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APPENDIX: Analytical Methods

Table DR1. Zircon U-Pb results for the Miocene Xigaze dikes in the southern Lhasa subterrane.

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APPENDIX

Analytical Methods

A total of twenty samples have been analyzed for major and trace elements. The selected eleven samples have been analyzed for whole-rock Sr-Nd isotope compositions. The selected Xigaze samples were carried out for whole-rock trace and Sr-Nd compositions at the State Key Laboratory of Isotope Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (SKLIG GIG CAS) and for whole-rock major compositions at the Key Laboratory of Continental Dynamics, Northwest University, China. These selected Xigaze samples were carefully cut into small particles like soybeans, which then were cleaned three or four times using deionized water containing <3% HCL and also washed three or four times with deionized water to remove residual HCL, then dried with 105 °C drying oven and finally crushed into about ~200-mesh size powders in an agate mortar for analysis of whole-rock trace elements and Sr-Nd isotopes at the State Key Laboratory of Isotope Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences (SKLaBIG, GIGCAS) and major element compositions at the Key Laboratory of Continental Dynamics, Northwest University, China.

Whole-rock major element oxides contents were determined on fused glass sheet using a X-ray fluorescence (XRF; Rikagu RIX 2100) at the State Key Laboratory of Continental Dynamics, Northwest University, Xi'an, China. Analyses of rock standards were used to ensure (USGS and Chinese national rock standards: BCR-2, GSR-1, and GSR-3) the analytical precision and accuracy of the major elements that were generally better than 5%. Whole-rock trace element contents of the selected RKZ samples in this paper were analyzed by using a Perkin–Elmer Sciex ELAN 6000 ICP-MS at SKLaBIG GIG CAS. Same analysis steps in detail can be found in Li et al. (2004). During analysis, data quality of the selected Xigaze samples was monitored by analyses of a set of rock standards (including BHVO-2, GSR-1, GSR-2, GSR-3, SARM-4, AGV-2 and W-2a). For most trace elements abundances, the relative standard deviations are <3%.

Sr-Nd isotope analysis of the selected Xigaze samples in this study was performed by using a Micromass Isoprobe multi-collector mass spectrometer (MC–ICPMS) at SKLaBIG, GIG-CAS. The analytical procedures in detail were also provided by Li et al. (2004). All measured $^{143}Nd/^{144}Nd$ and $^{86}Sr/^{88}Sr$ ratios in this study were corrected to $^{146}Nd/^{144}Nd = 0.7219$ and $^{86}Sr/^{88}Sr = 0.1194$, respectively. The reported $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ ratios of the selected Xigaze samples in this study were respectively adjusted to the NBS987 standard ($^{87}Sr/^{86}Sr = 0.710285$) and the Shin Etsu JNdi–1 standard ($^{143}Nd/^{144}Nd = 0.512085$).

Zircon crystals were separated from three rock samples (RKZ14–1, RKZ15–1 and RKZ18–1) for in situ U–Pb isotope analysis. Zircons were separated from each sample by using conventional heavy-liquid and magnetic techniques in the Laboratory of the Geological Team of Hebei Province, China. Cathodoluminescence (CL) images of zircon grains were taken at State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, China by using a Quanta 400FEG environmental scanning electron microscope equipped with an Oxford energy dispersive spectroscopy system and a Gatan CL detector prior to U–Pb geochronological analyses for inspecting internal structure of zircon and for choosing optimum spot locations for zircon U-Pb isotope analyses. Zircon U–Pb dating with a beam size of 32 μm was conducted using LA-ICP-MS at the State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, China. Detailed operating conditions, procedures and data reduction are the same as those reported in Yuan et al. (2004). An Agilent 7500a ICP–MS instrument equipped with a 193 nm ArF–excimer laser and a homogenizing, imaging optical system were used for simultaneous determination of zircon U-Pb ages. The needs of $^{206}Pb/^{238}U$ and $^{207}Pb/^{235}U$ ratios were calculated using the GLITTER program. The standard of Harvard zircon 91500 was used for correcting both instrumental mass bias and depth dependent elemental and isotopic fractionation. U, Th and Pb concentrations were calibrated by using ^{29}Si as an internal standard and NIST SRM 610 as an external standard. The weighted mean U–Pb ages and concordia plots were calculated using the ISOPLOT 3.0 software (Ludwig, 2003).

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Table DR1. Zircon U-Pb results for the Miocene Xigaze dikes in the southern Lhasa subterrane.

Spot	Th	U	Th/U	Ratio						Age (Ma)					
No.				$^{207}Pb/^{206}Pb$	**1σ**	$^{207}Pb/^{235}U$	**1σ**	$^{206}Pb/^{238}U$	**1σ**	$^{207}Pb/^{206}Pb$	**1σ**	$^{207}Pb/^{235}U$	**1σ**	$^{206}Pb/^{238}U$	**1σ**
16RKZ14-1	N29°16′ 1.88″ E 88°6′ 24.85″														
1	66	216	0.30	0.0577	0.0008	0.66355	0.00740	0.08335	0.00051	519	31	517	5	516	3
2	15	925	0.02	0.0474	0.0015	0.02066	0.00060	0.00316	0.00003	67.7	72.3	20.8	0.6	20.4	0.2
3	3510	2225	1.58	0.0640	0.0021	0.01374	0.00041	0.00156	0.00001	742	67	13.9	0.4	10.0	0.1
4	268	789	0.34	0.0695	0.0008	1.27602	0.01002	0.13324	0.00077	912	24	835	40	806	40
5	4564	3370	1.35	0.0586	0.0021	0.01366	0.00047	0.00169	0.00002	551	77	13.8	0.5	10.9	0.1
6	259	2321	0.11	0.0570	0.0006	0.61998	0.00399	0.07887	0.00044	492	24	490	3	489	3
7	622	2322	0.27	0.0452	0.0018	0.00997	0.00038	0.00160	0.00001	0.1	49.8	10.1	0.4	10.3	0.1
8	480	1151	0.42	0.0565	0.0008	0.34478	0.00394	0.04429	0.00027	470	32	301	3	279	2
9	655	1993	0.33	0.0555	0.0010	0.05541	0.00086	0.00724	0.00005	434	39	54.8	0.8	46.5	0.3
10	436	1732	0.25	0.0587	0.0022	0.01294	0.00045	0.00160	0.00002	556	78	13.1	0.5	10.3	0.1
11	9519	3504	2.72	0.0794	0.0016	0.01736	0.00031	0.00159	0.00001	1183	39	17.5	0.3	10.2	0.1
12	223	1328	0.17	0.0609	0.0007	0.75434	0.00603	0.08995	0.00052	634	25	571	3	555	30
13	3179	1633	1.95	0.0677	0.0033	0.01574	0.00073	0.00169	0.00002	861	98	15.9	0.7	10.9	0.1
14	4849	2888	1.68	0.0608	0.0028	0.01305	0.00057	0.00156	0.00002	631	95	13.2	0.6	10.0	0.1
15	1796	1021	1.76	0.0618	0.0069	0.01341	0.00144	0.00158	0.00004	666	222	13.5	1.5	10.1	0.3
16	407	1500	0.27	0.0579	0.0056	0.01310	0.00122	0.00164	0.00004	527	198	13.2	1.2	10.6	0.2
17	62	359	0.17	0.0644	0.0013	0.53502	0.00985	0.06027	0.00042	756	43	435	7	377	3
18	2849	1212	2.35	0.0615	0.0064	0.01316	0.00133	0.00155	0.00004	657	208	13.3	1.3	10.0	0.2
16RKZ15-1	N29°13′ 11.61 ″ E 88°11′ 48.4″														
1	49	327	0.15	0.0485	0.0073	0.01350	0.00200	0.00202	0.00006	124	321.	13.6	2.0	13.0	0.4
2	67	203	0.33	0.0645	0.0114	0.01805	0.00314	0.00203	0.00007	758	335	18.2	3.1	13.1	0.4
3	7	135	0.05	0.1733	0.0327	0.04925	0.00877	0.00206	0.00013	2589	284	48.8	8.5	13.3	0.8
4	34	261	0.13	0.0617	0.0142	0.01554	0.00351	0.00183	0.00008	662	430	15.7	3.5	11.8	0.6
5	30	243	0.12	0.0658	0.0131	0.01862	0.00363	0.00205	0.00009	799	371	18.7	3.6	13.2	0.6
6	19	311	0.06	0.0503	0.0091	0.01318	0.00236	0.00190	0.00006	207	375	13.3	2.4	12.2	0.4
7	42	140	0.30	0.0774	0.0182	0.02193	0.00503	0.00205	0.00011	1132	408	22.0	5.0	13.2	0.7
8	9	114	0.08	0.0612	0.019	0.01615	0.00495	0.00191	0.00009	646	555	16.3	4.9	12.3	0.6
9	111	251	0.44	0.0801	0.0095	0.02232	0.00259	0.00202	0.00005	1199	218	22.4	2.6	13.0	0.3
10	12	129	0.09	0.0572	0.0181	0.01594	0.00497	0.00202	0.00011	498	578	16.1	5.0	13.0	0.7
11	15	306	0.05	0.0507	0.0080	0.01334	0.00208	0.00191	0.00005	226	329	13.5	2.1	12.3	0.3
12	38	218	0.17	0.0667	0.0118	0.01859	0.00324	0.00202	0.00007	829	332	18.7	3.2	13.0	0.4
13	3	116	0.02	0.0828	0.0228	0.02141	0.00577	0.00188	0.00011	1263	461	21.5	5.7	12.1	0.7
14	8	80	0.11	0.0653	0.0330	0.01901	0.00946	0.00211	0.00018	784	808	19.1	9.4	13.6	1.2
15	22	156	0.14	0.0837	0.0183	0.02296	0.00487	0.00199	0.00010	1286	375	23.0	4.8	12.8	0.7
16	33	282	0.12	0.0738	0.0123	0.01926	0.00311	0.00189	0.00008	1036	304	19.4	3.1	12.2	0.5
17	17	100	0.17	0.0410	0.0218	0.01107	0.00587	0.00196	0.00010	0.1	701.4	11.2	5.9	12.6	0.7
18	13	133	0.10	0.0512	0.0166	0.01490	0.00478	0.00211	0.00009	250	613	15.0	4.8	13.6	0.6
19	18	240	0.07	0.0635	0.0145	0.01801	0.00402	0.00205	0.00009	726	421	18.1	4.0	13.2	0.6
20	14	156	0.09	0.0636	0.0164	0.01825	0.00463	0.00208	0.00009	728	469	18.4	4.6	13.4	0.6
16RKZ18-1	N29°18′ 30.47 ″ E 88°48′ 2.81″														

1	29	221	0.13	0.0539	0.0104	0.01740	0.00333	0.00234	0.00007	365	386	17.5	3.3	15.1	0.5
2	258	759	0.34	0.0458	0.0041	0.01447	0.00127	0.00229	0.00004	0.1	188.5	14.6	1.3	14.8	0.2
3	39	86	0.46	0.0517	0.0193	0.01667	0.00620	0.00234	0.00010	270	687	16.8	6.2	15.1	0.6
4	180	855	0.21	0.0417	0.0041	0.01299	0.00126	0.00226	0.00004	0.1	0.0	13.1	1.3	14.5	0.3
5	82	244	0.34	0.0636	0.0097	0.01942	0.00292	0.00221	0.00006	730	294	19.5	2.9	14.2	0.4
6	85	326	0.26	0.0454	0.0072	0.01455	0.00226	0.00232	0.00005	0.1	310.9	14.7	2.3	14.9	0.3
7	173	173	1.00	0.0385	0.0126	0.01206	0.00391	0.00227	0.00009	0.1	245.1	12.2	3.9	14.6	0.6
8	123	470	0.26	0.0524	0.0073	0.01565	0.00214	0.00216	0.00005	304	290	15.8	2.1	13.9	0.4
9	141	149	0.95	0.0441	0.0137	0.01393	0.00430	0.00229	0.00009	0.1	523.5	14.0	4.3	14.7	0.6
10	111	460	0.24	0.0543	0.0058	0.01684	0.00176	0.00225	0.00005	385	223	17.0	1.8	14.5	0.3
11	42	240	0.17	0.0447	0.0099	0.01374	0.00302	0.00223	0.00007	0.1	395.4	13.9	3.0	14.4	0.5
12	74	126	0.59	0.0611	0.0141	0.01840	0.00421	0.00218	0.00008	641	432	18.5	4.2	14.1	0.5
13	291	877	0.33	0.0480	0.0045	0.01542	0.00142	0.00233	0.00004	101	209	15.5	1.4	15.0	0.3
14	92	118	0.77	0.0463	0.0182	0.01409	0.00549	0.00221	0.00011	12.4	744.7	14.2	5.5	14.2	0.7
15	147	215	0.68	0.0602	0.0123	0.01878	0.00376	0.00226	0.00008	612	388	18.9	3.8	14.6	0.5
16	41	68	0.61	0.0437	0.0313	0.01421	0.01012	0.00236	0.00017	0.1	1067.7	14.3	10.1	15.2	1.1
17	174	347	0.50	0.0619	0.0083	0.01968	0.00257	0.00231	0.00006	669	263	19.8	2.6	14.9	0.4
18	34	46	0.74	0.0383	0.0378	0.01320	0.01298	0.00250	0.00018	0.1	1097.7	13.3	13.0	16.1	1.2
19	146	187	0.78	0.0540	0.0048	0.06775	0.00589	0.00910	0.00017	371	189	66.6	5.6	58.4	1.1
20	96	500	0.19	0.0679	0.0055	0.02238	0.00176	0.00239	0.00004	864	159	22.5	1.8	15.4	0.3
21	19	37	0.51	0.0861	0.0387	0.02740	0.01214	0.00231	0.00017	1341	685	27.5	12.0	14.9	1.1
22	551	484	1.14	0.0542	0.0025	0.09411	0.00420	0.01260	0.00014	377	101	91.3	3.9	80.7	0.9
23	209	336	0.62	0.0571	0.0110	0.01804	0.00340	0.00229	0.00008	494	376	18.2	3.4	14.8	0.5
24	171	183	0.94	0.0463	0.0114	0.01863	0.00454	0.00292	0.00011	12.9	506	18.7	4.5	18.8	0.7

Table DR2. Geochemistry of the Miocene Xigaze dikes in the southern Lhasa subterrane.

	the Xigaze K-rich dikes				the Xigaze Na-rich dikes					
Sample	16RKZ14-2	16RKZ14-3	16RKZ14-4	16RKZ14-5	16RKZ15-2	16RKZ15-3	16RKZ15-4	16RKZ15-5	16RKZ16-2-01	16RKZ16-3
SiO_2	68.91	69.59	69.31	69.27	64.87	64.41	64.62	64.36	63.82	63.38
TiO_2	0.30	0.28	0.28	0.28	0.61	0.61	0.60	0.62	0.55	0.55
Al_2O_3	14.87	15.18	15.22	15.08	16.76	16.67	16.64	16.73	16.11	16.21
$Fe_2O_3^T$	2.44	2.43	2.33	2.46	3.61	3.70	3.79	3.57	3.99	4.01
MnO	0.06	0.05	0.05	0.06	0.06	0.08	0.08	0.06	0.07	0.08
MgO	0.64	0.64	0.64	0.63	1.43	1.45	1.40	1.45	2.46	2.42
CaO	1.26	0.95	1.23	1.21	2.72	3.01	3.01	3.17	2.91	3.04
Na_2O	3.36	2.72	2.86	2.93	5.20	5.22	5.15	5.12	4.69	4.43
K_2O	5.61	5.68	5.53	5.60	2.49	2.44	2.51	2.58	3.08	3.10
P_2O_5	0.13	0.14	0.13	0.15	0.15	0.17	0.15	0.17	0.14	0.17
LOI	2.11	1.98	1.97	1.88	1.81	1.94	1.72	1.77	1.91	2.30
TOTAL	99.69	99.64	99.55	99.55	99.71	99.70	99.67	99.60	99.73	99.69
Na_2O/K_2O	0.60	0.48	0.52	0.52	2.09	2.14	2.05	1.98	1.52	1.43
A/CNK	1.07	1.23	1.18	1.15	1.03	1.00	1.00	0.98	0.98	1.00
Mg#	38	38	39	37	48	48	46	49	59	58
Sc	3.36	3.95	3.95	3.91	5.86	5.73	5.56	6.17	8.53	7.83
Ti	1744	1785	1846	1752	1517	3342	3399	3756	3319	3117
Cr	26.62	22.86	22.55	18.56	40.97	22.62	33.42	26.47	25.35	30.12
Mn	517	369	419	483	452	577	646	490	540	548
Co	2.70	2.54	2.72	2.52	8.51	8.23	8.83	8.87	12.30	11.56
Ni	4.62	4.37	4.49	4.57	9.29	8.91	9.28	9.25	39.76	34.62
Cu	6.47	7.65	6.12	6.55	37.62	34.60	34.18	36.01	34.43	36.78
Zn	133.1	106.2	115.3	118.4	66.87	65.75	68.04	71.44	76.76	68.2
Ga	25.87	24.47	26.18	24.98	21.3	19.79	20.91	21.59	22.08	21.15
Ge	2.62	2.13	2.12	2.13	1.59	1.58	2.12	1.65	1.80	1.97
Rb	311.3	306.6	314.3	307.3	54.13	49.89	53.85	59.98	80.99	76.85
Sr	891	841	923	875	1180	1066	1130	1249	955	1046
Y	10.56	11.35	11.55	11.49	5.30	5.33	5.30	5.87	9.09	8.47
Zr	200.9	207.2	226.5	214.1	94.15	111.4	117.6	122.3	126.1	119.5
Nb	16.52	16.05	16.81	15.92	1.913	3.426	3.674	3.786	4.473	4.03
Cs	18.47	17.66	19.5	19.31	0.879	0.781	0.952	0.814	0.764	1.024
Ba	1766	1683	1750	1689	751	706	761	799	972	899
La	78.9	78.95	81.65	77.75	20.14	18.85	20.13	21.19	30.67	28.96
Ce	144.9	147.1	151.1	142	41.15	38.55	40.07	42.88	60.19	56.88
Pr	15.99	16.72	16.95	16.32	5.127	4.88	5.06	5.466	7.543	7.109
Nd	56.27	57.94	59.75	57.26	20.19	19.3	19.75	21.33	29.52	27.65
Sm	8.32	8.86	8.82	8.43	3.32	3.19	3.29	3.59	4.94	4.64
Eu	1.67	1.70	1.71	1.68	0.88	0.82	0.86	0.92	1.19	1.14
Gd	5.59	5.74	5.82	5.56	2.21	2.19	2.25	2.44	3.40	3.20
Tb	0.55	0.59	0.59	0.57	0.25	0.24	0.25	0.27	0.38	0.36
Dy	2.31	2.54	2.44	2.46	1.14	1.14	1.16	1.29	1.88	1.71
Ho	0.38	0.39	0.39	0.40	0.19	0.19	0.20	0.21	0.33	0.31
Er	1.03	1.02	1.02	1.01	0.46	0.46	0.51	0.52	0.83	0.77
Tm	0.13	0.13	0.13	0.13	0.06	0.06	0.07	0.07	0.12	0.11
Yb	0.83	0.83	0.86	0.86	0.36	0.38	0.41	0.43	0.73	0.68
Lu	0.13	0.13	0.14	0.13	0.05	0.06	0.06	0.07	0.12	0.11
Hf	5.88	6.21	6.63	6.30	2.97	3.18	3.35	3.62	3.81	3.60
Ta	1.15	1.18	1.23	1.17	0.13	0.22	0.23	0.25	0.29	0.26
Pb	111.30	85.43	103.50	100.00	25.80	23.52	24.84	24.91	47.70	51.50
Th	62.70	64.71	64.99	63.58	5.03	4.81	4.94	5.28	10.94	10.07
U	7.20	8.26	8.48	8.17	1.36	1.35	1.32	1.52	2.66	2.46
Sr/Y	84	74	80	76	223	200	213	213	105	124
$(La/Yb)_N$	68	68	68	65	40	36	35	35	30	31
Eu^*	0.71	0.68	0.69	0.71	0.94	0.90	0.91	0.90	0.84	0.86
T_{Zr}	805	823	827	819	730	738	743	744	746	743

Continue:

	the Xigaze Na-rich dikes									
Sample	16RKZ16-4	16RKZ16-5	16RKZ17-2	16RKZ17-3	16RKZ17-4	16RKZ17-5	16RKZ18-2	16RKZ18-3	16RKZ18-4	16RKZ18-5
SiO_2	63.54	63.16	59.44	59.61	59.14	59.47	61.16	60.34	61.07	60.85
TiO_2	0.53	0.55	0.78	0.76	0.78	0.78	0.73	0.76	0.74	0.75
Al_2O_3	16.02	16.11	16.79	16.68	16.74	16.63	17.09	16.73	16.98	16.83
$Fe_2O_3^T$	4.04	4.30	5.39	5.44	5.58	5.67	5.21	5.54	5.33	5.70
MnO	0.08	0.09	0.08	0.08	0.10	0.10	0.09	0.10	0.10	0.12
MgO	2.31	2.44	2.95	3.08	3.01	2.91	2.70	2.85	2.72	2.74
CaO	3.35	3.14	3.19	2.73	3.06	3.26	4.31	4.17	4.18	4.26
Na_2O	4.44	4.52	5.64	5.54	5.57	5.28	5.11	5.09	5.18	5.27
K_2O	3.12	3.25	2.04	2.29	2.00	1.98	2.13	2.06	2.19	2.01
P_2O_5	0.15	0.14	0.24	0.24	0.25	0.23	0.17	0.20	0.18	0.19
LOI	1.94	2.25	3.28	3.28	3.38	3.91	1.30	1.96	1.00	1.15
TOTAL	99.52	99.95	99.82	99.73	99.61	100.22	100.00	99.80	99.67	99.87
Na_2O/K_2O	1.42	1.39	2.76	2.42	2.79	2.67	2.40	2.47	2.37	2.62
A/CNK	0.95	0.97	0.97	1.01	0.99	0.99	0.92	0.92	0.92	0.90
Mg#	57	57	56	57	56	54	55	55	54	53
Sc	7.92	8.10	9.82	9.69	9.51	5.98	7.14	7.28	7.55	8.40
Ti	3177	3145	4519	2210	4368	4150	3791	3685	4021	4435
Cr	37.46	34.14	49.77	82.93	49.16	50.04	46.63	48.48	44.83	67.04
Mn	654	620	617	614	684	619	578	602	686	862
Co	11.69	11.37	16.71	16.62	16.38	15.99	13.99	14.17	14.87	16.75
Ni	35.62	37.16	34.42	38.55	33.38	34.25	33.71	35.56	35.35	39.73
Cu	30.44	32.65	46.73	47.52	44.87	40.08	39.32	39.88	48.28	51.66
Zn	76.1	73.94	77.45	73.84	76.7	72.16	66.34	67.2	64.74	74.98
Ga	21.94	20.79	20.99	20.65	20.34	17.62	18.64	17.73	19.93	21.88
Ge	1.76	1.72	2.03	2.05	2.02	1.61	1.47	1.62	1.70	1.97
Rb	79.63	81.64	71.53	82.14	67.2	11.63	41.73	37.01	44.27	43.04
Sr	1147	1172	1144	1125	1106	421	1023	933	1204	1343
Y	8.31	8.46	10.56	10.43	10.34	7.04	7.08	7.09	7.53	8.49
Zr	123	113	158.3	157.9	152.9	143.3	85.95	80.97	92.03	102.3
Nb	4.248	4.012	8.356	5.007	7.924	7.534	3.848	3.694	4.142	4.432
Cs	0.642	0.688	0.521	0.568	0.47	0.864	0.61	0.625	0.562	0.469
Ba	1019	979	1547	1310	1279	765	620	573	670	722
La	28.72	28.17	27.95	27.25	27.29	12.58	16.01	15.73	17.51	18.79
Ce	56.57	55.37	58.1	57.53	57.19	27.38	35.84	33.3	36.18	39.98
Pr	6.997	6.908	7.596	7.502	7.586	3.439	4.48	4.435	4.862	5.301
Nd	27.45	27.24	30.69	30.25	30.65	13.91	18.37	18.21	19.44	21.88
Sm	4.60	4.60	5.37	5.29	5.30	2.57	3.27	3.31	3.58	3.94
Eu	1.09	1.11	1.19	1.14	1.18	0.57	0.87	0.86	0.94	1.05
Gd	3.12	3.15	3.56	3.45	3.52	1.91	2.45	2.44	2.61	2.96
Tb	0.35	0.36	0.43	0.43	0.43	0.24	0.32	0.32	0.33	0.37
Dy	1.68	1.72	2.16	2.11	2.10	1.25	1.48	1.53	1.62	1.79
Ho	0.29	0.31	0.38	0.38	0.38	0.24	0.26	0.25	0.27	0.31
Er	0.74	0.77	0.95	0.91	0.93	0.61	0.62	0.60	0.66	0.73
Tm	0.11	0.11	0.13	0.13	0.13	0.09	0.08	0.09	0.09	0.10
Yb	0.66	0.68	0.81	0.79	0.80	0.59	0.52	0.50	0.55	0.62
Lu	0.10	0.11	0.13	0.13	0.12	0.10	0.08	0.08	0.09	0.09
Hf	3.69	3.40	4.67	4.55	4.53	4.24	2.61	2.48	2.82	3.09
Ta	0.27	0.26	0.52	0.21	0.49	0.48	0.25	0.23	0.26	0.28
Pb	43.01	43.15	24.72	24.62	24.16	16.81	14.13	15.36	16.31	18.59
Th	10.00	9.53	31.91	31.95	31.00	14.52	4.16	3.91	4.48	4.76
U	2.44	2.32	4.48	4.56	4.32	2.46	0.89	0.85	0.98	1.04
Sr/Y	138	139	108	108	107	60	145	132	160	158
$(La/Yb)_N$	31	30	25	25	24	15	22	23	23	22
Eu^*	0.83	0.84	0.78	0.77	0.79	0.75	0.90	0.89	0.90	0.90
T_{Zr}	740	734	755	760	754	750	702	697	707	712

Note: The units of major and trace elements are wt.% and ppm, respectively. A/CNK = molar ratio of $Al_2O_3/(CaO + Na_2O + K_2O)$; $Mg^\#$ = molar ratio of $MgO/(MgO + 0.79*Fe_2O_3^T)*100$.

Table DR3. Sr-Nd isotopic composition of the Miocene Xigaze dikes in the southern Lhasa subterrane.

Samnple	Rb	Sr	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$	2σ	$(^{87}Sr/^{86}Sr)_i$	Sm	Nd	$^{147}Sm/^{144}Nd$	$^{143}Nd/^{144}Nd$	2σ	$(^{143}Nd/^{144}Nd)_i$	$\varepsilon_{Nd}(t)$	T_{DM}^{2}	$f_{Sm/Nd}$
16RKZ14-2	311	891	1.0110	0.712265	0.000014	0.712122	8.32	56.27	0.0894	0.512215	0.000007	0.512209	-8.11	1486	-0.55
16RKZ14-4	314	923	0.9862	0.712254	0.000014	0.712114	8.82	59.75	0.0893	0.512189	0.000010	0.512183	-8.62	1527	-0.55
16RKZ15-2	54	1180	0.1327	0.706290	0.000014	0.706271	3.32	20.19	0.0995	0.512535	0.000007	0.512528	-1.89	978	-0.49
16RKZ15-4	54	1130	0.1379	0.706219	0.000011	0.706199	3.29	19.75	0.1007	0.512519	0.000010	0.512512	-2.20	1004	-0.49
16RKZ16-2-01	81	955	0.2453	0.708659	0.000011	0.708624	4.94	29.52	0.1011	0.512463	0.000009	0.512456	-3.29	1093	-0.49
16RKZ16-3	77	1046	0.2126	0.707738	0.000011	0.707708	4.64	27.65	0.1014	0.512440	0.000008	0.512433	-3.74	1130	-0.48
16RKZ16-5	82	1172	0.2015	0.707865	0.000014	0.707836	4.60	27.24	0.1020	0.512437	0.000010	0.512430	-3.80	1134	-0.48
16RKZ17-2	72	1144	0.1810	0.706964	0.000013	0.706938	5.37	30.69	0.1059	0.512245	0.000010	0.512238	-7.55	1439	-0.46
16RKZ17-4	67	1106	0.1758	0.706922	0.000011	0.706897	5.30	30.65	0.1046	0.512261	0.000008	0.512254	-7.24	1414	-0.47
16RKZ18-2	42	1023	0.1180	0.705451	0.000013	0.705434	3.27	18.37	0.1074	0.512569	0.000008	0.512562	-1.23	925	-0.45
16RKZ18-4	44	1204	0.1063	0.705464	0.000011	0.705449	3.58	19.44	0.1114	0.512538	0.000009	0.512531	-1.84	974	-0.43

$^{87}Rb/^{86}Sr$ and $^{147}Sm/^{144}Nd$ are calculated using whole-rock Rb, Sr, Sm and Nd contents in Table 1.

$\varepsilon_{Nd}(t) = [(^{143}Nd/^{144Nd})s / (^{143}Nd/^{144}Nd)_{CHUR} - 1] \times 10000$. $T_{DM} = \ln[(^{143}Nd/^{144}Nd)s - (^{143}Nd/^{144}Nd)_{DM}] /$

$[(^{143}Sm/^{144}Nd)s - (^{147}Sm/^{144}Nd)_{DM}] / \lambda$.

In the calculation, $(^{143}Nd/^{144}Nd)_{CHUR} = 0.512638$, $(^{147}Sm/^{144}Nd)_{CHUR} = 0.1967$, $(^{143}Nd/^{144}Nd)_{DM} = 0.51315$,

$(^{147}Sm/^{144}Nd)_{DM} = 0.2136$ and t = 10 Ma.