



Supplement of

Reactive interaction between migmatite-related melt and mafic rocks: clues from the Variscan lower crust of Palmi (southwestern Calabria, Italy)

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Table S1

Electron microprobe analysis of plagioclase and calculated mineral formula

Sample	PN4	PN4	PN4	PN4	PN4	PN4	PN3	PN3	PN3	PN3	PN3	PN3	PN3	PN3	
rock-type	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	medium-grained amphibolite	
mineral	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	Pl	
SiO ₂	46.1	47.2	46.5	46.8	46.1	47.3	47.2	46.8	46.6	47.8	46.9	47.5	47.3	47.7	
TiO ₂	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	
Al ₂ O ₃	35.1	33.6	34.1	34.9	33.8	34.5	33.3	33.8	33.9	33.3	33.8	33.2	33.8	34.1	
FeO	0.05	0.02	0.02	0.01	0.10	0.03	0.06	0.00	0.01	0.10	0.07	0.17	0.00	0.01	
MnO	0.00	0.02	0.00	0.02	0.03	0.00	0.00	0.01	0.00	0.03	0.02	0.00	0.03	0.02	
MgO	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	
CaO	18.4	18.0	18.3	18.0	18.0	18.6	16.8	17.4	17.0	16.7	16.5	16.6	16.9	17.1	
Na ₂ O	1.64	1.68	1.64	1.79	1.82	1.37	1.90	1.55	1.54	1.95	2.00	2.13	1.91	2.00	
K ₂ O	0.02	0.13	0.03	0.01	0.02	0.01	0.01	0.00	0.03	0.03	0.01	0.03	0.00	0.03	
Sum	101.2	100.7	100.5	101.5	99.9	101.7	99.3	99.5	99.1	99.9	99.3	99.6	99.9	101.0	
<i>a.p.f.u.</i>															
Si	2.101	2.157	2.132	2.120	2.130	2.139	2.181	2.156	2.157	2.194	2.165	2.187	2.170	2.167	
Ti	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	
Al	1.884	1.814	1.842	1.865	1.842	1.838	1.813	1.839	1.850	1.799	1.838	1.801	1.827	1.828	
FeT	0.002	0.001	0.001	0.000	0.004	0.001	0.002	0.000	0.000	0.004	0.003	0.007	0.000	0.000	
Mn	0.000	0.001	0.000	0.001	0.001	0.000	0.000	0.001	0.000	0.001	0.001	0.000	0.001	0.001	
Mg	0.000	0.000	0.000	0.005	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Ca	0.897	0.883	0.898	0.874	0.889	0.900	0.830	0.859	0.841	0.820	0.817	0.819	0.833	0.834	
Na	0.145	0.149	0.146	0.157	0.163	0.120	0.170	0.139	0.138	0.173	0.179	0.190	0.170	0.176	
K	0.001	0.007	0.002	0.000	0.001	0.000	0.001	0.000	0.002	0.002	0.001	0.002	0.000	0.002	
Sum	5.030	5.013	5.020	5.023	5.030	5.001	4.997	4.993	4.988	4.993	5.003	5.006	5.001	5.008	
An (mol%)	86.0	85.0	85.9	84.7	84.4	88.2	82.9	86.1	85.7	82.4	82.0	81.0	83.0	82.4	

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Table S1 (continued)

Electron microprobe analysis of plagioclase and calculated mineral formula

Sample	PN2	PN2	PN2	PN2	PN2	PN2	PN2	PN2	PN2	PN1	PN1	PN1	PN1	PN1	PN1
rock-type	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite	fine-grained amphibolite
mineral	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1
SiO ₂	46.9	46.9	46.8	46.7	45.9	46.2	46.7	47.9	47.0	47.0	47.9	47.7	47.6	47.4	46.8
TiO ₂	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.02	0.02	0.03	0.02
Al ₂ O ₃	33.6	33.8	33.9	33.6	34.0	33.5	33.9	33.7	33.3	33.3	33.1	33.0	33.1	33.3	33.6
FeO	0.07	0.02	0.00	0.14	0.03	0.10	0.03	0.08	0.01	0.06	0.00	0.11	0.06	0.00	0.12
MnO	0.00	0.02	0.00	0.00	0.05	0.03	0.00	0.00	0.03	0.00	0.06	0.03	0.01	0.03	0.00
MgO	0.00	0.00	0.00	0.00	0.02	0.01	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01
CaO	17.0	17.1	17.1	16.9	17.0	17.0	17.2	16.4	16.9	16.7	16.4	16.5	16.1	16.9	17.0
Na ₂ O	1.75	1.83	1.67	1.79	1.71	1.69	1.64	2.01	1.91	1.91	2.15	2.02	2.28	1.83	1.67
K ₂ O	0.02	0.03	0.03	0.02	0.02	0.03	0.04	0.03	0.01	0.01	0.02	0.02	0.00	0.02	0.04
Sum	99.3	99.7	99.4	99.2	98.8	98.5	99.5	100.2	99.2	99.0	99.7	99.4	99.2	99.5	99.3
<i>a.p.f.u.</i>															
Si	2.167	2.158	2.158	2.163	2.136	2.154	2.155	2.190	2.175	2.178	2.201	2.198	2.197	2.185	2.163
Ti	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.001
Al	1.829	1.836	1.843	1.833	1.865	1.840	1.843	1.815	1.817	1.817	1.792	1.792	1.802	1.808	1.832
FeT	0.003	0.001	0.000	0.005	0.001	0.004	0.001	0.003	0.001	0.002	0.000	0.004	0.002	0.000	0.005
Mn	0.000	0.001	0.000	0.000	0.002	0.001	0.000	0.000	0.001	0.000	0.002	0.001	0.001	0.001	0.000
Mg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.840	0.846	0.843	0.839	0.849	0.847	0.850	0.803	0.838	0.829	0.807	0.817	0.798	0.832	0.843
Na	0.157	0.163	0.149	0.161	0.154	0.153	0.147	0.178	0.171	0.172	0.191	0.181	0.204	0.163	0.150
K	0.001	0.002	0.002	0.001	0.001	0.002	0.003	0.002	0.000	0.001	0.001	0.001	0.000	0.001	0.003
Sum	4.997	5.006	4.995	5.002	5.009	5.002	4.997	4.991	5.003	4.999	4.995	4.996	5.004	4.992	4.996
An (mol%)	84.2	83.7	84.8	83.8	84.5	84.5	85.1	81.7	83.0	82.8	80.7	81.8	79.6	83.5	84.7

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Table S1 (continued)

Electron microprobe analysis of plagioclase and calculated mineral formula

Sample	S11	S11	S11	S11	S11	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR
rock-type	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite
mineral	Pl	Pl	Pl	Pl	Pl	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix
SiO ₂	45.6	45.8	46.7	46.9	46.1	46.4	46.1	46.3	46.5	46.7	46.1	46.0	46.2	45.9
TiO ₂	0.04	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.01	0.00
Al ₂ O ₃	34.0	34.7	33.8	33.4	34.4	34.4	34.8	34.4	34.4	34.7	34.8	34.6	35.2	34.7
FeO	0.12	0.03	0.01	0.04	0.07	0.06	0.00	0.08	0.00	0.12	0.12	0.02	0.15	0.19
MnO	0.00	0.02	0.00	0.03	0.02	0.02	0.00	0.06	0.00	0.02	0.00	0.04	0.03	0.03
MgO	0.02	0.01	0.02	0.00	0.00	0.01	0.00	0.01	0.02	0.02	0.00	0.01	0.02	0.00
CaO	17.8	18.0	17.3	17.5	18.0	18.0	18.1	18.2	18.0	17.7	18.2	18.0	18.2	18.1
Na ₂ O	1.33	1.27	1.57	1.52	1.20	1.46	1.28	1.34	1.39	1.50	1.30	1.22	1.18	1.25
K ₂ O	0.01	0.03	0.03	0.04	0.02	0.02	0.02	0.00	0.02	0.01	0.01	0.01	0.03	0.02
Sum	98.9	99.9	99.5	99.3	99.9	100.3	100.3	100.3	100.3	100.7	100.5	99.8	101.0	100.2
<i>a.p.f.u.</i>														
Si	2.123	2.113	2.157	2.168	2.125	2.129	2.116	2.126	2.130	2.131	2.113	2.119	2.108	2.110
Ti	0.001	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Al	1.865	1.882	1.837	1.818	1.867	1.861	1.883	1.860	1.862	1.867	1.877	1.876	1.889	1.883
FeT	0.004	0.001	0.000	0.002	0.003	0.002	0.000	0.003	0.000	0.005	0.005	0.001	0.006	0.007
Mn	0.000	0.001	0.000	0.001	0.001	0.001	0.000	0.002	0.000	0.001	0.000	0.002	0.001	0.001
Mg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.889	0.891	0.857	0.865	0.890	0.883	0.887	0.894	0.884	0.865	0.893	0.888	0.890	0.891
Na	0.120	0.114	0.141	0.136	0.107	0.130	0.114	0.120	0.124	0.133	0.115	0.109	0.104	0.112
K	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.000	0.001	0.000	0.000	0.000	0.001	0.001
Sum	5.004	5.003	4.994	4.992	4.994	5.006	5.001	5.004	5.001	5.002	5.004	4.995	5.000	5.005
An (mol%)	88.0	88.5	85.8	86.2	89.2	87.1	88.5	88.2	87.6	86.6	88.5	89.0	89.4	88.8

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Table S1 (continued)

Electron microprobe analysis of plagioclase and calculated mineral formula

Sample	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR
rock-type	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite
mineral	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix	Pl in matrix
SiO ₂	45.7	46.3	46.0	45.5	45.9	46.2	46.9	45.7	45.6	46.1	45.6	46.0	45.4	46.2	46.1	47.5
TiO ₂	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00
Al ₂ O ₃	34.7	34.6	34.3	35.3	35.0	34.7	34.7	34.8	35.2	35.0	35.2	35.1	35.1	34.8	35.0	34.1
FeO	0.05	0.16	0.07	0.15	0.03	0.00	0.00	0.19	0.16	0.05	0.03	0.20	0.24	0.04	0.21	0.00
MnO	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.04	0.05	0.00	0.00	0.05	0.01	0.00	0.03	0.02
MgO	0.03	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.02	0.01	0.00	0.00	0.01	0.00	0.03	0.02
CaO	18.4	18.0	18.2	18.6	18.4	18.0	17.7	18.2	17.9	18.3	18.5	18.4	18.7	17.9	18.1	16.9
Na ₂ O	1.19	1.43	1.32	1.00	1.27	1.22	1.47	1.22	1.23	1.27	1.12	1.07	1.00	1.37	1.23	1.93
K ₂ O	0.00	0.00	0.03	0.01	0.01	0.01	0.02	0.01	0.04	0.00	0.02	0.01	0.00	0.01	0.00	0.04
Sum	100.1	100.5	99.9	100.6	100.6	100.2	100.9	100.2	100.2	100.7	100.5	100.9	100.4	100.4	100.7	100.5
<i>a.p.f.u.</i>																
Si	2.104	2.123	2.119	2.087	2.104	2.119	2.135	2.104	2.098	2.109	2.092	2.101	2.087	2.118	2.110	2.168
Ti	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
Al	1.884	1.869	1.865	1.907	1.889	1.878	1.865	1.885	1.907	1.884	1.902	1.892	1.901	1.880	1.884	1.834
FeT	0.002	0.006	0.003	0.006	0.001	0.000	0.000	0.007	0.006	0.002	0.001	0.008	0.009	0.001	0.008	0.000
Mn	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.002	0.000	0.000	0.002	0.001	0.000	0.001	0.001
Mg	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ca	0.906	0.882	0.896	0.914	0.901	0.886	0.866	0.899	0.879	0.894	0.907	0.903	0.918	0.881	0.888	0.824
Na	0.106	0.127	0.118	0.089	0.113	0.109	0.130	0.109	0.109	0.112	0.099	0.095	0.090	0.122	0.109	0.171
K	0.000	0.000	0.002	0.001	0.001	0.001	0.001	0.000	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.003
Sum	5.004	5.006	5.003	5.004	5.008	4.995	4.997	5.007	5.004	5.001	5.005	5.001	5.007	5.003	5.000	5.000
An (mol%)	89.5	87.4	88.2	91.1	88.8	89.0	86.9	89.2	88.7	88.9	90.0	90.5	91.1	87.8	89.1	82.6

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Table S2

Electron microprobe analysis of cummingtonite and calculated mineral formula

Sample	PN4	PN4	PN4	PN4	PN4	PN3	PN3	PN3	PN3	PN3	PN3	PN3
rock-type	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite
mineral	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum
SiO ₂	54.2	54.5	54.7	55.1	56.1	55.0	55.6	55.3	54.6	54.0	54.0	55.0
TiO ₂	0.08	0.04	0.06	0.11	0.01	0.11	0.01	0.00	0.01	0.09	0.07	0.06
Al ₂ O ₃	0.66	0.60	0.80	1.58	0.53	0.68	0.43	0.46	0.60	0.63	1.35	0.62
Cr ₂ O ₃	0.03	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00
FeO	22.6	22.2	21.0	22.0	21.5	23.1	21.3	22.6	22.9	22.9	22.1	22.7
MnO	0.64	0.54	0.54	0.48	0.59	0.54	0.43	0.49	0.49	0.50	0.50	0.52
MgO	18.5	16.8	19.6	18.7	16.4	19.1	19.5	18.4	18.8	18.9	18.3	18.7
CaO	0.86	0.73	0.80	1.43	0.73	0.78	0.66	0.68	0.63	0.65	1.42	0.68
Na ₂ O	0.02	0.02	0.03	0.14	0.03	0.04	0.04	0.03	0.06	0.00	0.06	0.04
K ₂ O	0.01	0.00	0.01	0.03	0.01	0.00	0.03	0.02	0.00	0.01	0.03	0.02
Sum	97.6	95.5	97.5	99.6	95.9	99.3	98.0	98.0	98.1	97.6	97.7	98.3
<i>a.p.f.u.</i>												
Si	7.902	8.088	7.898	7.843	8.229	7.856	7.995	7.997	7.912	7.847	7.839	7.938
Ti	0.009	0.004	0.007	0.011	0.002	0.012	0.001	0.000	0.001	0.010	0.007	0.007
Al	0.113	0.105	0.136	0.265	0.091	0.114	0.074	0.079	0.103	0.109	0.231	0.106
Cr	0.003	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.002	0.000	0.000	0.000
Fe ³⁺	0.055	0.000	0.043	0.000	0.000	0.140	0.000	0.000	0.053	0.176	0.054	0.000
Fe ²⁺	2.699	2.758	2.498	2.617	2.632	2.617	2.557	2.739	2.720	2.604	2.629	2.745
Mn	0.078	0.068	0.066	0.058	0.073	0.066	0.052	0.060	0.060	0.062	0.061	0.064
Mg	4.008	3.712	4.227	3.978	3.579	4.076	4.172	3.977	4.052	4.091	3.957	4.031
Ca	0.134	0.116	0.123	0.218	0.114	0.119	0.102	0.106	0.097	0.102	0.221	0.105
Na	0.007	0.006	0.008	0.039	0.007	0.010	0.012	0.009	0.016	0.001	0.017	0.010
K	0.001	0.000	0.002	0.005	0.001	0.001	0.005	0.004	0.000	0.002	0.005	0.003
Sum	15.008	14.858	15.010	15.035	14.728	15.011	14.974	14.970	15.016	15.003	15.022	15.009
Mg#	59.8	57.4	62.9	60.3	57.6	60.9	62.0	59.2	59.8	61.1	60.1	59.5
Fe ratio	0.98	1.00	0.98	1.00	1.00	0.95	1.00	1.00	0.98	0.94	0.98	1.00

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

$$\text{Mg\#} = 100 \times \text{Mg}^{2+} / (\text{Mg}^{2+} + \text{Fe}^{2+})$$

$$\text{Fe ratio, Fe}^{2+} / (\text{Fe}^{2+} + \text{Fe}^{3+})$$

Table S2 (continued)

Electron microprobe analysis of cummingtonite and calculated mineral formula

Sample	PN3	PN3	PN2	PN2	PN2	PN2	PN2	PN2	PN2	PN2	PN2	PN2	PN2
rock-type	Medium-grained amphibolite	Medium-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite
mineral	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum
SiO ₂	55.0	55.2	54.2	54.4	54.3	54.0	53.7	53.9	54.3	53.9	54.2	54.0	54.6
TiO ₂	0.04	0.05	0.05	0.06	0.01	0.03	0.02	0.08	0.03	0.03	0.02	0.08	0.06
Al ₂ O ₃	0.57	0.60	0.71	0.62	0.51	0.88	0.66	0.89	0.89	1.02	0.72	0.77	0.86
Cr ₂ O ₃	0.00	0.00	0.01	0.00	0.03	0.02	0.02	0.03	0.00	0.00	0.01	0.06	0.06
FeO	22.9	22.0	24.7	24.5	24.8	24.1	26.4	25.1	25.0	24.4	25.0	24.8	24.8
MnO	0.62	0.59	0.57	0.53	0.57	0.48	0.52	0.54	0.53	0.50	0.40	0.53	0.49
MgO	18.6	19.2	17.4	17.3	17.3	17.5	15.9	16.8	17.1	17.2	17.4	16.8	17.2
CaO	0.79	0.74	0.63	0.63	0.47	0.69	0.71	0.73	0.63	0.89	0.68	0.64	0.83
Na ₂ O	0.01	0.00	0.04	0.07	0.00	0.06	0.04	0.09	0.04	0.06	0.05	0.05	0.05
K ₂ O	0.01	0.02	0.00	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.01
Sum	98.5	98.4	98.3	98.2	97.9	97.7	98.0	98.2	98.5	98.1	98.4	97.7	98.9
<i>a.p.f.u.</i>													
Si	7.936	7.944	7.911	7.948	7.954	7.908	7.938	7.895	7.913	7.883	7.899	7.933	7.920
Ti	0.005	0.005	0.006	0.007	0.001	0.003	0.002	0.009	0.004	0.003	0.002	0.009	0.006
Al	0.098	0.101	0.121	0.106	0.087	0.152	0.115	0.154	0.152	0.175	0.124	0.134	0.147
Cr	0.000	0.000	0.001	0.000	0.003	0.002	0.003	0.003	0.000	0.000	0.001	0.007	0.007
Fe ³⁺	0.016	0.000	0.033	0.000	0.000	0.003	0.000	0.010	0.004	0.035	0.056	0.000	0.000
Fe ²⁺	2.749	2.650	2.982	2.994	3.038	2.946	3.260	3.071	3.048	2.953	2.989	3.046	3.008
Mn	0.076	0.072	0.070	0.066	0.070	0.060	0.065	0.067	0.066	0.061	0.050	0.066	0.060
Mg	3.998	4.111	3.778	3.762	3.773	3.818	3.499	3.676	3.715	3.751	3.773	3.685	3.713
Ca	0.122	0.113	0.099	0.098	0.074	0.108	0.112	0.115	0.099	0.139	0.107	0.100	0.129
Na	0.003	0.001	0.011	0.021	0.000	0.018	0.012	0.025	0.011	0.018	0.015	0.015	0.013
K	0.002	0.004	0.000	0.003	0.000	0.001	0.004	0.001	0.000	0.001	0.002	0.002	0.002
Sum	15.005	15.002	15.011	15.004	15.000	15.019	15.009	15.025	15.011	15.019	15.017	14.997	15.005
Mg#	59.3	60.8	55.9	55.7	55.4	56.4	51.8	54.5	54.9	56.0	55.8	54.7	55.2
Fe ratio	0.99	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.98	1.00	1.00

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

$$\text{Mg\#} = 100 \times \text{Mg}^{2+} / (\text{Mg}^{2+} + \text{Fe}^{2+})$$

$$\text{Fe ratio, Fe}^{2+} / (\text{Fe}^{2+} + \text{Fe}^{3+})$$

Table S2 (continued)

Electron microprobe analysis of cummingtonite and calculated mineral formula

Sample	PN1	PN1	PN1	PN1	PN1	PN1	PN1	PN1	PN1
rock-type	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite
mineral	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum	Cum
SiO ₂	54.3	54.0	53.8	54.6	54.3	54.8	54.1	54.1	54.8
TiO ₂	0.04	0.02	0.03	0.04	0.07	0.00	0.05	0.00	0.05
Al ₂ O ₃	0.62	1.28	0.66	0.58	0.68	0.78	1.13	0.85	0.68
Cr ₂ O ₃	0.01	0.00	0.00	0.05	0.01	0.07	0.00	0.10	0.00
FeO	24.8	24.5	24.5	25.1	25.1	25.2	24.8	25.5	24.8
MnO	0.48	0.50	0.52	0.52	0.53	0.51	0.55	0.52	0.45
MgO	17.5	16.5	17.1	17.1	17.0	16.6	17.0	16.4	16.7
CaO	0.59	1.07	0.63	0.61	0.59	0.73	0.80	0.89	0.69
Na ₂ O	0.08	0.10	0.07	0.02	0.07	0.07	0.07	0.06	0.06
K ₂ O	0.01	0.03	0.01	0.01	0.03	0.01	0.00	0.02	0.02
Sum	98.5	97.9	97.4	98.6	98.4	98.8	98.5	98.4	98.3
<i>a.p.f.u.</i>									
Si	7.911	7.908	7.928	7.946	7.932	7.964	7.890	7.927	7.989
Ti	0.005	0.003	0.003	0.005	0.008	0.000	0.006	0.000	0.005
Al	0.107	0.222	0.115	0.099	0.118	0.134	0.195	0.147	0.117
Cr	0.001	0.000	0.000	0.005	0.001	0.008	0.000	0.011	0.000
Fe ³⁺	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe ²⁺	2.986	3.002	3.024	3.060	3.064	3.065	3.016	3.123	3.028
Mn	0.059	0.062	0.065	0.064	0.066	0.062	0.068	0.065	0.055
Mg	3.803	3.596	3.766	3.720	3.705	3.607	3.698	3.572	3.635
Ca	0.092	0.167	0.099	0.095	0.093	0.114	0.125	0.139	0.108
Na	0.023	0.029	0.021	0.005	0.020	0.020	0.020	0.018	0.017
K	0.001	0.006	0.002	0.002	0.006	0.002	0.001	0.003	0.004
Sum	15.024	14.996	15.023	15.001	15.013	14.976	15.018	15.004	14.957
Mg#	56.0	54.5	55.5	54.9	54.7	54.1	55.1	53.4	54.6
Fe ratio	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

$$\text{Mg\#} = 100 \times \text{Mg}^{2+} / (\text{Mg}^{2+} + \text{Fe}^{2+})$$

$$\text{Fe ratio, Fe}^{2+} / (\text{Fe}^{2+} + \text{Fe}^{3+})$$

Table S2 (continued)

Electron microprobe analysis of cummingtonite and calculated mineral formula

Sample	S11	S11	S11	S11	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR
rock-type	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite
mineral	Cum	Cum	Cum	Cum	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix
SiO ₂	53.8	53.9	55.6	53.8	54.4	54.7	53.7	55.0	53.9	54.2	54.2
TiO ₂	0.02	0.05	0.01	0.00	0.07	0.04	0.06	0.03	0.03	0.12	0.05
Al ₂ O ₃	0.77	1.17	0.49	1.02	0.80	0.76	1.60	0.58	1.65	1.35	0.67
Cr ₂ O ₃	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.02
FeO	25.6	26.2	26.0	26.2	24.8	25.0	24.2	25.1	24.2	25.1	24.8
MnO	0.65	0.77	0.77	0.80	0.87	0.92	0.87	0.98	0.81	0.85	0.88
MgO	16.0	15.6	14.8	15.8	17.6	17.3	16.7	17.4	17.0	16.5	17.5
CaO	0.52	0.93	0.55	0.92	0.82	0.86	1.52	0.72	1.54	1.43	1.02
Na ₂ O	0.03	0.06	0.11	0.10	0.10	0.04	0.14	0.04	0.19	0.10	0.06
K ₂ O	0.00	0.01	0.04	0.05	0.00	0.00	0.02	0.00	0.03	0.04	0.01
Sum	97.4	98.6	98.3	98.6	99.5	99.6	98.9	99.8	99.2	99.7	99.3
<i>a.p.f.u.</i>											
Si	7.958	7.906	8.135	7.898	7.849	7.890	7.807	7.910	7.793	7.844	7.835
Ti	0.002	0.005	0.001	0.000	0.008	0.005	0.006	0.004	0.004	0.013	0.006
Al	0.135	0.202	0.084	0.176	0.136	0.129	0.273	0.098	0.281	0.229	0.113
Cr	0.003	0.000	0.000	0.000	0.000	0.000	0.001	0.003	0.000	0.000	0.003
Fe ³⁺	0.000	0.000	0.000	0.000	0.123	0.070	0.056	0.061	0.066	0.020	0.186
Fe ²⁺	3.171	3.217	3.183	3.224	2.870	2.946	2.887	2.959	2.858	3.019	2.814
Mn	0.082	0.096	0.095	0.099	0.107	0.112	0.107	0.120	0.099	0.105	0.107
Mg	3.533	3.405	3.218	3.452	3.782	3.715	3.625	3.734	3.661	3.548	3.779
Ca	0.082	0.146	0.086	0.145	0.126	0.132	0.237	0.112	0.239	0.222	0.157
Na	0.009	0.017	0.030	0.028	0.027	0.011	0.039	0.010	0.054	0.029	0.016
K	0.000	0.001	0.007	0.010	0.000	0.000	0.004	0.000	0.005	0.007	0.002
Sum	14.975	14.996	14.840	15.033	15.028	15.011	15.043	15.010	15.059	15.036	15.017
Mg#	52.7	51.4	50.3	51.7	56.9	55.8	55.7	55.8	56.2	54.0	57.3
Fe ratio	1.00	1.00	1.00	1.00	0.96	0.98	0.98	0.98	0.98	0.99	0.94

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

Mg# = $100 \times \text{Mg}^{2+} / (\text{Mg}^{2+} + \text{Fe}^{2+})$ Fe ratio, $\text{Fe}^{2+} / (\text{Fe}^{2+} + \text{Fe}^{3+})$

Table S2 (continued)

Electron microprobe analysis of cummingtonite and calculated mineral formula

Sample	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR
rock-type	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite
mineral	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix	Cum in matrix	Cum in Grt	Cum in Grt	Cum in Grt	Cum in Grt
SiO ₂	54.5	54.2	54.3	53.7	54.5	54.5	54.0	54.9	55.2	54.9	55.0
TiO ₂	0.01	0.06	0.01	0.09	0.06	0.01	0.05	0.01	0.06	0.06	0.06
Al ₂ O ₃	0.77	1.59	0.71	1.65	0.68	0.56	1.49	1.00	0.80	1.45	0.83
Cr ₂ O ₃	0.02	0.03	0.00	0.00	0.00	0.02	0.00	0.01	0.04	0.00	0.00
FeO	25.1	24.5	24.6	23.8	25.9	24.6	25.1	23.0	22.2	22.6	21.9
MnO	0.92	0.82	0.80	0.84	0.73	0.80	0.83	0.59	0.53	0.62	0.60
MgO	17.5	16.8	17.4	17.2	16.2	17.8	16.7	18.8	19.7	18.5	19.4
CaO	0.68	1.44	0.81	1.69	0.99	0.73	1.22	0.57	0.72	1.33	0.82
Na ₂ O	0.03	0.14	0.08	0.21	0.07	0.03	0.14	0.09	0.07	0.14	0.09
K ₂ O	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01
Sum	99.5	99.6	98.6	99.2	99.1	99.1	99.5	99.0	99.3	99.5	98.7
<i>a.p.f.u.</i>											
Si	7.860	7.824	7.895	7.757	7.939	7.883	7.818	7.884	7.862	7.836	7.880
Ti	0.001	0.006	0.001	0.010	0.007	0.001	0.006	0.001	0.006	0.007	0.007
Al	0.130	0.271	0.122	0.282	0.117	0.096	0.255	0.170	0.135	0.244	0.140
Cr	0.002	0.004	0.000	0.000	0.000	0.003	0.000	0.002	0.004	0.000	0.000
Fe ²⁺	0.138	0.022	0.064	0.123	0.000	0.125	0.058	0.034	0.106	0.028	0.059
Fe ³⁺	2.882	2.928	2.931	2.756	3.154	2.851	2.976	2.727	2.535	2.673	2.571
Mn	0.113	0.100	0.098	0.103	0.091	0.098	0.102	0.072	0.064	0.075	0.073
Mg	3.770	3.622	3.763	3.708	3.524	3.831	3.598	4.024	4.178	3.934	4.143
Ca	0.105	0.223	0.126	0.262	0.155	0.113	0.189	0.087	0.110	0.203	0.127
Na	0.007	0.040	0.022	0.058	0.019	0.008	0.040	0.026	0.018	0.040	0.025
K	0.000	0.004	0.000	0.003	0.003	0.000	0.001	0.000	0.000	0.001	0.002
Sum	15.007	15.044	15.022	15.061	15.007	15.008	15.041	15.026	15.018	15.041	15.027
Mg#	56.7	55.3	56.2	57.4	52.8	57.3	54.7	59.6	62.2	59.5	61.7
Fe ratio	0.95	0.99	0.98	0.96	1.00	0.96	0.98	0.99	0.96	0.99	0.98

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

 $Mg\# = 100 \times Mg^{2+} / (Mg^{2+} + Fe^{2+})$ $Fe\ ratio, Fe^{2+} / (Fe^{2+} + Fe^{3+})$

Table S3

Electron microprobe analysis of hornblende and calculated mineral formula

Sample	PN4	PN4	PN4	PN4	PN3	PN3	PN3	PN3	PN3	PN3
rock-type	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite
mineral	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl
SiO ₂	47.4	47.3	46.9	47.0	46.9	47.5	47.7	47.9	48.8	47.4
TiO ₂	0.83	0.73	0.69	0.83	0.78	0.92	0.55	0.69	0.52	0.93
Al ₂ O ₃	9.92	10.66	10.71	11.44	9.82	9.54	8.91	10.16	9.13	10.09
Cr ₂ O ₃	0.03	0.06	0.02	0.00	0.04	0.04	0.02	0.01	0.04	0.00
FeO	14.1	13.8	13.5	12.9	13.2	13.7	15.5	13.1	14.8	14.0
MnO	0.12	0.22	0.16	0.20	0.19	0.14	0.19	0.20	0.24	0.20
MgO	12.7	12.7	12.7	12.8	13.6	13.0	14.6	13.1	13.9	13.2
CaO	11.62	11.58	11.72	12.24	11.52	10.62	8.83	11.43	9.52	11.15
Na ₂ O	0.86	0.96	1.02	1.02	0.89	0.86	0.74	1.00	0.81	0.94
K ₂ O	0.26	0.22	0.24	0.27	0.30	0.32	0.25	0.26	0.23	0.35
Sum	97.8	98.3	97.6	98.6	97.3	96.6	97.4	97.8	98.0	98.2
<i>a.p.f.u.</i>										
Si	6.901	6.850	6.831	6.761	6.836	6.978	6.947	6.936	7.056	6.872
Ti	0.091	0.079	0.075	0.090	0.086	0.102	0.061	0.075	0.056	0.102
Al	1.703	1.819	1.840	1.942	1.686	1.651	1.528	1.735	1.556	1.725
Cr	0.003	0.007	0.002	0.000	0.004	0.005	0.002	0.001	0.004	0.000
Fe ³⁺	0.019	0.005	0.013	0.022	0.158	0.000	0.199	0.000	0.000	0.000
Fe ²⁺	1.693	1.670	1.627	1.533	1.450	1.678	1.688	1.591	1.793	1.694
Mn	0.015	0.027	0.019	0.024	0.023	0.017	0.024	0.025	0.030	0.024
Mg	2.761	2.746	2.762	2.740	2.960	2.838	3.175	2.819	3.003	2.850
Ca	1.814	1.797	1.830	1.888	1.798	1.671	1.377	1.775	1.475	1.733
Na	0.242	0.269	0.287	0.283	0.252	0.245	0.209	0.281	0.226	0.264
K	0.049	0.041	0.044	0.050	0.056	0.060	0.046	0.049	0.043	0.064
Sum	15.290	15.310	15.331	15.333	15.308	15.245	15.256	15.286	15.243	15.327
Mg#	62.0	62.2	62.9	64.1	67.1	62.8	65.3	63.9	62.6	62.7
Fe ratio	0.99	1.00	0.99	0.99	0.90	1.00	0.89	1.00	1.00	1.00

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

$$\text{Mg\#} = 100 \times \text{Mg}^{2+} / (\text{Mg}^{2+} + \text{Fe}^{2+})$$

$$\text{Fe ratio, Fe}^{2+} / (\text{Fe}^{2+} + \text{Fe}^{3+})$$

Table S3 (continued)

Electron microprobe analysis of hornblende and calculated mineral formula

Sample	PN2	PN2	PN2	PN2	PN2	PN1	PN1	PN1	PN1
rock-type	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite
mineral	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl
SiO ₂	43.7	46.6	44.5	47.5	47.9	43.2	42.4	45.8	47.2
TiO ₂	0.74	0.55	0.68	0.44	0.42	0.37	0.41	0.73	0.16
Al ₂ O ₃	13.79	11.23	13.74	10.54	9.46	15.76	16.84	10.45	11.27
Cr ₂ O ₃	0.06	0.02	0.04	0.00	0.06	0.04	0.03	0.10	0.07
FeO	16.2	18.3	16.1	18.3	19.1	16.4	16.6	17.8	18.5
MnO	0.21	0.27	0.12	0.24	0.29	0.19	0.15	0.22	0.26
MgO	9.9	11.4	10.0	11.8	11.8	8.9	8.2	11.5	11.0
CaO	10.93	8.79	11.06	7.68	7.25	11.09	11.26	8.98	8.34
Na ₂ O	1.20	1.00	1.21	0.79	0.83	1.37	1.34	0.85	0.98
K ₂ O	0.41	0.26	0.38	0.28	0.26	0.35	0.31	0.32	0.21
Sum	97.1	98.4	97.8	97.6	97.4	97.6	97.5	96.8	98.0
<i>a.p.f.u.</i>									
Si	6.503	6.824	6.555	6.975	7.072	6.392	6.295	6.826	6.926
Ti	0.083	0.061	0.075	0.049	0.047	0.041	0.046	0.082	0.018
Al	2.419	1.939	2.386	1.824	1.645	2.750	2.944	1.835	1.948
Cr	0.007	0.002	0.005	0.000	0.007	0.005	0.003	0.012	0.008
Fe ³⁺	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.000
Fe ²⁺	2.015	2.245	1.980	2.246	2.355	2.029	2.058	2.189	2.271
Mn	0.026	0.034	0.015	0.030	0.037	0.024	0.019	0.028	0.032
Mg	2.192	2.495	2.203	2.592	2.602	1.958	1.809	2.563	2.407
Ca	1.743	1.380	1.746	1.208	1.146	1.759	1.790	1.433	1.310
Na	0.347	0.283	0.346	0.226	0.236	0.393	0.385	0.245	0.278
K	0.077	0.049	0.072	0.052	0.049	0.067	0.058	0.060	0.039
Sum	15.413	15.311	15.384	15.203	15.198	15.419	15.407	15.305	15.237
Mg#	52.1	52.6	52.7	53.6	52.5	49.1	46.8	53.9	51.5
Fe ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

$$\text{Mg\#} = 100 \times \text{Mg}^{2+} / (\text{Mg}^{2+} + \text{Fe}^{2+})$$

$$\text{Fe ratio, Fe}^{2+} / (\text{Fe}^{2+} + \text{Fe}^{3+})$$

Table S3 (continued)

Electron microprobe analysis of hornblende and calculated mineral formula

Sample	PN1	PN1	PN1	PN1	S11	S11	S11	S11	SI_MR
rock-type	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Grt amphibolite
mineral	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl	Hbl in Grt
SiO ₂	45.4	42.0	44.1	45.9	42.8	43.5	43.0	42.9	47.0
TiO ₂	0.61	0.17	0.74	0.62	0.13	0.42	0.31	0.76	0.67
Al ₂ O ₃	12.68	17.74	13.10	13.46	16.06	14.48	15.59	13.85	10.66
Cr ₂ O ₃	0.11	0.00	0.13	0.06	0.00	0.06	0.06	0.13	0.08
FeO	16.1	17.2	16.6	16.6	19.2	18.2	17.6	20.0	14.3
MnO	0.24	0.16	0.16	0.26	0.25	0.29	0.24	0.28	0.12
MgO	10.2	7.5	9.4	8.2	6.8	8.2	7.5	7.5	12.1
CaO	10.69	11.33	10.89	11.20	11.49	11.37	11.39	10.76	11.64
Na ₂ O	1.09	1.25	1.16	1.34	1.00	1.23	1.00	1.20	1.02
K ₂ O	0.34	0.35	0.38	0.36	0.43	0.48	0.44	0.47	0.37
Sum	97.4	97.6	96.7	98.0	98.2	98.3	97.2	97.8	97.9
<i>a.p.f.u.</i>									
Si	6.695	6.235	6.596	6.750	6.384	6.463	6.439	6.461	6.858
Ti	0.067	0.019	0.084	0.068	0.014	0.047	0.034	0.086	0.073
Al	2.206	3.107	2.310	2.331	2.824	2.537	2.749	2.458	1.832
Cr	0.013	0.000	0.016	0.007	0.000	0.007	0.007	0.015	0.010
Fe ³⁺	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000
Fe ²⁺	1.990	2.139	2.078	2.044	2.388	2.268	2.206	2.512	1.743
Mn	0.030	0.020	0.020	0.032	0.032	0.036	0.030	0.036	0.015
Mg	2.245	1.657	2.104	1.792	1.512	1.826	1.669	1.693	2.620
Ca	1.691	1.804	1.746	1.763	1.836	1.811	1.826	1.736	1.819
Na	0.313	0.359	0.337	0.381	0.289	0.355	0.290	0.350	0.289
K	0.064	0.067	0.072	0.067	0.082	0.091	0.084	0.090	0.069
Sum	15.316	15.406	15.362	15.236	15.371	15.441	15.335	15.436	15.328
Mg#	53.0	43.7	50.3	46.7	38.8	44.6	43.1	40.3	60.1
Fe ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Cations are normalized to 23 oxygens

$$\text{Mg\#} = 100 \times \text{Mg}^{2+} / (\text{Mg}^{2+} + \text{Fe}^{2+})$$

$$\text{Fe ratio, } \text{Fe}^{2+} / (\text{Fe}^{2+} + \text{Fe}^{3+})$$

Table S4

Electron microprobe analysis of biotite and garnet and calculated mineral formula

Sample	PN3	PN3	PN3	PN3	PN3	PN3	PN2	PN2	PN2
rock-type	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Medium-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite
mineral	Bt	Bt	Bt	Bt	Bt	Bt	Bt	Bt	Bt
SiO ₂	38.1	38.2	37.9	38.3	38.1	38.1	37.1	37.3	37.6
TiO ₂	2.24	2.62	2.02	2.20	2.30	2.34	1.67	2.13	2.01
Al ₂ O ₃	17.7	16.7	17.5	17.1	17.7	17.3	17.6	17.4	17.7
Cr ₂ O ₃	0.02	0.00	0.02	0.00	0.00	0.05	0.14	0.06	0.00
FeO	14.7	15.7	13.5	15.5	14.5	15.0	17.4	17.3	16.7
MnO	0.02	0.08	0.02	0.01	0.08	0.03	0.05	0.03	0.08
MgO	14.3	13.7	15.3	14.6	15.2	14.8	12.8	12.5	13.4
CaO	0.00	0.01	0.11	0.16	0.22	0.05	0.06	0.06	0.00
Na ₂ O	0.08	0.04	0.17	0.06	0.19	0.17	0.09	0.16	0.15
K ₂ O	8.69	8.37	8.91	8.66	8.46	9.12	8.15	8.53	8.81
Sum	95.9	95.5	95.5	96.6	96.8	96.9	95.1	95.4	96.4
<i>a.p.f.u.</i>									
Si	5.583	5.647	5.564	5.589	5.531	5.546	5.549	5.564	5.541
Ti	0.247	0.291	0.223	0.242	0.251	0.257	0.188	0.239	0.223
Al	3.055	2.908	3.024	2.947	3.026	2.977	3.110	3.056	3.071
Cr	0.002	0.000	0.003	0.000	0.000	0.006	0.016	0.007	0.000
Fe ³⁺	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe ²⁺	1.806	1.941	1.656	1.895	1.753	1.822	2.182	2.161	2.060
Mn	0.003	0.010	0.003	0.002	0.010	0.003	0.006	0.004	0.010
Mg	3.122	3.015	3.351	3.182	3.292	3.215	2.849	2.788	2.945
Ca	0.000	0.001	0.018	0.025	0.034	0.007	0.010	0.009	0.000
Na	0.023	0.012	0.049	0.016	0.053	0.048	0.026	0.047	0.044
K	1.624	1.577	1.668	1.613	1.565	1.696	1.556	1.626	1.657
Sum	15.464	15.402	15.558	15.511	15.515	15.578	15.491	15.501	15.551
Fe#	0.37	0.39	0.33	0.37	0.35	0.36	0.43	0.44	0.41
Prp	-	-	-	-	-	-	-	-	-
Alm	-	-	-	-	-	-	-	-	-
Grs	-	-	-	-	-	-	-	-	-
Sps	-	-	-	-	-	-	-	-	-

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

$$\text{Fe\#} = 100 \times \text{Fe}^{2+} / (\text{Fe}^{2+} + \text{Mg})$$

Table S4 (continued)

Electron microprobe analysis of biotite and garnet and calculated mineral formula

Sample	PN1	PN1	PN1	S11	S11	S11	SI_MR	SI_MR
rock-type	Fine-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Qtz amphibolite	Qtz amphibolite	Qtz amphibolite	Grt amphibolite	Grt amphibolite
mineral	Bt	Bt	Bt	Bt	Bt	Bt	Bt in matrix	Bt in matrix
SiO ₂	38.4	37.7	37.6	37.0	36.9	36.5	37.9	37.4
TiO ₂	2.02	2.01	2.37	2.23	2.94	2.57	2.60	2.45
Al ₂ O ₃	16.9	17.4	17.3	17.4	16.7	16.2	16.3	16.7
Cr ₂ O ₃	0.00	0.04	0.07	0.00	0.10	0.08	0.08	0.07
FeO	17.4	16.9	17.2	17.6	20.3	19.4	17.4	16.8
MnO	0.01	0.00	0.07	0.07	0.09	0.04	0.07	0.06
MgO	12.8	12.4	12.5	11.4	10.1	11.1	13.1	13.1
CaO	0.00	0.04	0.01	0.02	0.05	0.06	0.03	0.01
Na ₂ O	0.24	0.28	0.21	0.17	0.21	0.18	0.21	0.16
K ₂ O	8.70	8.53	8.75	8.87	9.15	8.59	9.54	9.79
Sum	96.4	95.3	96.1	94.7	96.5	94.7	97.2	96.5
<i>a.p.f.u.</i>								
Si	5.664	5.615	5.580	5.593	5.561	5.571	5.599	5.550
Ti	0.224	0.225	0.264	0.253	0.333	0.295	0.289	0.274
Al	2.939	3.060	3.020	3.093	2.969	2.921	2.827	2.926
Cr	0.000	0.005	0.008	0.000	0.012	0.010	0.009	0.008
Fe ³⁺	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe ²⁺	2.151	2.110	2.139	2.224	2.558	2.474	2.144	2.090
Mn	0.001	0.000	0.009	0.008	0.012	0.005	0.009	0.007
Mg	2.810	2.754	2.760	2.555	2.255	2.520	2.882	2.903
Ca	0.000	0.006	0.002	0.003	0.008	0.010	0.006	0.001
Na	0.068	0.081	0.060	0.050	0.062	0.053	0.061	0.045
K	1.639	1.622	1.656	1.709	1.759	1.673	1.797	1.856
Sum	15.496	15.478	15.499	15.487	15.526	15.532	15.623	15.660
Fe#	0.43	0.43	0.44	0.47	0.53	0.50	0.43	0.42
Prp	-	-	-	-	-	-	-	-
Alm	-	-	-	-	-	-	-	-
Grs	-	-	-	-	-	-	-	-
Sps	-	-	-	-	-	-	-	-

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Fe# = 100 x Fe²⁺ / (Fe²⁺ + Mg)

Table S4 (continued)

Electron microprobe analysis of biotite and garnet and calculated mineral formula

Sample	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR
rock-type	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite
mineral	Bt in matrix	Bt in matrix	Bt in matrix	Bt in matrix	Bt in matrix	Bt in matrix	Bt in matrix	Bt in Grt	Bt in Grt
SiO ₂	37.6	37.9	38.0	37.8	37.8	37.6	37.4	38.6	38.3
TiO ₂	2.34	2.36	2.44	2.81	2.55	2.91	2.31	2.73	2.47
Al ₂ O ₃	16.7	17.7	16.7	16.8	16.9	16.3	16.9	17.0	15.8
Cr ₂ O ₃	0.04	0.06	0.00	0.05	0.08	0.01	0.03	0.00	0.11
FeO	18.2	15.8	17.5	17.6	17.2	17.1	17.1	14.9	15.8
MnO	0.07	0.07	0.03	0.04	0.06	0.07	0.04	0.05	0.06
MgO	12.9	13.2	13.3	12.9	13.1	13.5	13.4	14.3	15.3
CaO	0.04	0.03	0.01	0.00	0.03	0.01	0.01	0.07	0.03
Na ₂ O	0.18	0.13	0.15	0.14	0.15	0.23	0.23	0.07	0.39
K ₂ O	9.49	9.97	9.81	9.74	9.68	9.56	9.65	9.82	9.03
Sum	97.6	97.2	97.9	97.8	97.5	97.3	97.0	97.6	97.2
<i>a.p.f.u.</i>									
Si	5.551	5.558	5.574	5.552	5.555	5.547	5.528	5.604	5.596
Ti	0.260	0.260	0.269	0.310	0.282	0.323	0.257	0.298	0.272
Al	2.905	3.048	2.880	2.901	2.925	2.831	2.944	2.909	2.718
Cr	0.005	0.007	0.000	0.005	0.009	0.002	0.004	0.000	0.012
Fe ³⁺	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Fe ²⁺	2.245	1.941	2.143	2.156	2.112	2.106	2.112	1.807	1.934
Mn	0.009	0.009	0.003	0.006	0.007	0.008	0.005	0.006	0.007
Mg	2.836	2.876	2.907	2.822	2.872	2.963	2.944	3.089	3.326
Ca	0.006	0.004	0.001	0.000	0.005	0.002	0.002	0.011	0.005
Na	0.052	0.038	0.041	0.041	0.043	0.065	0.067	0.020	0.111
K	1.786	1.864	1.835	1.825	1.815	1.798	1.822	1.817	1.685
Sum	15.654	15.605	15.655	15.617	15.626	15.645	15.685	15.562	15.666
Fe#	0.44	0.40	0.42	0.43	0.42	0.42	0.42	0.37	0.37
Prp	-	-	-	-	-	-	-	-	-
Alm	-	-	-	-	-	-	-	-	-
Grs	-	-	-	-	-	-	-	-	-
Sps	-	-	-	-	-	-	-	-	-

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

$$\text{Fe\#} = 100 \times \text{Fe}^{2+} / (\text{Fe}^{2+} + \text{Mg})$$

Table S4 (continued)

Electron microprobe analysis of biotite and garnet and calculated mineral formula

Sample	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR
rock-type	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite
mineral	Bt in Grt	Bt in Grt	Bt in Grt	Grt rim	Grt rim	Grt rim	Grt rim	Grt interm	Grt interm
SiO ₂	37.8	38.4	38.4	38.8	38.7	38.5	37.9	38.3	38.6
TiO ₂	2.10	2.37	1.93	0.07	0.01	0.00	0.00	0.00	0.00
Al ₂ O ₃	16.7	16.4	16.6	22.0	22.3	22.2	21.9	21.9	22.0
Cr ₂ O ₃	0.04	0.00	0.02	0.01	0.07	0.02	0.03	0.00	0.04
FeO	15.5	14.1	14.5	29.8	29.9	29.9	30.0	30.9	31.0
MnO	0.04	0.05	0.03	3.82	3.30	3.23	3.80	3.53	3.40
MgO	15.2	15.7	15.7	3.3	3.9	4.0	3.2	4.0	3.9
CaO	0.04	0.02	0.09	5.30	5.01	5.01	5.20	4.39	4.17
Na ₂ O	0.40	0.32	0.44	0.06	0.03	0.00	0.00	0.00	0.00
K ₂ O	9.03	9.38	8.52	0.00	0.00	0.00	0.00	0.00	0.01
Sum	96.9	96.6	96.3	103.2	103.2	102.8	102.1	103.0	103.1
<i>a.p.f.u.</i>									
Si	5.538	5.602	5.609	2.993	2.974	2.971	2.959	2.960	2.980
Ti	0.231	0.260	0.212	0.004	0.000	0.000	0.000	0.000	0.000
Al	2.885	2.814	2.859	2.003	2.019	2.016	2.017	1.994	2.003
Cr	0.004	0.000	0.002	0.001	0.004	0.001	0.002	0.000	0.003
Fe ³⁺	0.000	0.000	0.000	0.011	0.033	0.042	0.063	0.086	0.034
Fe ²⁺	1.899	1.716	1.771	1.913	1.892	1.890	1.898	1.906	1.967
Mn	0.006	0.006	0.004	0.250	0.215	0.211	0.251	0.231	0.222
Mg	3.317	3.410	3.421	0.379	0.445	0.456	0.375	0.459	0.444
Ca	0.006	0.004	0.014	0.438	0.413	0.414	0.435	0.363	0.345
Na	0.113	0.091	0.123	0.009	0.004	0.000	0.000	0.000	0.000
K	1.687	1.747	1.587	0.000	0.000	0.000	0.000	0.000	0.001
Sum	15.686	15.650	15.604	8.000	8.000	8.000	8.000	8.000	8.000
Fe#	0.36	0.33	0.34	-	-	-	-	-	-
Prp	-	-	-	12.8	15.3	15.7	13.1	16.2	15.2
Alm	-	-	-	64.6	65.0	65.0	66.2	67.3	67.3
Grs	-	-	-	14.2	12.3	12.1	11.9	8.39	9.93
Sps	-	-	-	8.42	7.39	7.26	8.77	8.15	7.60

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

$$\text{Fe\#} = 100 \times \text{Fe}^{2+} / (\text{Fe}^{2+} + \text{Mg})$$

Table S4 (continued)

Electron microprobe analysis of biotite and garnet and calculated mineral formula

Sample	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR	SI_MR
rock-type	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite	Grt amphibolite
mineral	Grt interm	Grt core	Grt core	Grt core	Grt core	Grt core	Grt core	Grt core	Grt core
SiO ₂	38.6	38.9	39.0	39.3	38.6	39.0	38.8	38.9	38.9
TiO ₂	0.00	0.06	0.08	0.01	0.02	0.02	0.00	0.06	0.02
Al ₂ O ₃	22.0	22.2	22.2	22.3	22.2	22.2	22.0	22.2	22.0
Cr ₂ O ₃	0.03	0.05	0.02	0.01	0.01	0.02	0.06	0.04	0.03
FeO	30.9	28.6	28.2	29.9	29.5	28.6	29.7	28.1	28.6
MnO	3.26	3.46	3.61	3.17	2.89	3.54	3.18	3.62	3.21
MgO	4.1	4.6	4.7	4.8	4.6	4.5	4.4	4.4	4.6
CaO	3.93	5.59	5.50	4.20	5.12	5.49	4.81	5.87	5.42
Na ₂ O	0.06	0.02	0.06	0.02	0.01	0.00	0.00	0.03	0.03
K ₂ O	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00
Sum	102.9	103.4	103.3	103.6	103.0	103.3	103.0	103.3	102.7
<i>a.p.f.u.</i>									
Si	2.976	2.970	2.979	2.994	2.963	2.978	2.983	2.974	2.988
Ti	0.000	0.004	0.004	0.000	0.001	0.001	0.000	0.004	0.001
Al	2.005	1.998	1.994	2.001	2.005	1.996	1.997	2.002	1.993
Cr	0.002	0.003	0.001	0.001	0.001	0.001	0.004	0.002	0.002
Fe ³⁺	0.051	0.055	0.047	0.013	0.068	0.045	0.033	0.046	0.031
Fe ²⁺	1.943	1.769	1.751	1.890	1.825	1.784	1.878	1.750	1.803
Mn	0.213	0.224	0.233	0.205	0.188	0.229	0.207	0.234	0.209
Mg	0.475	0.519	0.532	0.549	0.526	0.516	0.501	0.501	0.521
Ca	0.325	0.457	0.450	0.343	0.421	0.450	0.396	0.481	0.446
Na	0.009	0.003	0.009	0.003	0.002	0.000	0.000	0.005	0.005
K	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000
Sum	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000	8.000
Fe#	-	-	-	-	-	-	-	-	-
Prp	16.5	18.0	18.4	18.5	18.4	17.7	17.1	17.3	17.8
Alm	67.5	61.3	60.5	63.7	63.8	61.3	64.2	60.5	61.6
Grs	8.63	12.9	13.1	10.9	11.2	13.1	11.7	14.1	13.5
Sps	7.40	7.75	8.06	6.90	6.56	7.87	7.07	8.09	7.13

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

$$\text{Fe\#} = 100 \times \text{Fe}^{2+} / (\text{Fe}^{2+} + \text{Mg})$$

Table S5

Trace element compositions of cummingtonite (average values, ppm)

sample	PN3		PN2		PN1		SI1		SI-MR		SI-MR	
rock-type	Medium-grained amphibolite		Fine-grained amphibolite		Fine-grained amphibolite		Qtz amphibolite		Grt amphibolite		Grt amphibolite	
	n = 4	SD	n = 3	SD	n = 6	SD	n = 6	SD	in matrix n = 4	SD	in Grt n = 2	SD
V	211	7	246	9	366	39	251	32	83	19	102	17
Cr	37.3	2.3	24.2	3.3	62.3	8.6	49.4	7.9	61.8	16.1	140.6	111.8
Co	60.1	2.7	58.6	0.6	61.3	1.2	46.1	1.0	47.6	7.2	51.5	2.6
Rb	0.08	0.07	0.07	0.03	0.79	1.31	0.63	1.29	0.40	0.36	0.28	—
Sc	34.7	1.4	36.5	1.9	75.9	5.9	112.2	5.2	104.0	13.3	57.8	8.0
Ti	636	112	853	20	599	155	493	174	222	69	470	134
Sr	1.20	0.23	3.08	1.95	1.90	1.25	0.95	0.27	1.02	0.91	0.89	0.77
Ba	0.34	0.06	0.59	0.53	9.51	14.11	5.03	11.31	2.41	3.94	0.37	0.42
Zr	1.81	0.38	3.78	0.36	2.65	0.87	1.46	0.40	1.19	0.19	1.77	0.91
Nb	0.35	0.04	0.57	0.04	0.59	0.13	0.62	0.17	0.45	0.16	0.27	0.21
Y	9.60	0.42	9.46	1.63	11.71	2.42	114.95	25.52	90.81	18.51	39.43	9.43
Hf	0.20	0.02	0.20	0.02	0.20	0.04	0.34	0.05	0.20	0.09	<0.2	—
Ta	0.01	—	0.02	—	0.02	—	0.02	—	<0.01	—	<0.01	—
La	0.83	0.13	0.96	0.04	0.20	0.14	0.03	0.01	<0.03	—	<0.03	—
Ce	4.35	0.36	4.45	0.78	1.23	0.68	0.36	0.11	0.19	0.08	0.29	0.10
Pr	0.88	0.06	0.86	0.24	0.36	0.15	0.18	0.05	0.06	—	0.07	—
Nd	5.80	0.44	5.55	1.89	3.30	1.04	2.80	0.78	0.60	0.23	1.28	—
Sm	1.81	0.16	1.91	0.67	1.78	0.39	4.58	1.00	0.85	0.14	1.34	0.69
Eu	0.30	0.03	0.40	0.12	0.44	0.10	0.29	0.08	0.28	0.20	0.30	0.22
Gd	1.78	0.17	1.89	0.69	2.29	0.54	10.8	2.0	3.32	1.52	4.20	1.73
Tb	0.28	0.02	0.28	0.08	0.35	0.08	2.43	0.48	1.06	0.39	1.05	0.01
Dy	2.00	0.12	1.96	0.48	2.59	0.62	20.6	4.3	12.4	2.3	7.86	1.92
Ho	0.38	0.02	0.38	0.06	0.48	0.11	4.16	0.85	3.67	0.82	1.42	0.62
Er	1.15	0.07	1.10	0.16	1.50	0.29	13.1	2.5	13.0	2.3	3.07	0.82
Tm	0.16	0.01	0.15	0.02	0.20	0.03	1.89	0.29	2.21	0.50	0.29	0.01
Yb	1.34	0.06	1.39	0.05	1.83	0.23	15.5	1.9	18.9	2.1	2.33	0.52
Lu	0.17	0.01	0.18	—	0.24	0.03	1.86	0.21	2.63	0.53	0.23	0.09
Eu/Eu*	0.51		0.64		0.66		0.12		0.50		0.38	
Ce _N /Sm _N	0.59		0.57		0.17		0.02		0.05		0.05	
Gd _N /Lu _N	1.26		1.31		1.20		0.72		0.16		2.25	

Qtz amhibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Eu/Eu* = Eu_N/(Sm_N × Gd_N)^{1/2}

Table S5 (continued)

Trace element compositions of hornblende (average values, ppm)

sample	PN3		PN2		PN1		SI1
rock-type	Medium-grained amphibolite		Fine-grained amphibolite		Fine-grained amphibolite		Qtz amphibolite
	n = 5	SD	n = 3	SD	n = 6	SD	n = 1
V	1,407	107	1,247	105	2,068	73	1,873
Cr	213	44	108	12	279	60	304
Co	50.5	1.3	60.9	17.8	161	191	49.2
Rb	1.35	0.66	1.35	0.63	2.94	3.92	1.81
Sc	173	10	151	10	363	33	709
Ti	4,450	508	4,500	640	3,190	493	3,280
Sr	12.1	3.96	13.5	3.47	8.71	3.22	11.1
Ba	21.4	7.45	26.7	9.39	46.4	49.9	34.5
Zr	21.5	4.21	24.8	3.93	18.8	4.96	9.54
Nb	4.13	0.79	4.53	0.80	4.33	1.14	5.54
Y	87.1	10.4	61.1	2.07	92.3	33.4	1689
Hf	2.10	0.17	1.41	0.11	1.48	0.28	3.68
Pb	0.81	0.16	1.01	0.09	0.93	0.03	2.14
Th	0.16	0.16	0.20	0.05	0.01	0.01	0.00
U	0.11	0.04	0.05	0.01	0.03	0.01	0.12
La	10.7	2.65	9.25	1.37	2.58	1.51	0.92
Ce	55.6	6.47	44.0	4.19	16.4	10.1	10.6
Pr	11.3	1.20	8.63	0.59	4.55	2.79	5.69
Nd	74.4	8.66	57.7	3.03	41.1	24.8	94.6
Sm	22.5	3.25	17.4	0.89	18.9	10.0	132
Eu	2.20	0.22	2.80	0.32	3.18	0.63	4.87
Gd	21.6	2.82	16.4	0.88	22.4	11.1	258
Tb	3.10	0.43	2.18	0.10	3.21	1.41	47.1
Dy	20.1	2.31	14.2	0.58	21.7	8.72	346
Ho	3.49	0.44	2.44	0.11	3.79	1.37	60.7
Er	9.44	0.87	6.87	0.36	11.3	3.71	164
Tm	1.17	0.14	0.86	0.04	1.47	0.38	19.6
Yb	8.61	1.01	7.05	0.42	11.8	2.47	137
Lu	1.00	0.11	0.86	0.06	1.41	0.34	15.1
Eu/Eu*	0.30		0.50		0.47		0.08
Ce _N /Sm _N	0.60		0.62		0.21		0.02
Gd _N /Lu _N	2.66		2.35		1.97		2.12

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

$$\text{Eu/Eu}^* = \text{Eu}_N / (\text{Sm}_N \times \text{Gd}_N)^{1/2}$$

Table S5 (continued)

Trace element compositions of plagioclase, garnet, allanite (average values, ppm)

sample	PN3		PN2		PN1		SI1		SI-MR		SI-MR		SI-MR	
rock-type	Medium-grained amphibolite		Fine-grained amphibolite		Fine-grained amphibolite		Qtz amphibolite		Grt amphibolite		Grt amphibolite		Grt amphibolite	
mineral	Pl n = 4		Pl n = 5		Pl n = 4		n = 4		Grt core n = 3		Grt rim n = 4		Aln n = 2	
	n = 4	SD	n = 5	SD	n = 4	SD	n = 4	SD	n = 3	SD	n = 4	SD	n = 2	SD
V	1.2	0.9	5	5	3	4	19	18	101	30	92	5	603	36
Cr	0.6	0.2	2.6	3.4	1.1	1.2	5.0	4.3	130	19.1	122	33.2	391	38.5
Rb	0.16	0.16	0.10	0.08	0.47	0.80	6.38	6.33	0.19	0.06	<0.08	—	<0.08	—
Sc	0.68	0.28	0.86	0.58	0.36	0.19	0.87	0.49	127	6	105	36	191	12
Ti	10.4	2.7	25.1	19.2	36.2	54.6	272	261	70.1	54.5	94.0	25.7	1,610	164
Sr	524	15	529	9	497	3	423	13	0.19	0.11	—	—	85	8.2
Ba	20.5	3.7	15.9	3.4	25.2	10.1	70.1	53.0	<0.1	—	<0.1	—	255	12
Zr	<0.1	—	<0.1	—	<0.1	—	<0.1	—	2.28	2.48	2.05	0.53	2.65	0.11
Nb	<0.05	—	<0.05	—	<0.05	—	<0.05	—	0.06	0.02	0.06	—	<0.05	—
Y	0.15	0.08	0.29	0.23	0.09	0.03	0.96	0.40	598	111	115	21	3068	37
Hf	<0.2	—	<0.2	—	<0.2	—	<0.2	—	<0.2	—	<0.2	—	0.56	0.35
Pb	11.8	0.6	10.0	0.2	10.7	0.4	12.5	0.7	<0.06	—	<0.06	—	57.9	12.6
Th	<0.05	—	<0.05	—	<0.05	—	<0.05	—	<0.05	—	<0.05	—	1,750	281
U	<0.05	—	<0.05	—	<0.05	—	<0.05	—	<0.05	—	<0.05	—	1,130	79
La	9.17	0.98	7.66	0.11	5.11	2.06	1.71	0.52	<0.1	—	<0.1	—	42,900	4,190
Ce	12.4	1.38	9.77	0.35	6.66	2.84	4.33	1.53	<0.1	—	0.12	—	109,000	9,360
Pr	0.97	0.13	0.75	0.06	0.56	0.23	0.71	0.26	<0.1	—	0.04	—	11,300	1,610
Nd	3.16	0.49	2.59	0.21	2.18	0.80	4.52	1.56	0.75	0.13	1.19	0.42	33,300	6,210
Sm	0.26	0.05	0.25	0.09	0.18	0.07	1.03	0.33	3.87	1.39	1.93	0.67	4,750	307
Eu	1.65	0.21	1.65	0.06	1.63	0.10	2.17	0.06	0.18	0.09	0.68	0.25	196	20
Gd	0.12	0.02	0.14	0.07	0.09	0.06	0.66	0.27	20.6	6.0	10.0	2.4	2,690	160
Tb	0.01	0.00	0.01	0.01	0.01	—	0.06	0.03	8.19	1.13	2.42	0.43	284	15
Dy	0.05	0.04	0.06	0.05	0.03	0.01	0.26	0.12	84.2	3.1	17.2	2.4	1,130	6
Ho	0.01	—	0.01	0.01	<0.01	—	0.04	0.02	23.7	4.4	3.99	0.31	146	5
Er	0.01	0.01	0.03	0.03	0.01	0.00	0.07	0.04	72.6	23.1	11.8	1.0	224	4
Tm	<0.01	—	<0.01	—	<0.01	—	<0.01	—	11.4	3.9	1.95	0.36	18.6	1.4
Yb	<0.01	—	<0.01	—	<0.01	—	<0.01	—	83.8	37.0	15.5	3.1	93.3	9.9
Lu	<0.01	—	<0.01	—	<0.01	—	<0.01	—	11.9	6.6	2.13	0.48	9.27	0.42

Qtz amhibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Table S6

Whole-rock major element and normative composition of selected samples

Sample	PN4	PN3	PN2	PN1	SI-1	SI-MR
rock-type	Medium-grained amphibolite	Medium-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Qtz amphibolite	Grt amphibolite
<i>Major elements (wt%)</i>						
SiO ₂	48.4	46.4	46.8	47.2	47.9	48.9
TiO ₂	0.61	2.42	1.76	1.40	1.34	0.88
Al ₂ O ₃	20.0	18.6	21.2	20.1	21.2	21.3
Fe ₂ O ₃ ^{tot}	10.03	11.7	11.2	12.3	11.2	9.95
MnO	0.18	0.17	0.17	0.18	0.19	0.12
MgO	7.25	7.64	5.79	6.31	5.41	5.98
CaO	11.0	10.8	10.9	10.1	8.72	6.97
Na ₂ O	1.12	1.11	1.10	1.04	0.81	0.64
K ₂ O	0.45	0.41	0.43	0.56	2.25	3.95
P ₂ O ₅	0.06	0.13	0.35	0.38	0.26	0.09
L.O.I	1.63	0.94	1.08	0.91	0.98	1.67
Total	100.7	100.2	100.9	100.5	100.3	100.5
Mg#	58.9	56.5	50.5	50.4	48.8	54.4
SiO ₂ /Al ₂ O ₃	2.4	2.5	2.2	2.3	2.3	2.3
<i>CIPW normative composition</i>						
Q	0.04		0.5	0.6	1.0	
C				0.3	2.2	3.6
Or	2.7	2.4	2.5	3.3	13.3	23.3
Ab	9.5	9.4	9.3	8.8	6.9	5.4
An	48.3	44.5	51.7	47.7	41.6	34.0
Di	4.6	6.9	0.3			
Hy	31.7	26.8	30.3	34.1	30.2	28.3
Ol		3.2				1.4
Il	1.1	4.6	3.3	2.7	2.5	1.7
Ap	0.1	0.3	0.8	0.9	0.6	0.2

L.O.I. loss on ignition. Mg# = 100 × molar Mg/(Mg+Fe²⁺_{tot})

Qtz amphibolite, quartz amphibolite; Grt amphibolite, quartz garnet amphibolite

Table S6 (continued)

Sample	PN4	PN3	PN2	PN1	SI-1	SI-MR
rock-type	Medium-grained amphibolite	Medium-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Qtz amphibolite	Grt amphibolite
<i>Trace elements (ppm)</i>						
V	280	487	220	227	254	184
Cr	70	90	30	50	40	100
Sc	44	68	26	33	44	34
Co	29	35	28	33	25	28
Ni	<20	30	20	30	<20	30
Cu	20	20	20	30	10	30
Zn	100	100	100	130	160	150
Ga	18	18	20	21	23	20
Rb	11	9	13	15	91	171
Sr	253	231	302	275	217	171
Ba	80	94	93	179	628	432
Zr	19	47	16	115	110	96
Nb	2.8	10.9	8.9	10.5	12.3	7.5
Y	13.4	33.1	9.3	9.4	41.5	18.9
Hf	0.6	1.6	0.3	2.9	3.1	2.6
Ta	0.18	0.63	0.57	0.65	0.76	0.52
Pb	5	<5	<5	<5	9	6
Th	0.32	0.42	0.54	0.72	1.14	7.17
U	0.11	0.22	0.21	0.26	0.88	0.64
La	8.25	11.5	11.8	15.1	16.7	29.1
Ce	18.6	32.6	24.2	31.5	49.9	55.3
Pr	2.53	5.24	3.13	3.77	7.86	6.35
Nd	11.1	25.5	13.0	15.3	35.5	24.2
Sm	2.68	7.38	2.72	3.09	8.93	3.90
Eu	1.35	1.59	1.60	1.58	1.60	1.40
Gd	2.91	7.85	2.64	2.84	8.86	3.72
Tb	0.44	1.17	0.33	0.35	1.32	0.55
Dy	2.70	7.06	1.91	1.98	7.89	3.33
Ho	0.52	1.32	0.35	0.37	1.62	0.76
Er	1.48	3.61	0.98	1.06	4.51	2.25
Tm	0.21	0.46	0.14	0.15	0.64	0.35
Yb	1.36	2.79	0.92	1.00	4.23	2.49
Lu	0.20	0.40	0.15	0.16	0.63	0.37
La _N /Sm _N	1.93	0.98	2.72	3.06	1.17	4.68
Gd _N /Yb _N	1.77	2.33	2.37	2.35	1.73	1.23
Eu/Eu*	1.47	0.63	1.81	1.62	0.55	1.12
Rb _N /Y _N	0.56	0.18	0.95	1.08	1.49	6.14

$$\text{Eu/Eu}^* = \text{Eu}_N / (\text{Sm}_N \times \text{Gd}_N)^{1/2}$$

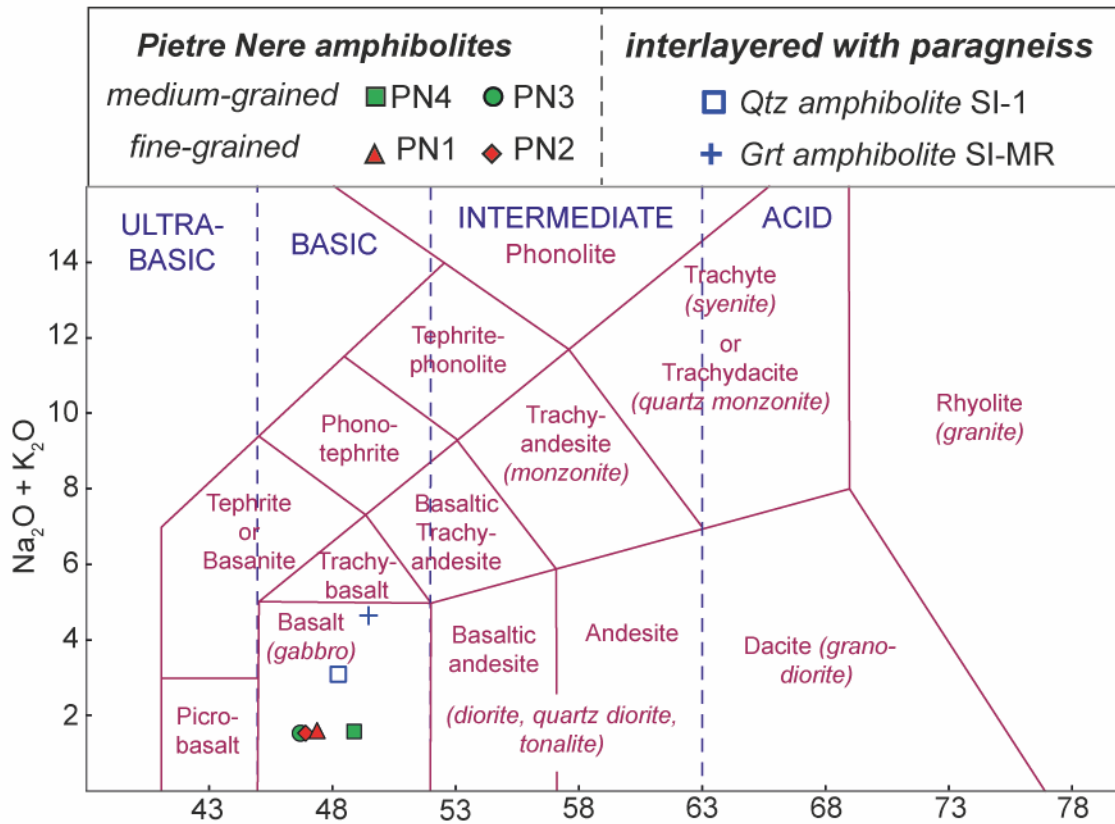
Table S7

Temperature estimates (°C) obtained for the selected Palmi rocks. A confining pressure of 6.1 kbar was assumed in the calculations, in agreement with pressure estimates reported by Caggianelli et al. (1997) for the the emplacement of the tonalite. The method of Putirka (2016) was applied using Eq. (6). The edenite-richterite calibration of the amphibole–plagioclase geothermometer by Holland and Blundy (1994) was applied.

Sample	PN4	PN3	PN2	PN1	SI-1
rock-type	Medium-grained amphibolite	Medium-grained amphibolite	Fine-grained amphibolite	Fine-grained amphibolite	Qtz amphibolite
Putirka (2016) Amp	806	781	773	804	803
Holland and Blundy (1994) Amp-Pl	-	-	-	-	828

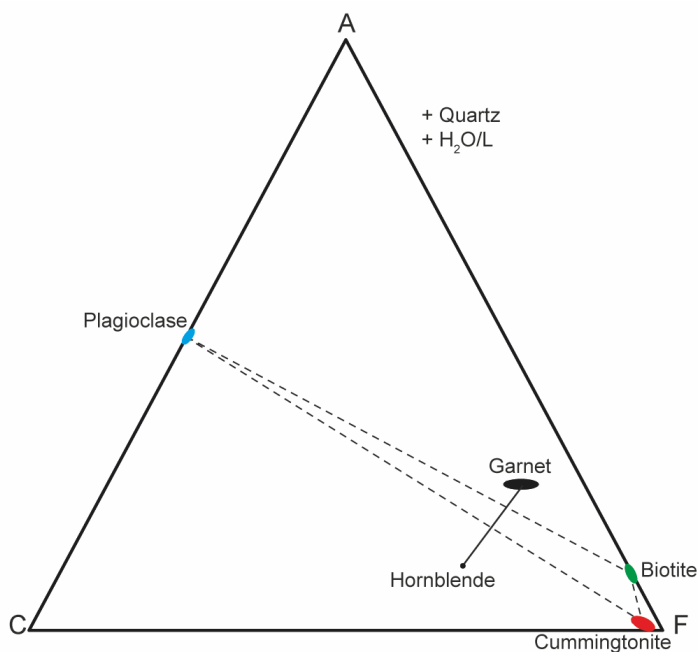
Qtz amhibolite, quartz amphibolite

Supplementary Figure 1



Classification of Palmi amphibolites on the total alkali versus silica diagram for volcanic and plutonic rocks (TAS, after Best 2003)

Supplementary Figure 2



ACF diagram illustrating the compositions of minerals for garnet amphibolite SI-MR, instable and stable mineral assemblages are indicated by broken and solid lines, respectively, according to reaction $\text{Cum} + \text{Pl} + \text{Bt} (+\text{Ilm}) = \text{Hbl} + \text{Grt} + \text{Qtz} + \text{H}_2\text{O}$ (see text for further details) .