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Supplemental Material

Table S1. EPMA data of minerals compositions for garnet amphibolite.

Table S2. Zircon U-Pb SHRIMP data for garnet amphibolite T0526.

Table S3. Major and trace element compositions of garnet amphibolites.

Table S1. EPMA data of minerals compositions for garnet amphibolite.

Garnet										
	T0527-1-1	T0527-1-2	T0527-1-3	T0527-1-4	T0527-1-5	T0527-1-6	T0527-1-7	T0527-1-8	T0527-1-9	T0527-1-10
SiO ₂	37.76	37.49	37.44	37.17	37.58	37.01	37.03	37.94	37.79	37.34
TiO ₂	0.01	0.03	0.04	0.04	0.00	0.04	0.02	0.02	0.04	0.04
Al ₂ O ₃	21.36	21.47	21.33	20.97	21.22	21.27	21.12	21.25	21.35	21.17
Cr ₂ O ₃	0.00	0.01	0.00	0.04	0.03	0.00	0.01	0.01	0.01	0.00
FeO	23.13	23.34	24.36	22.04	23.62	23.07	23.31	22.93	23.38	22.15
MnO	2.24	2.67	2.41	2.65	3.01	2.60	2.34	2.44	2.12	4.45
MgO	2.10	2.41	2.32	2.10	2.13	2.15	2.25	2.19	2.16	1.49
CaO	13.82	13.19	12.47	13.88	12.45	13.43	13.50	13.86	13.89	13.40
Na ₂ O	0.01	0.00	0.02	0.02	0.00	0.05	0.00	0.02	0.00	0.00
K ₂ O	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.02	0.00
Total	100.44	100.62	100.39	98.93	100.05	99.69	99.60	100.67	100.83	100.02
Si	2.96	2.93	2.94	2.95	2.96	2.92	2.93	2.96	2.95	2.95
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	1.97	1.98	1.97	1.96	1.97	1.98	1.97	1.96	1.97	1.97
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe ³⁺	0.11	0.16	0.15	0.13	0.10	0.18	0.18	0.12	0.13	0.12
Fe ²⁺	1.40	1.37	1.46	1.34	1.46	1.35	1.36	1.38	1.40	1.35
Mn	0.15	0.18	0.16	0.18	0.20	0.17	0.16	0.16	0.14	0.30
Mg	0.25	0.28	0.27	0.25	0.25	0.25	0.27	0.26	0.25	0.18
Ca	1.16	1.11	1.05	1.18	1.05	1.14	1.14	1.16	1.16	1.14
Na	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
K	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Py	0.08	0.10	0.09	0.08	0.08	0.09	0.09	0.09	0.09	0.06
Alm	0.47	0.47	0.50	0.45	0.49	0.46	0.46	0.47	0.47	0.46
Gross	0.39	0.38	0.36	0.40	0.36	0.39	0.39	0.39	0.39	0.38
Spess	0.05	0.06	0.05	0.06	0.07	0.06	0.05	0.05	0.05	0.10
Zoisite					Amphibolite					
	T0527-1-11	T0527-1-12	T0527-1-13	T0527-1-30	T0527-1-31	T0527-1-46	T0527-1-47	T0527-1-48	T0527-1-49	T0527-1-50
SiO ₂	39.32	39.35	40.12	39.98	40.62	43.39	46.71	44.57	46.72	45.38
TiO ₂	0.01	0.00	0.01	0.03	0.00	0.08	0.03	0.06	0.08	0.07
Al ₂ O ₃	32.18	32.29	32.15	32.28	31.80	11.51	9.30	12.24	9.26	10.39
Cr ₂ O ₃	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01
FeO	1.82	1.92	2.03	1.35	1.80	18.00	16.99	17.57	17.44	18.07
MnO	0.08	0.11	0.02	0.06	0.08	0.29	0.30	0.26	0.28	0.26
MgO	0.01	0.04	0.02	0.02	0.06	8.93	10.19	9.19	9.69	9.32
CaO	25.04	24.97	25.04	25.18	25.00	12.19	11.98	12.25	12.44	12.04
Na ₂ O	0.01	0.00	0.00	0.00	0.00	1.27	1.01	1.42	0.86	0.91
K ₂ O	0.01	0.00	0.00	0.01	0.01	0.48	0.31	0.42	0.36	0.45

Total	98.48	98.69	99.48	98.94	99.40	96.16	96.84	98.06	97.16	96.97
O	12.50	12.50	12.50	12.50	12.50	23.00	23.00	23.00	23.00	23.00
Si	3.00	2.99	3.02	3.02	3.06	6.59	6.97	6.62	6.99	6.80
Ti	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
Al	2.89	2.89	2.85	2.88	2.82	2.06	1.64	2.14	1.63	1.84
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe ³⁺	0.02	0.05	0.06	0.00	0.00	0.29	0.15	0.16	0.07	0.26
Fe ²⁺	0.10	0.07	0.07	0.09	0.11	2.00	1.97	2.02	2.11	2.01
Mn	0.01	0.01	0.00	0.00	0.01	0.04	0.04	0.03	0.04	0.03
Mg	0.00	0.01	0.00	0.00	0.01	2.02	2.27	2.04	2.16	2.08
Ca	2.04	2.03	2.02	2.04	2.02	1.98	1.92	1.95	1.99	1.93
Na	0.00	0.00	0.00	0.00	0.00	0.37	0.29	0.41	0.25	0.27
K	0.00	0.00	0.00	0.00	0.00	0.09	0.06	0.08	0.07	0.09
Sum	8.05	8.05	8.03	8.04	8.03	15.56	15.36	15.52	15.34	15.40
Plagioclase										
	T0527-1-24	T0527-1-25	T0527-1-26	T0527-1-32	T0527-1-33	T0527-1-34	T0527-1-44	T0527-1-45		
SiO ₂	58.47	57.70	58.18	58.29	57.97	58.07	60.62	60.70		
TiO ₂	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00		
Al ₂ O ₃	26.01	25.97	25.64	26.23	26.42	26.31	24.69	24.51		
Cr ₂ O ₃	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04		
FeO	0.28	0.25	0.11	0.13	0.06	0.07	0.01	0.11		
MnO	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.00		
MgO	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00		
CaO	8.33	8.42	8.15	8.49	8.92	8.80	7.09	6.60		
Na ₂ O	6.99	7.01	7.11	7.09	6.73	6.92	7.71	8.02		
K ₂ O	0.10	0.12	0.12	0.08	0.08	0.09	0.14	0.15		
Total	100.28	99.49	99.36	100.31	100.24	100.31	100.28	100.14		
O	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00		
Si	2.61	2.60	2.62	2.60	2.59	2.60	2.69	2.70		
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Al	1.37	1.38	1.36	1.38	1.39	1.39	1.29	1.29		
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Fe ³⁺	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00		
Fe ²⁺	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Mn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Mg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Ca	0.40	0.41	0.39	0.41	0.43	0.42	0.34	0.32		
Na	0.61	0.61	0.62	0.61	0.58	0.60	0.66	0.69		
K	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
Sum	5.00	5.02	5.01	5.01	5.00	5.01	5.00	5.01		
An	0.40	0.40	0.39	0.40	0.42	0.41	0.34	0.31		

Table S2. Zircon U-Pb SHRIMP data for garnet amphibolite T0526.

Spot		% ²⁰⁶ Pb	U ppm	Th ppm	²³² Th / ²³⁸ U	²⁰⁷ Pb* / ²⁰⁶ Pb	±%	²⁰⁷ Pb* / ²³⁵ U	±%	²⁰⁶ Pb* / ²³⁸ U	±%	err corr	²⁰⁶ Pb/ ²³⁸ U Age	²⁰⁷ Pb/ ²³⁵ U Age
T0526-1.1	M	0.81	719	61	0.088	0.04520	15.0	0.06430	15.0	0.01031	2.7	0.183	66.2	63.3
T0526-1.2	C	0.03	534	360	0.697	0.05100	5.5	0.20900	5.9	0.02977	2.3	0.381	189.1	192.7
T0526-2.1	M	1.15	216	161	0.770	0.04570	11.0	0.17000	12.0	0.02708	2.5	0.211	172.2	159.4
T0526-3.1	C	0.60	196	116	0.610	0.04830	9.8	0.18700	10.0	0.02806	2.5	0.248	178.4	174.1
T0526-4.1	R	9.27	861	51	0.061	0.06500	30.0	0.06200	30.0	0.00684	3.6	0.119	44.0	61.1
T0526-4.2	C	0.11	2750	216	0.081	0.04780	3.8	0.06170	4.5	0.00936	2.3	0.527	60.1	60.8
T0526-5.1	C	0.61	219	139	0.654	0.04810	6.5	0.18000	7.0	0.02721	2.6	0.371	173.1	168.1
T0526-6.1	C	1.14	205	149	0.750	0.05050	9.1	0.18700	9.5	0.02682	2.7	0.286	170.6	174.1
T0526-7.1	R	14.03	1844	40	0.022	0.08100	34.0	0.03700	34.0	0.00331	4.2	0.123	21.3	36.9
T0526-7.2	C	0.05	875	728	0.860	0.05680	2.0	0.63600	3.2	0.08110	2.5	0.770	503.0	499.8
T0526-8.1	M	0.70	2092	686	0.339	0.04450	7.6	0.06090	8.0	0.00993	2.5	0.305	63.7	60.0
T0526-9.1	M	0.04	597	140	0.242	0.07880	1.0	1.79100	2.6	0.16480	2.4	0.919	984.0	1042.2
T0526-10.1	M	1.10	503	141	0.290	0.04780	7.6	0.12040	8.0	0.01826	2.6	0.321	116.6	115.4
T0526-11.1	M	0.88	884	17	0.020	0.04920	12.0	0.07800	12.0	0.01150	2.6	0.218	73.7	76.3
T0526-12.1	R	0.87	710	96	0.140	0.05180	7.3	0.08410	7.8	0.01176	2.7	0.345	75.4	82.0
T0526-13.1	R	0.54	672	78	0.120	0.05410	13.0	0.06970	14.0	0.00934	2.8	0.207	60.0	68.4
T0526-14.1	R	3.01	686	152	0.230	0.04320	19.0	0.05100	19.0	0.00858	2.8	0.147	55.1	50.5
T0526-14.2	C	1.34	220	194	0.911	0.04680	13.0	0.17400	13.0	0.02689	2.7	0.212	171.0	162.9
T0526-15.1	R	1.58	876	191	0.225	0.04870	7.8	0.05120	8.2	0.00763	2.7	0.322	49.0	50.7
T0526-16.1	C	0.03	267	124	0.482	0.10980	1.0	4.69000	2.7	0.30970	2.5	0.927	1739.0	1765.5
T0526-17.1	M	2.62	457	62	0.139	0.03900	31.0	0.05600	31.0	0.01048	3.0	0.096	67.2	55.3
T0526-18.1	R	1.25	1483	5	0.004	0.04630	7.5	0.05460	8.0	0.00856	2.8	0.345	54.9	54.0
T0526-19.1	R	3.01	770	121	0.163	0.04300	30.0	0.04300	30.0	0.00733	3.2	0.106	47.1	42.7
T0526-20.1	R	0.42	1491	220	0.152	0.05280	9.4	0.05280	9.8	0.00725	2.9	0.292	46.6	52.2
T0526-21.1	M	5.91	518	74	0.147	0.03700	70.0	0.05400	70.0	0.01077	3.9	0.056	69.0	53.4
T0526-22.1	R	0.32	2334	97	0.043	0.04690	3.6	0.04910	4.2	0.00760	2.3	0.541	48.8	48.7
T0526-22.2	R	1.08	975	120	0.127	0.04390	10.0	0.04370	10.0	0.00723	2.4	0.234	46.4	43.4
T0526-24.1	R	4.55	712	111	0.161	0.05180	10.0	0.06080	10.0	0.00851	2.4	0.238	54.6	59.9
T0526-24.2	C	0.37	332	183	0.571	0.05060	3.3	0.18990	4.1	0.02721	2.3	0.573	173.1	176.5
T0526-25.1	R	0.00	2245	253	0.116	0.04790	7.8	0.06120	8.2	0.00927	2.5	0.303	59.5	60.3
T0526-26.1	C	0.48	425	194	0.473	0.07130	3.6	0.87500	4.8	0.08900	3.1	0.659	550.0	638.3
T0526-27.1	R	0.42	455	22	0.049	0.04780	6.6	0.06590	7.1	0.00999	2.6	0.369	64.1	64.8
T0526-28.1	M	0.94	887	102	0.119	0.05715	1.5	0.52600	2.8	0.06680	2.3	0.830	416.8	429.2

Note: C-Core, R-Rim, M-Mantle Pbc indicate the common portion.

The ²⁰⁷Pb/²³⁵U ages and standard deviation have been calculated following the formula of

$$t = \frac{1}{\lambda_{235}} \ln\left(\frac{^{207}\text{Pb}}{^{235}\text{U}} + 1\right) \quad (\lambda_{235}=9.8485 \times 10^{-10}, \text{ Steiger and Jager, 1977})$$
 and the table from Li and Xia (1978).

Li J.H., and Xia, D.X., 1978, Tables for the calculation of Isotope Ages: Atomic Energy Press.

Steiger, R. H. , and Jager, E., 1977, Subcommittee on geochronology: convention on the use of decay constants in geo- and cosmochemistry: Earth and Planetary Science Letters, v. 36, p. 359-362.

Table S3. Major and trace element compositions of garnet amphibolites.

Sample	T0527	T0527-1	T0528-4	T0527-AM-1	T0527-AM-2	T0527-AM-3	T0906-AM-1	T0906-AM-2	T0906-AM-3
Major element (wt.%)									
SiO ₂	50.38	49.42	50.17	46.65	49.86	49.73	48.57	48.68	48.50
TiO ₂	1.65	1.64	1.54	1.74	1.71	1.73	1.73	1.70	1.67
Al ₂ O ₃	15.24	15	14.49	15.85	14.86	14.78	13.92	14.04	14.02
FeO	7.89	8.42	8.68	10.71	10.06	9.95	9.63	9.36	8.69
Fe ₂ O ₃	3.81	3.61	3.67	1.74	1.88	2.15	3.77	3.93	4.51
MnO	0.21	0.2	0.22	0.26	0.20	0.20	0.22	0.22	0.23
MgO	5.94	5.91	6.06	6.07	5.98	6.03	6.33	6.29	6.37
CaO	10.50	10.66	10.16	11.14	10.68	10.42	10.95	10.87	10.86
Na ₂ O	2.84	2.74	2.33	2.77	2.71	2.73	2.36	2.39	2.34
K ₂ O	0.34	0.46	0.78	0.50	0.47	0.53	0.92	0.89	0.99
P ₂ O ₅	0.13	0.14	0.16	0.14	0.15	0.15	0.19	0.19	0.18
H ₂ O ⁺	0.74	0.78	0.86	0.40	0.66	0.70	0.50	0.32	0.52
LOI(%)	0.56	0.52	0.63	0.52	0.57	0.71	0.46	0.35	0.49
Total	100.23	99.50	99.75	98.49	99.79	99.81	99.55	99.23	99.37
Trace element (ppm)									
Sc	45.6	45.7	55.8	43.2	42.8	45.4	51.1	45.7	47.9
V	314	293	381	322	323	337	404	365	375
Cr	134	132	223	142	123	125	78.7	79.7	79
Ni	41.3	44.8	54.5	37.8	42.5	39.6	51.2	51.7	49.7
Co	46.1	45.6	51.2	40.7	43.6	44.9	53.9	49.7	49.4
Cu	133	111	101	6.23	131	68	144	132	99.6
Zn	137	124	123	100	105	107	125	112	132
Ga	21.7	21.5	21.1	20.2	19.9	20.6	20.3	18.3	19.9
Rb	15.5	15.7	19.7	14.8	14.6	19.7	19.7	13	14.5
Sr	196	194	117	171	178	175	197	186	154
Y	32.6	34.1	41.6	35.3	31.5	33.7	40.3	37.3	37.8
Zr	90.3	106	89	100	100	102	128	116	118
Nb	3.99	5.19	6.33	5.98	5.46	5.52	9.08	8.14	8.44
Mo	0.45	0.4	0.45	0.31	0.42	0.43	0.65	0.8	1.05
Cd	0.25	0.09	0.23	0.1	0.1	0.09	0.2	0.17	0.19
In	0.1	0.08	0.12	0.08	0.09	0.09	0.1	0.1	0.1
Sn	1.1	1.78	1.68	1.44	1.1	1.19	1.53	1.32	1.67
Cs	0.41	2.06	0.69	0.29	1.57	1.73	0.37	0.11	0.3
Ba	65.3	65.2	69.8	74.4	67.8	78.2	65.7	56.3	50
Ti	9900	9840	9240	10440	10260	10380	10380	10200	10020
La	5.77	5.95	11.8	4.61	5.73	5.8	11.2	10.1	10.1
Ce	15.3	15.2	25.4	12.5	15.5	15.2	26.1	24.2	23.6
Pr	2.34	2.35	3.32	2.15	2.58	2.55	3.81	3.49	3.55
Nd	11.7	12.3	14.6	11.7	13.5	13.1	18.3	16.7	16.2

Sm	3.96	3.92	4.59	3.85	4.1	4.06	4.87	4.45	4.55
Eu	1.4	1.42	1.47	1.48	1.51	1.51	1.81	1.67	1.69
Gd	5.53	5.41	6.06	6.16	6.45	6.34	7.61	6.84	7.05
Tb	1.02	0.97	1.13	1.08	1.06	1.05	1.32	1.18	1.22
Dy	5.96	6.05	7.46	6.92	6.68	6.61	8.35	7.45	7.73
Ho	1.32	1.28	1.67	1.46	1.36	1.31	1.69	1.52	1.55
Er	3.79	3.59	4.91	3.93	3.6	3.54	4.51	4.02	4.2
Tm	0.53	0.52	0.68	0.66	0.61	0.58	0.75	0.66	0.7
Yb	3.36	3.32	4.72	4.3	3.83	3.73	4.47	4.03	4.2
Lu	0.5	0.52	0.68	0.65	0.58	0.55	0.73	0.65	0.71
Hf	2.51	2.91	2.62	2.97	3.18	3.22	3.79	3.42	3.45
Ta	0.24	0.55	0.34	0.48	0.45	0.43	0.71	0.61	0.63
W	1.51	7.76	1.99	2.41	2.45	2.37	2.22	1.92	2.84
Tl	0.07	0.06	0.14	0.08	0.08	0.11	0.14	0.11	0.11
Th	1.37	0.91	2.64	0.94	1.02	0.98	2.5	2.09	1.98
U	0.23	0.26	4.07	0.34	0.2	0.21	3.53	6.61	1.48
(La/Yb) _N	1.2	1.3	1.8	0.8	1.1	1.1	1.8	1.8	1.7
(Gd/Yb) _N	1.4	1.4	1.1	1.2	1.4	1.4	1.4	1.4	1.4
Nb/La	0.7	0.9	0.5	1.3	1.0	1.0	0.8	0.8	0.8
Nb/Th	2.9	5.7	2.4	6.4	5.4	5.6	3.6	3.9	4.3
Ce/Yb	4.6	4.6	5.4	2.9	4.0	4.1	5.8	6.0	5.6