GSA Data Repository Item 2017375
Zhou, Q., Liu, Z., Lai, Y., Wang, G.-C., Liao, Z., Li, Y.-X., Wu, J.-Y., Wang, S., and Qing, C.-S., 2017, Petrogenesis of mafic and felsic rocks from the Comei large igneous province, South Tibet: Implications for the initial activity of Kerguelen plume: GSA Bulletin, https://doi.org/10.1130/B31653.1.

DATA REPOSITORY

Table S1. LA-ICP-MS zircon U-Pb dating data of the studied mafic and felsic rocks

APPENDIX A. DESCRIPTIONS OF ANALYTICAL METHODS

Zircon LA-ICP-MS U-Pb dating

We separated zircons from three samples (D707, D155 and D730-4) through conventional heavy liquid and magnetic separation methods, and then handpicked them with a binocular microscope. Representative zircon crystals were prepared and placed on a glass slide and covered with epoxy resin in a cylindrical frame. The surface of this side was polished for further cathodoluminescence (CL) investigations. CL images were obtained using a GATAN MINI probe placed on the JSM 6510 electron microprobe, with an accelerating potential of 10 kV at Beijing GeoAnalysis Co. Ltd., China. LA-ICP-MS U-Pb analyses for these zircons were conducted at the State Key Laboratory for Mineral Deposits Research, Nanjing University (SKLMDR, NJU), determined by an Agilent 7500a ICP-MS equipped with a New Wave Research 213 nm laser ablation system. Analytical procedures are described by Xu et al. (2009) and Jackson et al. (2004) in detail. We corrected mass discrimination of the mass spectrometer and residual elemental fractionation through calibration against a homogeneous standard zircon, GEMOC/GJ-1 (608.53 ± 0.37 Ma, n = 8, 2σ; Jackson et al., 2004). The Mud Tank (TIMS age = 732 ± 5 Ma, n = 5, Black and Gulson, 1978; LA-ICP-MS $^{206}Pb/^{238}U$ age = 732.4 ± 1.4 Ma, n = 359 at 95% confidence, Jackson et al., 2004) were determined as an independent control on reproducibility and instrument stability. We evaluated common Pb contents and corrected common Pb following a method introduced by Andersen (2002).

Major and trace elements, and whole-rock Sr-Nd-Pb isotope analysis

Major element contents were analyzed using XRF on fused glass beads at SKLMDR, NJU, with precision better than 5%. When it comes to analyzing trace elements, for each sample, ~50 mg of powder was dissolved in s screw-top Teflon beaker, mixed with HF/HNO3 mixture acid, and then heated at ~160 °C for 48 h. We determined whole-rock trace element contents through a Finnigan Element II inductively coupled plasma mass spectrometry (ICP-MS) at the State Key Laboratory of Continental Dynamics, Northwest University (SKLCD, NWU), with precision better than 10%. Detailed methods for trace elements analyses are presented in Gao et al. (2003). Result of repeated analyze of the sample (D730-5h) suggests that the errors of the most trace elemental analyses are mainly within 3%.

The Sr-Nd-Pb isotopic ratios were measured using a Finnigan Triton TI thermal ionization mass spectrometer (TIMS) at SKLMDR, NJU. For Sr-Nd isotopic analyses, ~100 mg of powder was dissolved in Teflon beakers with a $HF+HNO_3$ mixture acid, and Sr and Nd were then separated and purified by conventional cation-exchange technique. Detailed analytical procedures are elaborated by Pu et al. (2004, 2005). The mass fractionation corrections about $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ ratios are on the basis of $^{86}Sr/^{88}Sr$ of 0.1194 and $^{146}Nd/^{144}Nd$ of 0.7219, respectively. During the analyses, measurements for the La Jolla standard gave $^{143}Nd/^{144}Nd$ of 0.511842 ± 4 (2σ, n = 5), and for NBS-987 Sr standard gave $^{87}Sr/^{86}Sr$ of 0.710260 ± 10 (2σ, n = 30). Total analytical blanks were 5×10^{-11} g for Sm-Nd and $(2–5) \times 10^{-10}$ g for Rb-Sr.

For Pb isotopic measurement, ~100 mg powder were completely dissolved in ultrapure HNO_3 + HCl. Subsequently, we redissolved the residue in HBr + HNO_3 and then loaded it into a column with 50 Am of AG 1-X8 anionic resin. The extracted Pb was then purified in a second column. ~100 ng Pb was loaded onto single rhenium filaments through the silica-gel technique as described in Gerstenberger and Haase (1997). Results of analytical reproducibility obtained in this study are 0.01% (2σ) for $^{206}Pb/^{204}Pb$, 0.01% for $^{207}Pb/^{204}Pb$ and 0.02% for $^{208}Pb/^{204}Pb$. Mass fractionation corrections were made from runs of the NBS-981 standard according to the value mentioned in Todt et al. (1996), and the error is 0.04%. Measured values for the NBS-981 Pb isotope standard are $^{206}Pb/^{204}Pb$ = 16.893, $^{207}Pb/^{204}Pb$ = 15.432, and $^{208}Pb/^{204}Pb$ = 36.511, respectively.

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Supplementary Table S1 LA-ICP-MS zircon U-Pb dating data of the studied mafic and felsic rocks

Spot	Th(ppm)	U(ppm)	Th/U	$^{207}Pb/^{206}Pb$	±	$^{207}Pb/^{235}U$	±	$^{206}Pb/^{238}U$	±	$^{207}Pb/^{236}Pb$(age/Ma)	±1σ	$^{207}Pb/^{235}U$(age/Ma)	±1σ	$^{206}Pb/^{238}U$(age/Ma)	±1σ
Sample D707 (Rhyodacite)															
1	132	321	0.41	0.0534	0.0019	0.1590	0.0056	0.0216	0.0004	347	51	150	5	138	2
2	118	99	1.19	0.0494	0.0039	0.1468	0.0115	0.0216	0.0005	166	135	139	10	138	3
3	240	125	1.91	0.0505	0.0031	0.1488	0.0091	0.0214	0.0004	217	104	141	8	136	3
4	74	73	1.01	0.0548	0.0045	0.1627	0.0132	0.0216	0.0005	402	142	153	12	137	3
5	54	459	0.12	0.0660	0.0010	1.0123	0.0172	0.1112	0.0015	807	16	710	9	680	9
6	191	126	1.51	0.0523	0.0032	0.1522	0.0092	0.0211	0.0004	298	102	144	8	135	3
7	40	503	0.08	0.0762	0.0015	1.3502	0.0204	0.1285	0.0017	1100	41	868	9	779	10
8	87	226	0.38	0.0527	0.0022	0.1535	0.0062	0.0211	0.0004	314	61	145	5	135	2
9	1754	731	2.40	0.0813	0.0010	2.3698	0.0339	0.2115	0.0028	1228	13	1234	10	1237	15
10	153	94	1.63	0.0500	0.0043	0.1481	0.0124	0.0215	0.0005	195	146	140	11	137	3
11	104	83	1.25	0.0587	0.0047	0.1713	0.0134	0.0212	0.0005	555	130	161	12	135	3
12	435	551	0.79	0.0864	0.0011	2.6776	0.0399	0.2248	0.0030	1347	13	1322	11	1307	16
13	402	251	1.60	0.0769	0.0012	1.9712	0.0331	0.1860	0.0025	1118	15	1106	11	1099	14
14	297	246	1.21	0.1004	0.0015	3.6948	0.0594	0.2671	0.0036	1631	13	1570	13	1526	18
15	300	258	1.16	0.0727	0.0013	1.4715	0.0280	0.1468	0.0020	1005	18	919	11	883	11
16	75	193	0.39	0.0522	0.0024	0.1656	0.0075	0.0230	0.0004	292	72	156	7	147	3
17	114	422	0.27	0.0711	0.0011	1.5681	0.0255	0.1600	0.0021	960	15	958	10	957	12
18	132	267	0.50	0.1169	0.0015	4.4303	0.0652	0.2749	0.0036	1910	12	1718	12	1566	18
19	32	560	0.06	0.0770	0.0011	1.3620	0.0209	0.1284	0.0017	1121	14	873	9	778	10
20	349	347	1.00	0.0554	0.0011	0.5078	0.0100	0.0665	0.0009	427	22	417	7	415	6
21	305	202	1.51	0.0637	0.0012	1.0565	0.0209	0.1203	0.0017	732	21	732	10	732	10
22	115	105	1.10	0.0579	0.0038	0.1722	0.0109	0.0216	0.0004	524	103	161	9	138	3
Sample D155 (Diabase)															
1	72	100	0.72	0.0833	0.0012	2.4824	0.0361	0.2162	0.0031	1276	13	1267	11	1262	16
2	1458	727	2.01	0.0486	0.0057	0.1449	0.0168	0.0216	0.0006	127	209	137	15	138	4
3	63	62	1.01	0.0875	0.0009	2.4316	0.0261	0.2016	0.0028	1372	12	1252	8	1184	15
4	53	65	0.81	0.0784	0.0034	0.7017	0.0294	0.0649	0.0013	1156	52	540	18	406	8
5	118	139	0.85	0.0494	0.0084	0.1569	0.0262	0.0230	0.0008	169	277	148	23	147	5
6	75	101	0.74	0.0624	0.0013	0.9673	0.0198	0.1125	0.0017	686	21	687	10	687	10
7	43	55	0.77	0.0495	0.0042	0.1568	0.0131	0.0230	0.0005	172	149	148	11	146	3
8	415	227	1.83	0.0492	0.0074	0.1667	0.0246	0.0246	0.0007	157	259	157	21	157	4
9	433	236	1.84	0.0479	0.0029	0.1419	0.0083	0.0215	0.0004	96	95	135	7	137	3
10	183	96	1.91	0.0498	0.0050	0.1476	0.0146	0.0215	0.0005	188	181	140	13	137	3
11	119	623	0.19	0.0748	0.0008	1.8295	0.0203	0.1773	0.0024	1064	13	1056	7	1052	13
12	36	33	1.10	0.0513	0.0127	0.1899	0.0466	0.0269	0.0011	253	393	177	40	171	7
13	91	90	1.01	0.0517	0.0047	0.1581	0.0140	0.0222	0.0005	273	161	149	12	141	3
14	239	306	0.78	0.0533	0.0016	0.3860	0.0110	0.0526	0.0009	340	36	331	8	330	5
15	194	97	2.01	0.0493	0.0071	0.1561	0.0219	0.0230	0.0008	161	246	147	19	146	5
16	137	104	1.32	0.0488	0.0043	0.1450	0.0127	0.0216	0.0004	139	158	137	11	137	3
17	117	646	0.18	0.0840	0.0010	1.6187	0.0193	0.1397	0.0020	1293	12	977	7	843	11
18	96	114	0.84	0.0488	0.0045	0.1449	0.0131	0.0216	0.0005	136	162	137	12	137	3
19	281	186	1.51	0.0792	0.0013	1.7922	0.0282	0.1642	0.0024	1176	14	1043	10	980	13
20	854	483	1.77	0.0887	0.0008	2.4936	0.0249	0.2040	0.0029	1397	13	1270	7	1197	15
21	46	36	1.29	0.0702	0.0038	1.5213	0.0787	0.1573	0.0036	933	69	939	32	942	20
22	212	244	0.87	0.0721	0.0012	1.6405	0.0261	0.1651	0.0024	988	14	986	10	985	13
23	83	96	0.86	0.0488	0.0050	0.1457	0.0146	0.0217	0.0005	136	182	138	13	138	3
24	543	277	1.96	0.0785	0.0009	2.1336	0.0249	0.1970	0.0028	1161	13	1160	8	1159	15
Sample D730-4 (Diabase)															
1	205	236	0.87	0.0869	0.0013	2.4659	0.0409	0.2059	0.0029	1358	14	1262	12	1207	15
2	696	317	2.20	0.0729	0.0013	1.4022	0.0275	0.1395	0.0020	1011	19	890	12	842	11
3	250	264	0.95	0.0785	0.0013	1.5248	0.0277	0.1410	0.0020	1158	17	940	11	850	11
4	97	56	1.74	0.0606	0.0064	0.1842	0.0190	0.0221	0.0006	624	178	172	16	141	4
5	301	189	1.59	0.0502	0.0030	0.1489	0.0087	0.0215	0.0004	203	97	141	8	137	3
6	197	257	0.77	0.0821	0.0012	2.4168	0.0395	0.2137	0.0030	1247	14	1248	12	1248	16
7	207	163	1.27	0.0934	0.0016	2.0100	0.0375	0.1562	0.0023	1496	16	1119	13	935	13
8	116	121	0.95	0.0536	0.0038	0.1594	0.0111	0.0216	0.0005	352	118	150	10	138	3
9	66	54	1.22	0.0539	0.0078	0.1636	0.0232	0.0220	0.0008	366	255	154	20	140	5
10	82	264	0.31	0.0546	0.0013	0.4686	0.0113	0.0623	0.0009	394	29	390	8	390	6
11	214	156	1.38	0.0542	0.0019	0.3634	0.0123	0.0486	0.0008	381	47	315	9	306	5
12	116	142	0.81	0.0744	0.0017	1.0470	0.0243	0.1020	0.0016	1053	24	727	12	626	9
13	111	250	0.44	0.0520	0.0027	0.1546	0.0078	0.0216	0.0004	285	80	146	7	138	3
14	79	80	0.98	0.0491	0.0064	0.1503	0.0190	0.0222	0.0007	154	223	142	17	141	4
15	182	436	0.42	0.0766	0.0012	1.4390	0.0245	0.1362	0.0019	1112	15	905	10	823	11
16	95	91	1.04	0.0500	0.0042	0.1492	0.0124	0.0217	0.0005	195	146	141	11	138	3
17	177	100	1.78	0.0487	0.0040	0.1490	0.0122	0.0222	0.0005	132	143	141	11	142	3
18	172	636	0.27	0.0630	0.0010	0.9483	0.0167	0.1091	0.0015	710	17	677	9	668	9
19	94	58	1.62	0.0488	0.0058	0.1462	0.0171	0.0217	0.0006	140	215	139	15	138	3
20	57	67	0.84	0.0480	0.0050	0.1392	0.0143	0.0210	0.0005	101	187	132	13	134	3
21	209	171	1.22	0.0555	0.0030	0.1657	0.0088	0.0217	0.0004	431	84	156	8	138	3
22	112	56	2.00	0.0758	0.0019	1.9447	0.0487	0.1860	0.0029	1091	26	1097	17	1100	16
23	128	129	0.99	0.0547	0.0034	0.1623	0.0100	0.0215	0.0004	399	102	153	9	137	3
24	54	48	1.12	0.0490	0.0077	0.1505	0.0233	0.0223	0.0007	150	267	142	21	142	4

For LA-ICP-MS zircon U-Pb dating, errors are reported at 1σ level for individual data; Common ^{206}Pb was corrected using non-radiogenic ^{204}Pb.