

Supplementary data

Table A1 Representative mineral compositions for mafic granulite samples

Samples	AQ10-4-4.1									AQ10-4-2.3							
Mineral	Gr-t-c	Gr-t-m	Gr-t-r	Pl-in	Pl	Pl	Cpx	Opx	Amp-in	AmpI	AmpII	Gr-t-c	Gr-t-r	Pl	Cpx	AmpI	AmpII
SiO ₂	37.83	38.01	37.78	61.533	62.12	52.33	51.47	48.95	45.09	42.82	47.76	37.79	38.19	62.08	51.22	42.12	45.09
TiO ₂	0.00	0.00	0.00	0.06	0.04	0.03	0.11	0.00	1.00	1.92	0.58	0.00	0.00	0.09	0.16	1.63	0.99
Al ₂ O ₃	21.10	21.28	21.28	23.80	23.59	29.83	2.13	0.32	9.62	12.03	7.59	20.58	20.37	23.77	2.16	11.63	9.62
Cr ₂ O ₃	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.03	0.00	0.00
FeO	29.83	27.85	29.07	0.03	0.05	0.33	12.45	32.91	18.48	19.98	18.12	28.27	28.97	0.15	13.21	19.60	18.48
MnO	1.39	0.88	1.09	0.00	0.00	0.00	0.15	0.56	0.12	0.13	0.10	0.82	1.01	0.01	0.12	0.12	0.12
MgO	3.68	4.61	4.02	0.00	0.00	0.00	11.60	16.41	9.34	9.29	11.78	3.84	3.22	0.02	10.64	7.86	9.34
CaO	7.21	8.19	7.76	4.81	4.16	11.49	21.16	0.39	11.39	10.86	11.24	8.62	8.64	5.39	22.09	11.21	11.38
Na ₂ O	0.02	0.03	0.00	9.38	9.28	4.79	0.68	0.00	1.14	1.93	1.16	0.03	0.02	7.89	0.77	1.39	1.14
K ₂ O	0.00	0.00	0.00	0.29	0.22	0.10	0.02	0.00	0.82	1.08	0.50	0.00	0.00	0.34	0.00	1.27	0.82
Totals	100.99	100.85	101.00	99.91	99.47	98.90	99.77	100.07	97.00	100.04	98.84	100.04	100.56	99.77	100.71	96.99	97.16
O	12.0	12.0	12.0	8.0	8.0	8.0	6.0	6.0	23.0	23.0	23.0	12.0	12.0	8.0	6.0	23.0	23.0
Si	2.960	2.958	2.951	2.741	2.766	2.394	1.944	1.916	6.784	6.307	6.961	2.984	3.013	2.756	1.931	6.448	6.794
Ti	0.000	0.000	0.000	0.002	0.001	0.001	0.003	0.000	0.129	0.213	0.064	0.000	0.000	0.003	0.005	0.188	0.112
Al	1.946	1.951	1.960	1.250	1.238	1.609	0.095	0.015	1.706	2.089	1.304	1.916	1.895	1.244	0.096	2.099	1.709
Cr	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.000
Fe ³⁺	0.137	0.139	0.138	0.001	0.002	0.013	0.062	0.153	0.194	0.437	0.498	0.120	0.081	0.006	0.088	0.186	0.199
Fe ²⁺	1.815	1.673	1.762	0.000	0.000	0.000	0.331	0.924	2.132	2.024	1.711	1.739	1.831	0.000	0.329	2.324	2.129
Mn	0.105	0.058	0.072	0.000	0.000	0.000	0.005	0.019	0.015	0.016	0.012	0.055	0.068	0.000	0.004	0.016	0.015
Mg	0.429	0.534	0.468	0.000	0.000	0.000	0.653	0.957	2.094	2.039	2.559	0.452	0.379	0.001	0.598	1.793	2.097
Ca	0.604	0.683	0.650	0.223	0.198	0.563	0.856	0.016	1.836	1.714	1.755	0.729	0.731	0.256	0.893	1.839	1.837
Na	0.003	0.005	0.000	0.810	0.801	0.425	0.050	0.000	0.333	0.551	0.328	0.005	0.003	0.679	0.056	0.413	0.333
K	0.000	0.000	0.000	0.016	0.013	0.006	0.001	0.000	0.158	0.203	0.093	0.000	0.000	0.019	0.000	0.248	0.158
Sum	8.000	8.000	8.000	5.045	5.020	5.010	4.000	4.000	15.382	15.594	15.285	8.000	8.000	4.965	4.000	15.553	15.385

Notes: Gr-t-c: garnet core; Gr-t-m: garnet mantle; Gr-t-r: garnet rim; Amp-in, amphibole inclusion in garnet core. AmpI: brown amphibole, AmpII: green amphibole around AmpI. Mineral compositions were analyzed at the Institute of Geology and Mineral Resources, Chinese Academy of Geological Sciences (Beijing), using a JXA8800 electron microprobe with a 20 keV accelerating voltage, 20 nA beam current, a 2 μm beam diameter and counting time of 100 s.

Table A2 Results for peak P–T estimation using the multi-equilibrium approach. Multi-equilibrium calculations were realized with the mode “Average-P–T” of THERMOCALC 3.1 (Powell et al., 1998). Average pressures, temperatures and corresponding uncertainties ($\pm 1 \sigma$) are derived from the independent set of equilibria.

Independent set of reactions	Results
1) Cats + Qtz = An	T=858 \pm 109°C, P=11.6 \pm 1.8kbar Cor=0.622, sight=0.65
2) Prp + 2Grs + 3Qtz = 3An + 3Di	
3) 2Grs + Alm + 3Qtz = 3An + 3Hed	
4) Prp + 3Hed = Alm + 3Di	

Table A3 LA-MC-ICPMS U-Pb analytical data for zircon from mafic granulite samples

Spots	Pb ppm	U ppm	Th/U	$^{207}\text{Pb}/^{235}\text{U}$	1 σ	$^{206}\text{Pb}/^{238}\text{U}$	1 σ	$^{207}\text{Pb}/^{206}\text{Pb}$	1 σ	$^{206}\text{Pb}/^{238}\text{U}$ (Ma)	1 σ	$^{207}\text{Pb}/^{235}\text{U}$ (Ma)	1 σ	$^{207}\text{Pb}/^{206}\text{Pb}$ (Ma)	1 σ
AQ10-4-4.1															
1	33	142	0.51	3.0970	0.0529	0.2178	0.0027	0.1031	0.0014	1270	16	1432	24	1681	26
2	58	179	0.66	4.4099	0.0780	0.2904	0.0033	0.1101	0.0017	1644	19	1714	30	1801	28
3	60	191	0.69	4.2868	0.0594	0.2855	0.0038	0.1089	0.0010	1619	21	1691	23	1781	17
4	62	183	0.67	4.6547	0.0673	0.3041	0.0047	0.1110	0.0008	1712	27	1759	25	1816	14
5	53	385	0.89	1.4187	0.0253	0.1192	0.0015	0.0863	0.0012	726	9	897	16	1345	28
6	67	217	0.53	4.3156	0.0546	0.2875	0.0035	0.1089	0.0009	1629	20	1696	21	1781	15
7	72	231	0.53	4.3360	0.0443	0.2865	0.0030	0.1098	0.0007	1624	17	1700	17	1796	11
8	69	222	0.67	4.2186	0.0509	0.2781	0.0030	0.1100	0.0009	1582	17	1678	20	1800	15
9	78	239	0.70	4.4507	0.0482	0.2910	0.0029	0.1109	0.0008	1647	17	1722	19	1814	13
10	100	302	0.71	4.4672	0.0484	0.2940	0.0035	0.1102	0.0006	1661	20	1725	19	1803	10
11	63	213	0.50	4.1680	0.0383	0.2726	0.0018	0.1109	0.0008	1554	10	1668	15	1814	14
12	55	177	0.59	4.2663	0.0584	0.2822	0.0038	0.1096	0.0009	1603	21	1687	23	1793	15
13	74	237	0.95	3.9104	0.0567	0.2602	0.0038	0.1090	0.0010	1491	22	1616	23	1783	16
14	82	274	0.48	4.1747	0.0248	0.2765	0.0018	0.1095	0.0007	1574	10	1669	10	1791	12

15	100	294	0.60	4.6661	0.0323	0.3046	0.0027	0.1111	0.0009	1714	15	1761	12	1818	14
16	49	147	1.91	3.3377	0.0456	0.2287	0.0014	0.1058	0.0013	1328	8	1490	20	1729	23
17	185	585	0.61	4.2419	0.0260	0.2823	0.0019	0.1090	0.0003	1603	11	1682	10	1783	4
18	79	420	0.60	2.3132	0.0319	0.1694	0.0022	0.0990	0.0009	1009	13	1216	17	1606	16
19	77	240	0.52	4.4756	0.0394	0.2919	0.0019	0.1112	0.0008	1651	11	1726	15	1819	13
20	59	194	0.51	4.2173	0.0417	0.2735	0.0017	0.1119	0.0009	1558	10	1677	17	1830	15
21	66	234	0.60	3.7770	0.0369	0.2509	0.0019	0.1092	0.0008	1443	11	1588	16	1786	14
22	62	224	0.43	3.8838	0.0399	0.2557	0.0021	0.1102	0.0008	1468	12	1610	17	1802	14
23	119	365	0.63	4.4304	0.0294	0.2880	0.0018	0.1116	0.0005	1632	10	1718	11	1825	8
24	79	284	0.46	3.8288	0.0476	0.2539	0.0033	0.1094	0.0007	1458	19	1599	20	1789	12
25	87	286	0.59	4.1481	0.0356	0.2723	0.0022	0.1105	0.0006	1553	13	1664	14	1807	10
26	111	341	0.61	4.4217	0.0238	0.2887	0.0027	0.1111	0.0007	1635	15	1716	9	1817	12
27	102	496	0.59	2.5901	0.0155	0.1851	0.0017	0.1015	0.0007	1095	10	1298	8	1651	13
28	55	195	0.59	3.8025	0.0475	0.2536	0.0027	0.1087	0.0010	1457	15	1593	20	1778	17
29	79	245	0.65	4.4686	0.0346	0.2904	0.0021	0.1116	0.0006	1644	12	1725	13	1826	9
30	108	439	0.49	3.3324	0.0273	0.2286	0.0018	0.1057	0.0006	1327	10	1489	12	1727	10
31	33	206	0.71	1.9148	0.0304	0.1442	0.0016	0.0963	0.0013	868	10	1086	17	1554	24
32	105	329	0.77	4.2762	0.0519	0.2835	0.0039	0.1094	0.0005	1609	22	1689	20	1790	8
33	56	164	0.69	4.6905	0.0621	0.3061	0.0043	0.1111	0.0007	1721	24	1766	23	1818	12
34	71	259	0.63	3.7217	0.0343	0.2488	0.0023	0.1085	0.0006	1432	13	1576	15	1774	10
35	95	281	0.79	4.6076	0.0553	0.2992	0.0043	0.1117	0.0003	1687	24	1751	21	1827	5
36	127	369	0.96	4.5519	0.0499	0.2977	0.0038	0.1109	0.0004	1680	21	1741	19	1814	7
37	44	137	0.65	4.4727	0.0562	0.2918	0.0035	0.1112	0.0009	1650	20	1726	22	1819	14
38	64	194	0.73	4.5155	0.0586	0.2965	0.0039	0.1105	0.0008	1674	22	1734	22	1807	13
39	54	258	0.50	2.7998	0.0407	0.1963	0.0017	0.1035	0.0013	1155	10	1355	20	1687	23
40	48	163	0.83	3.8850	0.0412	0.2573	0.0023	0.1095	0.0008	1476	13	1611	17	1792	14
41	44	128	0.52	4.5888	0.0395	0.3025	0.0025	0.1100	0.0002	1704	12	1747	7	1811	5
42	95	250	0.92	3.7272	0.0331	0.2508	0.0022	0.1078	0.0002	1443	11	1577	7	1763	2
43	74	190	0.69	4.6108	0.0371	0.3011	0.0025	0.1111	0.0002	1697	12	1751	7	1818	3
44	98	258	0.92	3.7014	0.0379	0.2497	0.0025	0.1075	0.0002	1437	13	1572	8	1758	4

45	102	241	0.77	4.6897	0.0321	0.3068	0.0020	0.1109	0.0002	1725	10	1765	6	1814	4
46	74	220	0.52	4.5346	0.0255	0.2958	0.0017	0.1112	0.0002	1670	8	1737	5	1820	8
47	79	205	0.66	4.6516	0.0316	0.3041	0.0020	0.1110	0.0002	1712	10	1759	6	1817	4
48	82	240	0.73	3.8324	0.0158	0.2585	0.0008	0.1075	0.0002	1482	4	1600	3	1758	4
49	44	147	0.69	3.3938	0.0150	0.2342	0.0009	0.1051	0.0003	1357	5	1503	3	1717	-1
50	56	164	0.50	4.6891	0.0316	0.3058	0.0020	0.1112	0.0003	1720	10	1765	6	1820	4
51	88	207	0.81	4.6164	0.0154	0.3000	0.0008	0.1116	0.0002	1691	4	1752	3	1826	5
52	14	95	0.57	1.4640	0.0099	0.1228	0.0005	0.0865	0.0005	747	3	916	4	1350	10
53	80	201	0.77	4.4228	0.0305	0.2891	0.0017	0.1109	0.0002	1637	8	1717	6	1815	4
54	65	216	0.69	3.2442	0.0125	0.2238	0.0007	0.1051	0.0002	1302	4	1468	3	1717	4
55	53	142	0.63	4.7233	0.0172	0.3066	0.0009	0.1117	0.0002	1724	5	1771	3	1828	4
56	45	156	0.56	3.7358	0.0246	0.2515	0.0015	0.1077	0.0003	1446	8	1579	5	1761	-1
57	78	194	0.72	4.6199	0.0171	0.3013	0.0010	0.1112	0.0002	1698	5	1753	3	1820	8
58	96	338	0.28	4.6351	0.0365	0.3042	0.0023	0.1105	0.0003	1712	11	1756	7	1809	5
59	41	108	0.62	4.7389	0.0229	0.3101	0.0014	0.1109	0.0003	1741	7	1774	4	1813	4
60	23	159	0.43	1.7932	0.0115	0.1417	0.0006	0.0917	0.0004	855	4	1043	4	1461	7
61	48	147	0.69	3.6804	0.0185	0.2493	0.0012	0.1071	0.0002	1435	6	1567	4	1750	4
62	56	146	0.67	4.4794	0.0211	0.2952	0.0013	0.1100	0.0002	1668	6	1727	4	1811	4
63	42	117	0.54	4.5336	0.0227	0.2997	0.0014	0.1097	0.0002	1690	7	1737	4	1794	4
64	67	200	0.66	3.8552	0.0162	0.2587	0.0011	0.1081	0.0002	1483	5	1604	3	1769	4
65	27	144	0.60	1.7398	0.0111	0.1392	0.0007	0.0906	0.0003	840	4	1023	4	1439	12
66	84	218	0.67	4.5599	0.0220	0.2978	0.0012	0.1110	0.0002	1681	6	1742	4	1817	4
67	53	172	0.66	3.4091	0.0205	0.2367	0.0013	0.1045	0.0002	1369	7	1506	5	1706	4
68	58	149	0.66	4.6361	0.0227	0.3014	0.0013	0.1116	0.0003	1698	7	1756	4	1825	4
AQ10-4-2.3															
1	55	190	0.34	4.1494	0.0776	0.2785	0.0038	0.1081	0.0011	1584	22	1664	31	1767	18
2	209	724	0.32	4.0536	0.0461	0.2792	0.0019	0.1053	0.0009	1587	11	1645	19	1720	16
3	87	258	0.77	4.4401	0.0534	0.2962	0.0029	0.1087	0.0005	1672	17	1720	21	1778	9
4	56	194	0.31	4.1291	0.0508	0.2787	0.0016	0.1075	0.0011	1585	9	1660	20	1757	19
5	171	643	0.48	3.5495	0.0553	0.2481	0.0030	0.1038	0.0008	1429	17	1538	24	1693	14

6	138	479	0.28	4.1335	0.0529	0.2806	0.0023	0.1068	0.0007	1594	13	1661	21	1746	12
7	60	167	0.60	4.9271	0.0602	0.3238	0.0024	0.1103	0.0012	1808	13	1807	22	1805	19
8	203	649	0.47	4.3477	0.0633	0.2921	0.0030	0.1079	0.0005	1652	17	1702	25	1765	9
9	72	236	0.19	4.6126	0.0694	0.3029	0.0041	0.1105	0.0011	1705	23	1752	26	1807	18
10	44	150	0.27	4.3141	0.0644	0.2853	0.0029	0.1097	0.0013	1618	16	1696	25	1794	22
11	43	192	0.28	3.1258	0.0823	0.2175	0.0041	0.1042	0.0015	1269	24	1439	38	1701	27
12	56	174	0.31	4.7722	0.0530	0.3106	0.0030	0.1114	0.0009	1744	17	1780	20	1823	14
13	46	157	0.30	4.2718	0.0625	0.2831	0.0033	0.1094	0.0012	1607	19	1688	25	1790	20
14	50	154	0.30	4.8043	0.0554	0.3128	0.0030	0.1114	0.0009	1754	17	1786	21	1822	15
15	40	143	0.34	4.1256	0.0663	0.2726	0.0037	0.1098	0.0013	1554	21	1659	27	1795	21
16	152	431	0.48	5.1367	0.0770	0.3278	0.0062	0.1137	0.0018	1828	34	1842	28	1859	29
17	95	276	0.75	4.5934	0.0531	0.3024	0.0039	0.1102	0.0005	1703	22	1748	20	1802	9
18	57	185	0.43	4.3840	0.1447	0.2864	0.0040	0.1110	0.0025	1624	23	1709	56	1816	42
19	150	496	0.46	4.1881	0.0469	0.2850	0.0036	0.1066	0.0004	1616	21	1672	19	1742	7
20	49	152	0.32	4.7103	0.0676	0.3106	0.0037	0.1100	0.0011	1743	21	1769	25	1799	19
21	65	230	0.87	3.4055	0.0844	0.2392	0.0026	0.1033	0.0017	1383	15	1506	37	1683	30
22	71	203	0.74	4.6928	0.0698	0.3077	0.0037	0.1106	0.0012	1730	21	1766	26	1809	20
23	185	726	0.57	3.2175	0.0362	0.2326	0.0029	0.1003	0.0004	1348	17	1461	16	1630	8
24	46	147	0.45	4.3197	0.0803	0.2919	0.0048	0.1073	0.0013	1651	27	1697	32	1755	23
25	133	431	0.47	4.2083	0.0457	0.2859	0.0036	0.1068	0.0003	1621	21	1676	18	1745	5
26	39	128	0.32	4.3520	0.0642	0.2904	0.0040	0.1087	0.0010	1644	23	1703	25	1778	17
27	54	165	0.41	4.7171	0.0433	0.3101	0.0032	0.1103	0.0010	1741	18	1770	16	1805	16
28	65	238	0.37	3.8052	0.0343	0.2570	0.0023	0.1074	0.0008	1474	13	1594	14	1755	14
29	58	175	0.82	4.2539	0.0659	0.2860	0.0040	0.1079	0.0011	1622	23	1684	26	1764	19
30	163	517	0.47	4.3705	0.0486	0.2931	0.0038	0.1082	0.0002	1657	22	1707	19	1769	4
31	197	647	0.42	4.2296	0.0655	0.2869	0.0047	0.1069	0.0008	1626	27	1680	26	1748	13
32	61	209	0.54	4.1253	0.0541	0.2703	0.0027	0.1107	0.0008	1542	15	1659	22	1811	13
33	204	672	0.35	4.5825	0.0873	0.2910	0.0045	0.1142	0.0005	1646	26	1746	33	1868	8
34	148	497	0.44	4.1637	0.0464	0.2802	0.0034	0.1078	0.0005	1593	19	1667	19	1762	9
35	45	163	0.18	4.1135	0.0488	0.2749	0.0021	0.1085	0.0011	1566	12	1657	20	1775	18

36	49	161	0.47	4.2558	0.0588	0.2854	0.0031	0.1082	0.0011	1618	17	1685	23	1769	19
37	44	146	0.30	4.3957	0.0525	0.2920	0.0025	0.1092	0.0010	1652	14	1712	20	1786	17
38	133	470	0.47	3.9141	0.0354	0.2657	0.0018	0.1068	0.0005	1519	10	1617	15	1746	9
39	31	91	0.24	4.5490	0.0222	0.2966	0.0012	0.1112	0.0004	1675	6	1740	4	1820	6
40	21	83	0.32	3.8920	0.0177	0.2604	0.0010	0.1084	0.0003	1492	5	1612	4	1773	10
41	48	122	0.78	3.5811	0.0149	0.2470	0.0009	0.1051	0.0003	1423	4	1545	3	1717	0
42	167	687	0.56	2.8887	0.0118	0.2045	0.0008	0.1024	0.0002	1200	4	1379	3	1669	3
43	22	83	0.29	4.6697	0.0329	0.3058	0.0012	0.1107	0.0006	1720	6	1762	6	1813	9
44	46	144	0.43	4.6215	0.0186	0.3011	0.0011	0.1113	0.0003	1697	5	1753	3	1821	4
45	221	595	0.60	4.5243	0.0180	0.2949	0.0011	0.1113	0.0002	1666	5	1735	3	1820	4
46	92	339	0.43	3.7134	0.0167	0.2509	0.0010	0.1074	0.0002	1443	5	1574	4	1755	4
47	14	70	0.45	2.5085	0.0172	0.1855	0.0009	0.0981	0.0005	1097	5	1274	5	1589	5
48	20	70	0.28	4.9144	0.0303	0.3188	0.0016	0.1119	0.0005	1784	8	1805	5	1831	8
49	65	230	0.30	4.5999	0.0189	0.2991	0.0011	0.1115	0.0002	1687	6	1749	3	1825	4
50	22	72	0.27	4.7701	0.0264	0.3106	0.0013	0.1114	0.0004	1744	6	1780	5	1822	6
51	95	330	0.34	4.4101	0.0181	0.2883	0.0010	0.1110	0.0002	1633	5	1714	3	1817	4
52	21	73	0.32	4.2439	0.0240	0.2786	0.0011	0.1105	0.0004	1584	6	1683	5	1807	1
53	95	389	0.21	4.3599	0.0185	0.2861	0.0011	0.1105	0.0002	1622	6	1705	3	1809	4
54	69	278	0.30	3.9134	0.0182	0.2622	0.0011	0.1082	0.0002	1501	6	1616	4	1770	5
55	9	52	0.25	3.0826	0.0210	0.2196	0.0012	0.1018	0.0004	1280	6	1428	5	1657	7
56	113	337	0.44	4.6536	0.0203	0.3020	0.0012	0.1118	0.0002	1701	6	1759	4	1829	3
57	20	69	0.27	4.5103	0.0211	0.2983	0.0012	0.1097	0.0003	1683	6	1733	4	1794	6
58	23	79	0.27	4.8671	0.0270	0.3186	0.0014	0.1108	0.0004	1783	7	1797	5	1813	6
59	35	85	0.65	4.7520	0.0290	0.3084	0.0016	0.1117	0.0003	1733	8	1776	5	1828	6
60	18	78	0.28	3.5407	0.0224	0.2431	0.0012	0.1056	0.0004	1403	6	1536	5	1725	7
61	25	83	0.26	4.7708	0.0247	0.3142	0.0013	0.1101	0.0004	1762	6	1780	4	1811	6
62	21	72	0.25	4.7456	0.0348	0.3101	0.0015	0.1109	0.0006	1741	7	1775	6	1817	9
63	23	77	0.29	5.0445	0.0270	0.3281	0.0015	0.1115	0.0003	1829	7	1827	5	1824	4

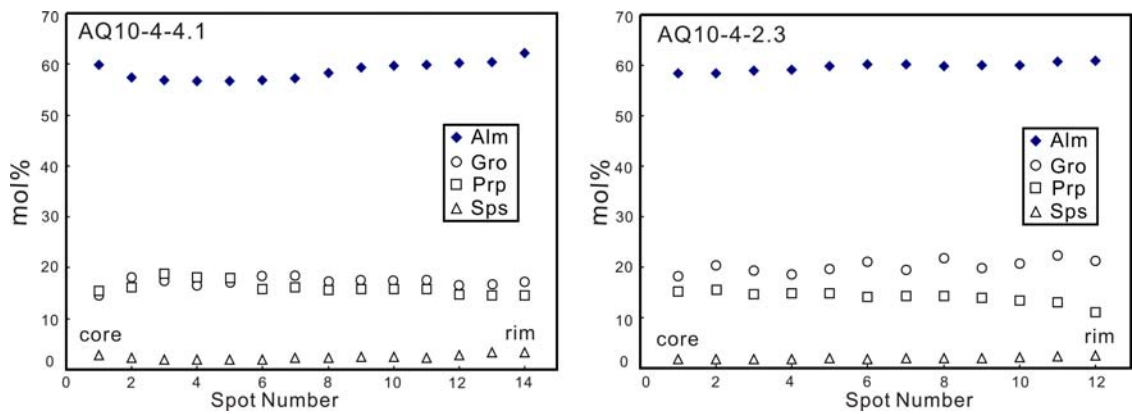


Fig. A1 Analyzed garnet compositional zoning profiles for mafic granulite

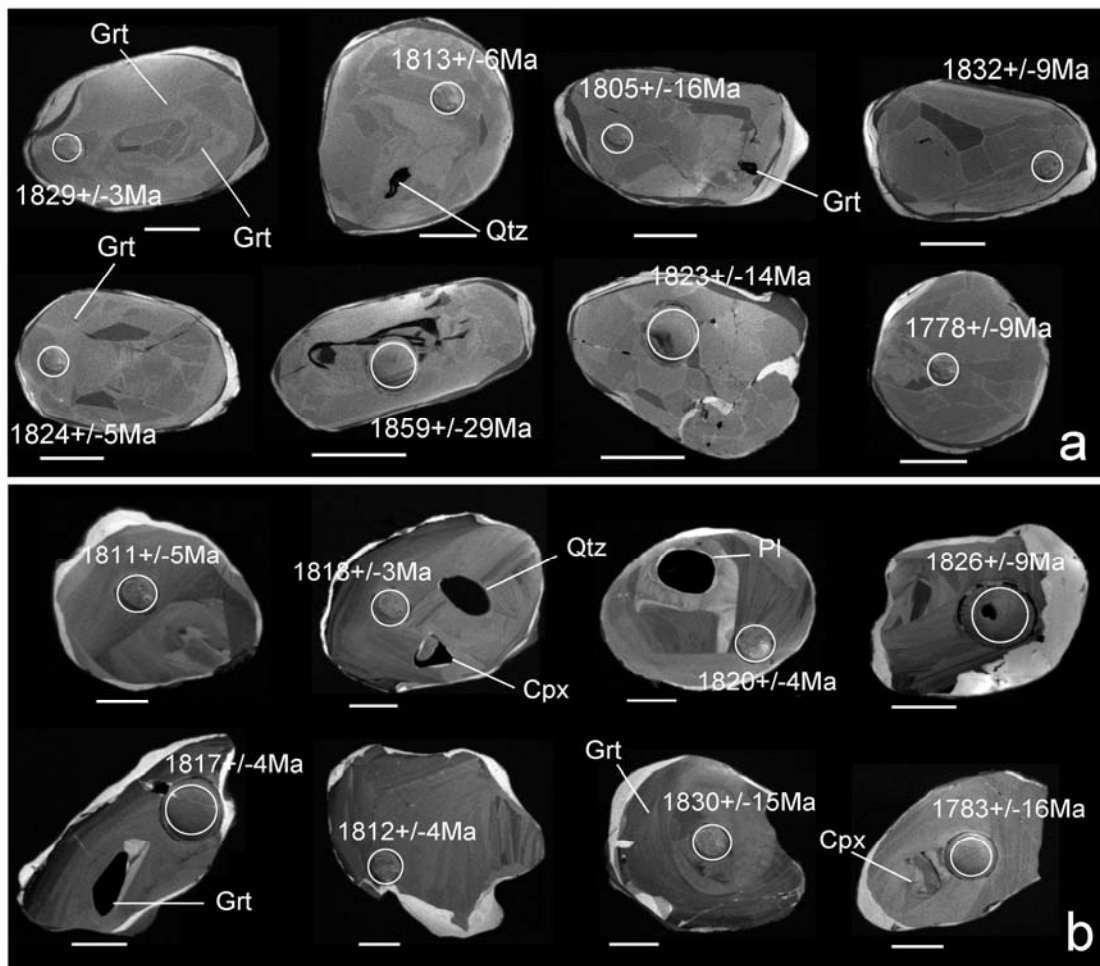


Fig. A2 Representative selection of CL zircon images from mafic granulites AQ10-4-2.3

(a) and AQ10-4-4.1 (b). Open circles show locations of LA-ICPMS analyses, and each spot is labeled with its individual $^{207}\text{Pb}/^{206}\text{Pb}$ ages. Mineral inclusions were identified by Laser Raman spectrophotometry, most of them are under zircon surface. A few mineral inclusions polished to the surface were analyzed by EDS. Scale is 50 μm .

Coordinates for mineral abbreviations:

Grt-garnet, Cpx-clinopyroxene, Opx-orthopyroxene, Pl-plagioclase, Qtz-quartz, Prp-pyrope, Alm-almandine, Sps- spessartine

Analytical Procedures

Zircon grains were mechanically separated from an approximately 5-10-kg sample by crushing and sieving followed by standard magnetic, heavy-liquid and hand-picking methods. The zircons were mounted in epoxy resin and were polished to expose the cores of the grains for Cathodoluminescence (CL) and U-Pb analyses. Prior to analysis, the mineral inclusions in zircons were identified by Laser Raman spectrophotometry. The U-Pb analyses were performed at the Institute of Mineral Resources, CAGS using the LA-MC-ICP-MS facility. Laser sampling was performed using a Newwave UP 213 laser ablation system. All analyses were carried out with a beam diameter of 25 μm at a 10-Hz repetition rate and an energy of 2.5J/cm². A Thermo Finnigan Neptune MC-ICP-MS instrument was used to acquire ion-signal intensities. Standards GJ1 and M127 were used during our analyses and were analysed twice every 5-10 analyses (Jackson et al., 2004; Nasdala et al., 2008). Data were evaluated by ICPMSDataCal 3.4 (Liu *et al.*, 2010). Concordia diagrams and age calculations were made using Isoplot/Ex ver3.0. Detailed operating conditions for the laser ablation system and the MC-ICP-MS instrument and data reduction are the same as those described by Hou *et al.* (2009).

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Coordinates for mineral abbreviations:

Grt-garnet, Cpx-clinopyroxene, Opx-orthopyroxene, Pl-plagioclase, Amphibole-Amp,
Qtz-quartz, Bt-biotite, Prp-pyrope, Alm-almandine, Sps-spessartine