57	75.12	75.57
TiO_2	0.40	0.33	0.39	0.39	0.36	0.34	0.14	0.14	0.13	0.14	0.14	0.14
Al_2O_3	14.58	13.67	13.55	13.92	13.97	14.36	13.30	13.16	13.35	13.15	13.53	13.14
$^{T}Fe_2O_3$	3.34	2.81	3.22	3.47	2.04	2.72	1.74	1.53	1.41	1.66	1.46	1.65
MnO	0.06	0.05	0.06	0.08	0.03	0.05	0.04	0.03	0.03	0.03	0.03	0.04
MgO	1.54	1.24	1.55	1.68	0.65	1.30	0.27	0.30	0.26	0.28	0.37	0.27
CaO	3.23	3.32	3.31	3.80	2.15	3.11	0.53	0.61	0.82	0.67	0.69	0.72
Na_2O	6.76	6.14	7.22	3.92	6.10	4.07	4.02	4.00	4.04	4.03	4.07	4.06
K_2O	3.72	3.92	3.52	3.20	4.03	3.33	4.29	4.21	4.27	4.33	4.41	4.25
P_2O_5	0.27	0.20	0.20	0.25	0.16	0.19	0.03	0.03	0.02	0.02	0.03	0.03
LOI	1.19	1.19	1.20	1.59	1.19	2.99	1.21	1.19	1.46	1.29	1.33	1.18
$Mg^{\#}$	47.70	46.66	48.85	48.97	38.56	48.72	23.72	27.69	26.90	25.27	33.58	24.71
Na_2O/K_2O	1.82	1.57	2.05	1.22	1.51	1.22	0.94	0.95	0.95	0.93	0.92	0.95
Na_2O+K_2O	10.48	10.06	10.74	7.12	10.13	7.41	8.31	8.21	8.31	8.36	8.48	8.30
A/CNK	0.69	0.67	0.62	0.83	0.76	0.90	1.09	1.07	1.05	1.05	1.06	1.04
10000*Ga/Al	3.13	3.33	3.28	2.86	3.16	2.76	2.73	2.63	2.60	2.69	2.67	2.68
Ba	303	335	334	321	333	292	660	650	630	610	650	600
Rb	117.94	134.54	109.56	134.60	117.82	119.11	162.50	154.50	161.50	158.50	163.50	154.00

Cs	4.55	6.32	4.38	4.27	4.36	4.73	3.35	7.03	3.47	3.36	3.89	2.98
Th	68.21	45.19	36.92	21.39	42.36	22.64	15.55	14.70	14.25	14.75	14.50	14.05
U	6.17	3.23	3.23	2.52	4.02	2.00	2.40	2.10	2.10	2.00	2.10	2.00
Nb	10.64	9.72	10.21	9.74	10.59	8.21	13.10	13.00	11.80	12.40	12.60	12.60
Ta	1.25	1.19	1.60	1.26	1.30	0.92	1.11	1.08	1.05	1.08	1.08	1.11
K	30863	32512	29199	26570	33494	27673	35300	34100	33600	34400	37100	35300
La	33.3	34.0	36.8	26.4	27.5	22.3	34.0	31.9	27.2	31.3	32.4	27.5
Ce	82	78	85	58	66	49	73	70	61	68	70	61
Pr	9.6	9.5	10.0	6.8	8.6	6.1	8.7	8.3	7.3	8.1	8.4	7.4
Pb	21.4	23.2	18.8	22.8	20.8	19.2	16.8	15.2	15.1	14.2	14.0	14.6
Sr	190	155	170	158	186	186	76	70	73	70	77	72
Nd	36.8	36.3	37.0	24.5	34.9	23.4	32.4	31.4	27.7	30.5	31.1	27.9
Zr	390	292	284	153	361	271	75	70	69	69	72	71
Hf	10.88	7.90	7.28	4.41	9.41	7.12	3.40	3.30	3.30	3.10	3.30	3.30
P	1157	863	865	1109	701	827	120	130	110	120	120	130
Sm	8.95	8.95	8.07	5.28	8.64	5.57	6.77	6.77	5.92	6.33	6.43	6.11
Ti	2413	1958	2321	2311	2140	2023	920	900	770	860	880	880
Eu	0.93	0.79	0.88	0.80	0.97	0.78	1.07	1.08	0.99	1.01	1.00	0.95
Gd	8.95	8.84	8.10	4.88	9.07	5.65	6.53	6.34	5.83	6.16	6.12	5.93
Tb	1.56	1.50	1.32	0.81	1.54	0.97	1.04	1.02	0.93	0.99	0.97	0.99
Dy	10.18	9.63	8.27	5.13	9.84	6.30	6.64	6.36	5.88	6.06	5.94	6.02
Y	62.2	58.3	50.3	33.8	59.1	39.1	35.1	33.9	31.8	32.4	32.5	32.6
Er	6.44	5.98	5.00	3.35	5.90	4.09	4.15	3.89	3.69	3.69	3.68	3.79
Yb	6.83	6.18	5.12	3.60	5.82	4.26	4.04	3.85	3.72	3.67	3.70	3.81
Lu	0.98	0.85	0.71	0.50	0.84	0.63	0.63	0.59	0.59	0.58	0.58	0.60
Ho	2.14	2.05	1.71	1.11	2.02	1.32	1.36	1.27	1.23	1.27	1.23	1.27
Tm	1.04	0.91	0.76	0.54	0.91	0.63	0.62	0.58	0.56	0.56	0.55	0.57
Ga	24.2	24.1	23.6	21.1	23.3	21.0	19.2	18.4	18.4	18.8	19.2	18.7
Cr	31.29	21.51	24.75	17.76	30.81	25.22	2.00	2.00	1.00	2.00	8.00	3.00
Ni	15.00	14.21	12.16	8.33	13.62	11.22	1.20	1.20	2.20	1.50	4.40	1.40
Co	8.92	6.78	8.12	5.71	9.05	6.39	1.60	1.30	1.20	1.60	1.80	1.70

ΣREE	209.23	203.47	209.06	142.08	182.62	131.49	181.13	172.92	151.99	167.71	171.97	154.14
LREE	171.12	167.53	178.07	122.17	146.68	107.64	156.12	149.02	129.56	144.73	149.20	131.16
HREE	38.12	35.95	30.99	19.91	35.95	23.85	25.01	23.90	22.43	22.98	22.77	22.98
LREE/HREE	4.49	4.66	5.75	6.14	4.08	4.51	6.24	6.24	5.78	6.30	6.55	5.71
$(La/Yb)_N$	3.50	3.94	5.16	5.27	3.39	3.75	6.04	5.94	5.24	6.12	6.28	5.18
$(La/Sm)_N$	2.40	2.45	2.95	3.23	2.06	2.59	3.24	3.04	2.97	3.19	3.25	2.91
$(Gd/Yb)_N$	1.08	1.18	1.31	1.12	1.29	1.10	1.34	1.36	1.30	1.39	1.37	1.29
δEu	0.32	0.27	0.33	0.48	0.33	0.42	0.49	0.50	0.52	0.49	0.49	0.48
δCe	1.12	1.06	1.09	1.06	1.05	1.04	1.04	1.05	1.06	1.04	1.04	1.05
Zr+Nb+Ce+Y	544.83	438.00	429.29	254.47	496.38	368.17	196.00	186.20	173.40	181.40	187.10	177.10

$^{T}FeO=0.8998*{}^{T}Fe_2O_3$; $Mg^{\#}=100*(MgO/40.3044)/(MgO/40.3044+{}^{T}FeO/71.844)$.

Table S2. (continued).

	17GQ-XW-02	17GQ-XW-03	17GQ-XW-04	17GQ-XW-05	17GQ-XW-06
	basaltic andesite	basaltic andesite	basaltic andesite	basaltic andesite	basaltic andesite
SiO_2	55.94	63.14	61.71	57.60	54.66
TiO_2	1.80	1.28	1.40	1.69	1.87
Al_2O_3	16.12	14.36	14.39	15.27	16.13
$^{T}Fe_2O_3$	10.17	7.97	8.81	9.84	10.71
MnO	0.19	0.17	0.17	0.17	0.18
MgO	4.13	3.47	3.79	3.97	4.26
CaO	5.13	3.78	4.43	5.21	5.70
Na_2O	4.32	3.59	3.25	4.07	4.30
K_2O	1.26	1.59	1.38	1.26	1.26
P_2O_5	0.54	0.40	0.41	0.50	0.55
LOI	2.55	2.41	2.49	2.28	2.23
$Mg^{\#}$	44.61	46.30	46.00	44.41	44.08
Na_2O/K_2O	3.43	2.26	2.37	3.23	3.41
Na_2O+K_2O	5.58	5.18	4.63	5.33	5.56
Ba	650	590	550	590	620

Rb	57.90	68.80	54.80	34.80	42.70
Cs	2.84	2.65	2.53	2.76	2.88
Th	5.35	8.87	6.22	4.27	3.74
U	3.90	3.00	2.50	2.70	2.90
Nb	9.20	11.50	10.20	9.30	8.30
Ta	0.65	0.81	0.72	0.65	0.57
K	9900	12100	10400	8900	9500
La	21.4	28.3	25.5	17.4	17.6
Ce	50	61	55	42	43
Pr	6.6	7.6	7.0	5.6	5.9
Pb	8.9	10.6	10.1	9.2	8.2
Sr	622	382	340	503	557
Nd	27.9	29.5	27.6	23.7	26.0
Zr	258	192	214	180	203
Hf	6.60	5.50	5.30	4.70	5.00
P	2310	1700	1770	2070	2370
Sm	6.56	6.22	6.04	5.63	6.41
Ti	10450	7310	7880	9030	10550
Eu	2.24	1.91	1.90	1.91	2.19
Gd	7.47	6.45	6.41	6.44	7.10
Tb	1.17	1.00	1.01	1.03	1.11
Dy	7.24	6.00	6.19	6.37	6.80
Y	39.5	32.6	38.9	33.5	37.6
Er	4.18	3.43	3.52	3.53	3.87
Yb	3.70	3.13	3.10	3.05	3.28
Lu	0.57	0.48	0.48	0.46	0.49
Ho	1.47	1.19	1.27	1.27	1.39
Tm	0.59	0.50	0.49	0.48	0.54
Ga	21.4	18.8	19.7	20.2	21.2
Cr	49.00	45.00	45.00	43.00	46.00
Ni	16.00	18.30	19.00	15.40	14.20

Co	26.00	20.20	21.80	25.10	27.90
ΣREE	140.95	156.62	145.69	118.35	125.15
LREE	114.56	134.44	123.22	95.72	100.57
HREE	26.39	22.18	22.47	22.63	24.58
LREE/HREE	4.34	6.06	5.48	4.23	4.09
$(La/Yb)_N$	4.15	6.49	5.90	4.09	3.85
$(La/Sm)_N$	2.11	2.94	2.73	2.00	1.77
$(Gd/Yb)_N$	1.67	1.70	1.71	1.75	1.79
δEu	0.98	0.92	0.93	0.97	0.99
δCe	1.03	1.02	1.01	1.03	1.03

$^{T}FeO=0.8998*{}^{T}Fe_2O_3$; $Mg^{\#}=100*(MgO/40.3044)/(MgO/40.3044+{}^{T}FeO/71.844)$.

Table S3. Whole-rock Nd-Hf isotopic data for the Baishantang bimodal volcanic rocks.

Sample	Sm (ppm)	Nd (ppm)	$^{147}Sm/^{144}Nd$	$^{143}Nd/^{144}Nd$	$(^{143}Nd/^{144}Nd)_i$	$\varepsilon_{Nd}(t)$	fSm/Nd	T_{DM2} (Ma)
17GQ-XW-4	**6.04**	**27.6**	**0.13224**	**0.512381**	**0.512146**	-2.8	-0.33	1267
17GQ-XW-5	5.63	23.7	0.14354	0.512522	0.512266	-0.4	-0.27	1075
17GQ-XW-6	6.41	26.0	0.14897	0.512470	0.512205	-1.6	-0.24	1173
17GQ-LW-4	6.33	30.5	0.12541	0.512264	0.512041	-4.8	-0.36	1433
17GQ-LW-5	6.43	31.1	0.12493	0.512252	0.512030	-5.0	-0.36	1451
17GQ-LW-6	6.11	27.9	0.13233	0.512259	0.512023	-5.2	-0.33	1460

Sample	$^{176}Lu/^{177}Hf$	$^{176}Lu/^{177}Hf$	Lu (ppm)	Hf (ppm)	$(^{176}Hf/^{177}Hf)_i$	$\varepsilon_{Hf}(t)$	fLu/Hf	T_{DM2} (Ma)
17GQ-XW-4	0.012984	0.282721	0.48	5.30	0.282655	1.8	-0.61	1175
17GQ-XW-5	0.014032	0.282789	0.46	4.70	0.282717	4.1	-0.58	1034
17GQ-XW-6	0.014050	0.282831	0.49	5.00	0.282759	5.5	-0.58	940
17GQ-LW-4	0.026824	0.282679	0.58	3.10	0.282542	-2.2	-0.19	1427
17GQ-LW-5	0.025198	0.282674	0.58	3.30	0.282546	-2.0	-0.24	1418
17GQ-LW-6	0.026067	0.282682	0.60	3.30	0.282549	-1.9	-0.21	1411

$\varepsilon_{Nd} = [(^{143}Nd/^{144}Nd)s/(^{143}Nd/^{144}Nd)_{CHUR}-1] \times 10000$, $f_{Sm/Nd} = (^{147}Sm/^{144}Nd)s/(^{147}Sm/^{144}Nd)_{CHUR} -1$; $(^{143}Nd/^{144}Nd)_{CHUR} = 0.512638$, $(^{147}Sm/^{144}Nd)_{CHUR} = 0.1967$, $T_{DM1} = 1/\lambda \times In\{1 + [(^{143}Nd/^{144}Nd)s - 0.51315)((^{147}Sm/^{144}Nd) - 0.2137]\}$, $\lambda_{Sm} = 6.54\times10^{-12}$; $\varepsilon_{Hf} = [(^{176}Hf/^{177}Hf)s/(^{176}Hf/^{177}Hf)_{CHUR} - 1] \times 10000$, $T_{DM1} = 1/\lambda \times In\{1 + [(^{176}Hf/^{177}Hf)s - (^{176}Hf/^{177}Hf)_{DM})/((^{176}Lu/^{171}Hf)s-(^{176}Lu/^{177}Hf)_{DM}]\}$, $f_{Lu/Hf} = (^{176}Lu/^{177}Hf)s/(^{176}Lu/^{177}Hf)_{CHUR} -1$. $(^{176}Hf/^{177}Hf)_{CHUR} = 0.28277$, $(^{176}Lu/^{177}Hf)_{CHUR} = 0.0332$, $(^{176}Lu/^{177}Hf)_{DM} = 028235$, $(^{176}Lu/^{177}Hf)_{DM} = 0.0384$, $\lambda_{Lu} = 1.867\times10^{-11}$, s = content of sample, t = crystallization age.