

1      **DR2014046**

- 2      - Data Repository item: Table DR1a-f. – Representative electron microprobe analyses and  
3            structural formulae of amphibole (a), white mica (b), feldspar (c), epidote (d), rutile (e),  
4            garnet (f).
- 5      - Data Repository item: Figure DR1a-c. (a) Composition of amphibole from the Sabzevar  
6            granitoids (top) and the metamorphic host rocks (bottom) plotted in the classification  
7            scheme of Leake et al. (2004). (b) Representative qualitative compositional map and  
8            quantitative EMPA profiles showing variation in cation (Mg, Ti, Na, Fe) distribution in  
9            primary (igneous) white micas from Sabzevar graniotids (sample I10-09). Chemical  
10          composition of white mica is also indicated. (c) Representative qualitative compositional  
11          map and quantitative EMPA profiles showing variation in cation (Mg, Fe, Ca, Mn)  
12          distribution in garnets from the amphibolite country rocks (samples 25Mb, 232, HGR2).

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TABLE DR1a. REPRESENTATIVE MICROPROBE ANALYSES AND STRUCTURAL FORMULAE (\*) OF AMPHIBOLE

Rock type Sample	Granitoid				Massive Amphibolite						Overprinted Blueschist			
	I10-09 primary	I10-09 primary	I10-09 primary	I10-09 secondary	232 (melanosome)				HGR2 (leucosome)			25Mb		
Type					primary	primary	primary, average	secondary	primary	primary	secondary			
SiO <sub>2</sub>	38.81	44.80	39.40	49.10	39.21	37.86	39.19	46.02	39.76	40.5	48.06	47.66	50.21	49.05
TiO <sub>2</sub>	1.30	0.33	1.44	0.43	1.31	1.52	1.29	0.25	1.35	1.03	0.2	0.20	0.18	0.21
Al <sub>2</sub> O <sub>3</sub>	15.74	10.66	15.26	8.95	16.38	16.87	16.21	9.54	16.73	15.39	6.98	7.82	5.99	6.37
FeO(tot)	18.17	17.48	17.83	10.78	15.41	15.90	15.66	16.74	16.71	16.83	18.03	19.96	18.44	19.54
MnO	0.18	0.34	0.22	0.18	0.13	0.16	0.17	0.31	0.21	0.26	0.36	0.71	0.70	0.79
MgO	8.38	10.21	8.20	13.46	9.17	8.83	9.08	11.21	8.09	8.08	11.57	9.72	10.27	10.18
CaO	10.86	8.46	10.67	9.64	11.10	11.47	10.85	9.51	10.93	10.63	9.82	7.33	8.71	7.06
Na <sub>2</sub> O	2.75	3.67	2.80	2.74	2.31	2.46	2.65	2.59	2.8	2.6	2.13	4.01	2.78	3.71
K <sub>2</sub> O	1.05	0.38	1.07	0.27	0.89	1.03	0.92	0.31	0.8	1.13	0.37	0.60	0.59	0.43
Total	97.24	96.33	96.89	95.55	95.92	96.10	96.02	96.46	97.38	96.45	97.52	98.01	97.87	97.34
Cations on the basis of 23 oxygens and 13CNK (excluding Ca, Na, K) normalisation														
Si	5.854	6.638	5.970	7.155	5.915	5.758	5.921	6.766	5.961	6.139	7.014	6.976	7.356	7.173
Ti	0.147	0.037	0.164	0.047	0.149	0.174	0.147	0.027	0.152	0.117	0.022	0.022	0.02	0.023
Al	2.798	1.862	2.725	1.537	2.913	3.023	2.887	1.653	2.956	2.749	1.201	1.349	1.034	1.098
Fe <sup>3+</sup>	0.681	0.977	0.952	0.223	0.520	0.448	0.511	0.970	0.338	0.301	0.984	1.105	0.579	1.166
Fe <sup>2+</sup>	1.611	1.189	1.748	1.091	1.423	1.575	1.467	1.088	1.757	1.832	1.217	1.339	1.681	1.224
Mn	0.023	0.043	0.028	0.022	0.016	0.020	0.022	0.038	0.027	0.033	0.045	0.088	0.087	0.098
Mg	1.884	2.255	1.852	2.924	2.063	2.001	2.045	2.457	1.808	1.826	2.517	2.121	2.243	2.219
Ca	1.755	1.343	1.732	1.505	1.794	1.869	1.756	1.498	1.756	1.726	1.536	1.150	1.367	1.106
Na	0.804	1.054	0.823	0.774	0.674	0.725	0.776	0.737	0.814	0.764	0.603	1.138	0.79	1.052
K	0.202	0.072	0.207	0.05	0.172	0.200	0.177	0.058	0.153	0.219	0.069	0.112	0.11	0.08
P1 <sup>(§)</sup> (GPa)	1.02	1.00	0.98	0.38										
P2 <sup>(§)</sup> (GPa)	1.10	1.09	1.06	0.39										
P3 <sup>(§)</sup> (GPa)	0.84	0.83	0.81	0.30										
P4 <sup>(§)</sup> (GPa)	1.03	1.04	1.00	0.43										

(\*) Calculated through the software WINAMPH (Yavuz, 2007).

(§) P1 to P4 = Aluminum-in-hornblende barometry; P1: Hammasrstron & Zen (1986); P2: Johnson & Rutherford (1989); P3: Hollister et al. (1987); P4: Schmidt (1992).

TABLE DR1b. REPRESENTATIVE MICROPROBE ANALYSES AND STRUCTURAL FORMULAE OF WHITE MICAS

Rock type	Granitoid					Overprinted Blueschist		Massive Amphibolite				
	CHILI #20_core	CHILI #12_rim	I10-09 #26_core	I10-09 #27_core	I10-09 #30_late	25Mb #83	25Mb #3	232 #1	232 #80	232 #44	HGR2 #1	HGR2 #71
SiO <sub>2</sub>	47.49	48.74	47.65	47.00	47.56	48.96	49.37	46.96	47.35	47.73	47.48	47.43
TiO <sub>2</sub>	1.35	0.23	0.51	1.14	0.35	0.36	0.40	0.54	0.46	0.40	0.56	0.54
Al <sub>2</sub> O <sub>3</sub>	28.72	30.91	28.44	27.52	27.73	24.38	23.86	26.74	27.70	27.39	28.07	28.06
FeO <sub>tot</sub>	4.00	2.41	4.73	4.64	5.07	7.22	6.98	6.09	4.89	5.01	4.41	4.69
MnO	0.02	0.06	0.02	bdl	0.02	0.07	0.07	0.08	0.04	0.07	0.00	0.02
MgO	2.55	1.81	2.36	2.57	2.85	3.06	3.09	2.66	2.49	2.56	2.30	2.57
CaO	bdl	0.01	0.03	bdl	bdl	bdl	0.06	0.02	0.02	0.02	0.02	0.02
BaO	0.19	0.17	0.15	0.19	0.18	0.07	0.03	0.09	0.08	0.05	0.43	0.32
Na <sub>2</sub> O	0.57	0.19	0.85	0.83	0.83	0.26	0.03	0.45	0.45	0.51	0.88	0.83
K <sub>2</sub> O	10.71	11.49	10.36	10.28	10.65	10.70	11.12	10.44	10.68	10.50	10.17	10.06
Total	95.595	96.01	95.09	94.17	95.25	95.08	95.01	94.067	94.17	94.23	94.32	94.54
Cations on the basis of 11 oxygens												
Si	3.217	3.253	3.249	3.241	3.253	3.381	3.406	3.264	3.265	3.286	3.263	3.253
Ti	0.069	0.000	0.026	0.059	0.018	0.019	0.021	0.028	0.024	0.021	0.029	0.028
Al	2.293	2.431	2.285	2.236	2.235	1.984	1.940	2.190	2.251	2.222	2.274	2.268
Fe <sup>2+</sup>	0.227	0.134	0.270	0.268	0.290	0.417	0.403	0.354	0.282	0.289	0.253	0.269
Mn	0.001	0.003	0.001	0.000	0.001	0.004	0.004	0.005	0.003	0.004	0.000	0.001
Mg	0.258	0.180	0.240	0.265	0.291	0.315	0.318	0.275	0.256	0.263	0.235	0.263
Ca	0.000	0.001	0.002	0.000	0.000	0.000	0.004	0.002	0.002	0.001	0.002	0.001
Ba	0.005	0.004	0.004	0.005	0.005	0.002	0.001	0.002	0.002	0.001	0.012	0.009
Na	0.075	0.024	0.112	0.110	0.111	0.035	0.039	0.060	0.060	0.067	0.118	0.110
K	0.925	0.978	0.901	0.904	0.929	0.943	0.978	0.926	0.940	0.922	0.892	0.880
XMg (*)	0.53	0.57	0.47	0.50	0.50	0.43	0.44	0.44	0.48	0.48	0.48	0.49

 (\*) XMg= Mg/(Mg+Fe<sup>2+</sup>)

TABLE DR1c. REPRESENTATIVE MICROPROBE ANALYSES AND STRUCTURAL FORMULAE OF FELDSPAR

Rock type	Granitoid					Overprinted Blueschist		Massive Amphibolite	
	CHILI #1-Kfsp	CHILI #5-PI	CHILI #34_PI	I10-09 #17_PI	I10-09 #22_PI	25Mb #84_PI	25Mb #73_PI	HGR2 #10	HGR2 #71
SiO <sub>2</sub>	64.82	68.41	67.75	67.82	67.76	67.56	67.13	67.96	68.12
Al <sub>2</sub> O <sub>3</sub>	18.36	19.44	20.26	19.46	19.41	19.83	19.53	19.77	19.42
CaO	0.01	0.13	0.76	0.77	0.51	0.38	0.19	1.25	0.21
Na <sub>2</sub> O	0.69	11.67	11.46	11.23	11.34	11.64	11.90	11.07	11.78
K <sub>2</sub> O	16.15	0.18	0.10	0.03	0.03	0.07	0.10	0.16	0.14
Total	100.04	99.83	100.33	99.30	99.06	99.49	98.85	100.21	99.66
Cations on the basis of 8 oxygens									
Si	2.996	2.994	2.957	2.985	2.988	2.971	2.974	2.970	2.989
Al	1.000	1.003	1.042	1.010	1.009	1.028	1.020	1.019	1.005
Ca	0.001	0.006	0.035	0.036	0.024	0.018	0.009	0.059	0.010
Na	0.062	0.991	0.970	0.958	0.970	0.993	1.022	0.938	1.002
K	0.952	0.010	0.006	0.001	0.002	0.004	0.006	0.009	0.008
An (%)	0.1	0.6	3.5	3.7	2.4	1.8	0.9	5.8	1.0
Ab (%)	6.1	98.4	95.9	96.2	97.4	97.8	98.6	93.3	98.0
Or (%)	93.8	1.0	0.5	0.1	0.2	0.4	0.5	0.9	0.7

TABLE DR1d. REPRESENTATIVE MICROPROBE ANALYSES AND STRUCTURAL FORMULAE OF EPIDOTE

Rock Type	Granitoids				Massive Amphibolite				Overprinted Blueschist	
	CHILI #68_core	CHILI #69_rim	I10-09 #2_core	I10-09 #5core	232 #1_rim	232 #4_core	HGR2 #93	HGR2 #94	25Mb #24	25Mb #76
SiO <sub>2</sub>	37.97	38.69	37.97	37.08	37.57	37.87	35.28	34.97	37.50	36.83
TiO <sub>2</sub>	0.15	0.07	0.41	0.31	0.12	0.14	0.28	0.27	0.19	0.08
Al <sub>2</sub> O <sub>3</sub>	25.75	29.61	27.33	25.77	22.32	27.22	24.87	25.62	25.36	24.41
FeO <sub>tot</sub>	11.11	4.96	8.90	9.63	14.23	8.60	11.03	9.92	11.00	11.94
MnO	0.38	0.10	0.19	0.06	0.64	0.11	0.15	0.19	0.60	0.51
MgO	0.08	0.02	0.22	0.36	0.05	0.12	0.11	0.18	0.01	0.02
CaO	22.84	24.11	22.89	22.12	22.45	22.99	22.04	22.23	23.38	23.23
Na <sub>2</sub> O	bdl	bdl	bdl	0.04	bdl	bdl	bdl	bdl	bdl	bdl
K <sub>2</sub> O	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl
Total	98.28	97.57	97.90	95.37	97.39	97.06	93.76	93.37	98.06	97.02
Cations on the basis of 12.5 oxygens										
Si	2.940	2.996	2.975	2.982	3.016	2.982	2.914	2.892	2.961	2.953
Ti	0.025	0.004	0.014	0.019	0.007	0.008	0.018	0.017	0.011	0.005
Al	2.412	2.702	2.462	2.443	2.112	2.526	2.421	2.497	2.360	2.307
Fe <sup>3+</sup>	0.614	0.289	0.568	0.583	0.860	0.510	0.686	0.617	0.654	0.720
Mn	0.040	0.006	0.010	0.004	0.039	0.006	0.009	0.012	0.036	0.031
Mg	0.012	0.003	0.025	0.044	0.006	0.014	0.013	0.023	0.001	0.002
Ca	1.959	2.000	1.935	1.907	3.024	1.940	1.950	1.970	1.978	1.996
Na	0.000	0.000	0.001	0.006	0.000	0.000	0.000	0.000	0.000	0.000
K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
XFe	0.60	0.29	0.55	0.57	0.89	0.49	0.62	0.55	0.64	0.70

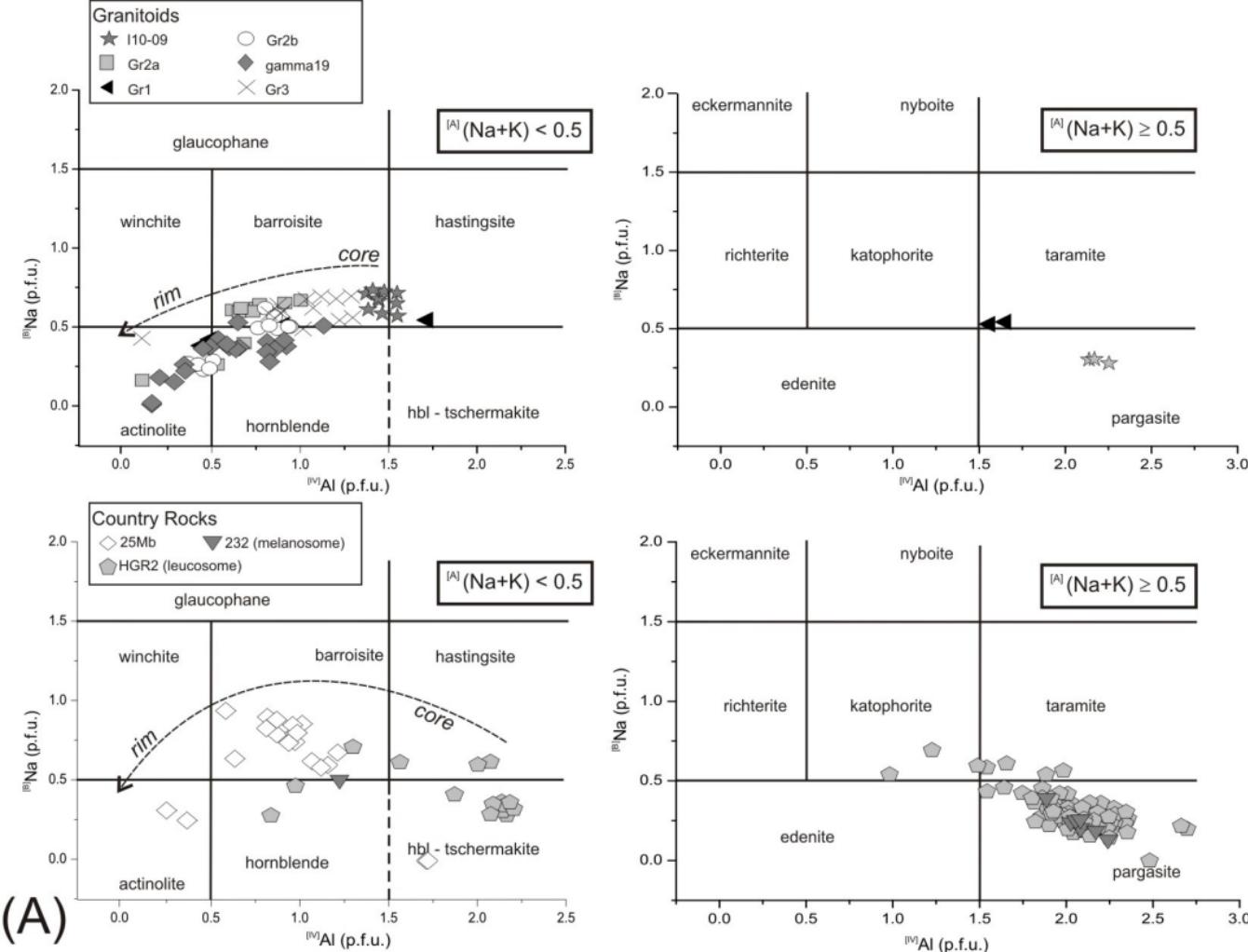
TABLE DR1e. REPRESENTATIVE MICROPROBE ANALYSES AND STRUCTURAL FORMULAE OF RUTILE

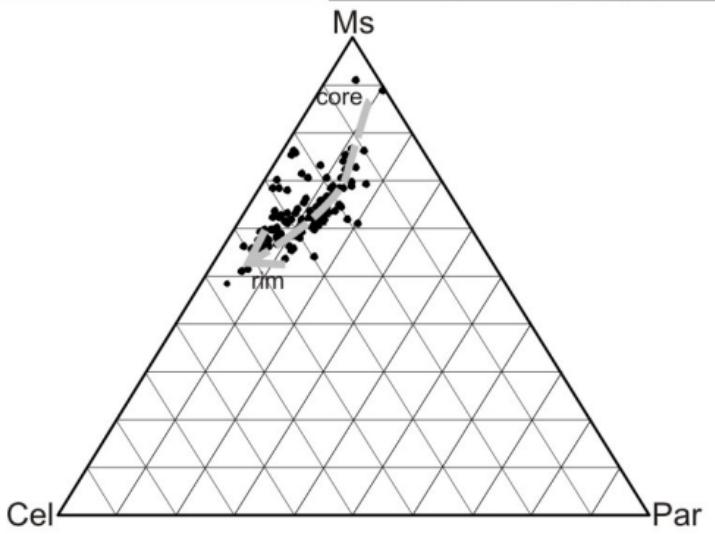
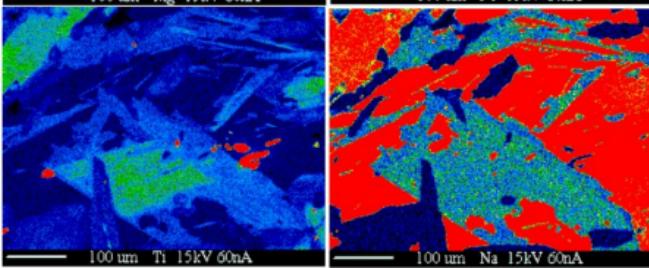
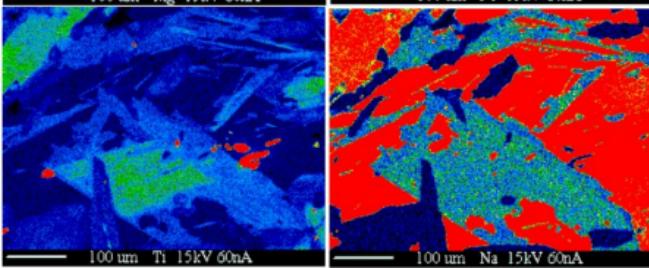
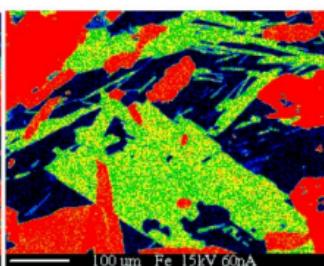
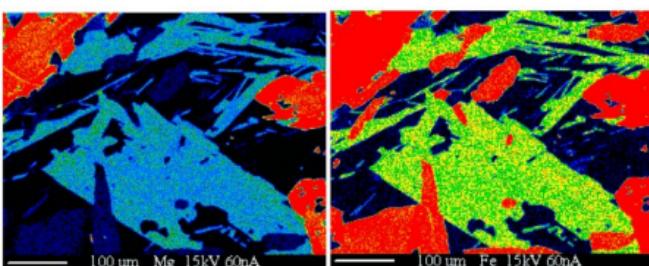
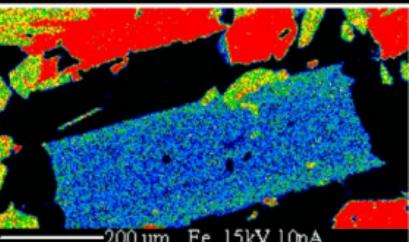
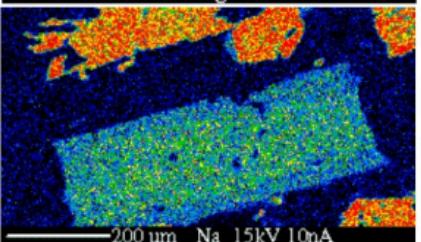
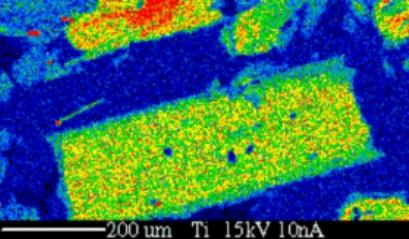
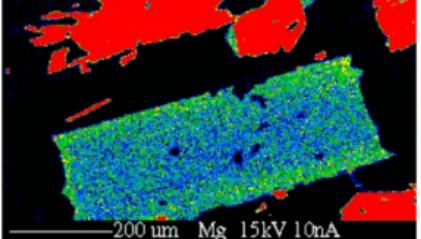
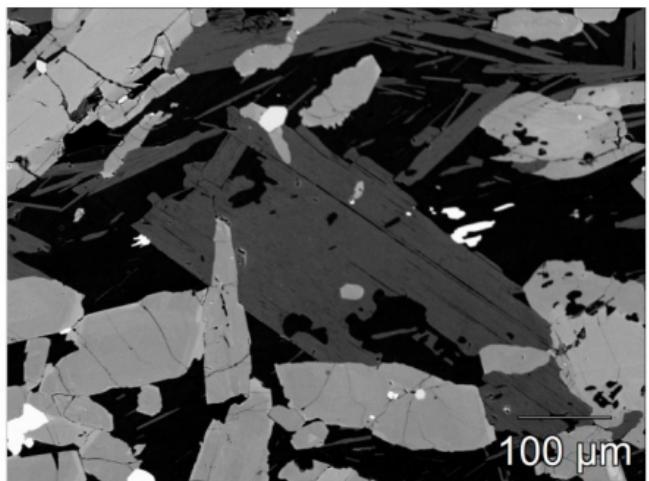
Sample	110-09						232			HGR2		
	#2	#4	#6	#7	#14	#15	#5	#1	#20	#17	#22	#33
Comment	matrix	matrix	matrix	matrix	incl. in Amp	incl. in Amp	matrix	matrix	matrix	matrix	matrix	matrix
ZrO <sub>2</sub> (%wt)	0.120	0.110	0.160	0.180	0.020	0.010	0.199	0.166	0.122	0.151	0.153	0.162
FeO	1.110	1.280	1.160	1.140	1.140	0.950	1.145	1.762	1.707	0.805	0.881	0.856
SiO <sub>2</sub>	0.050	0.000	0.010	0.010	0.150	0.050	0.000	0.021	0.000	0.000	0.000	0.000
Nb <sub>2</sub> O <sub>3</sub>	0.230	0.270	0.220	0.230	0.020	0.040	0.048	0.703	0.106	0.122	0.099	0.121
TiO <sub>2</sub>	98.490	98.340	98.450	98.440	98.650	98.940	98.606	97.344	98.064	98.920	98.865	98.860
Zr (ppm)	888	814	1184	1332	148	74	1473	1228	903	1117	1132	1199
T1 °C	858	847	894	910	629	540	936	897	860	887	889	896
T2 °C	740	732	770	782	588	541	793	773	742	764	765	771
T3 °C (@1.5 GPa)	771	763	800	813	621	574	823	803	773	794	796	802
T3 °C (@1.0 GPa)	745	737	773	785	599	553	795	776	746	767	768	774

T1, T2, T3: Rt-thermobarometry [T1: Zack et al (2004); T2: (Watson et al. (2007); T3: Tomkins et al. (2007)]

TABLE DR1f. REPRESENTATIVE MICROPROBE ANALYSES AND STRUCTURAL FORMULAE OF GARNET

Rock Type	Massive Amphibolite (melanosome)			Massive amphibolite (leucosome)			Overprinted Blueschist	
Sample	232 #9_T rim	232 #18_T rim	232 #27 core	HGR2 core #97	HGR2 rim #105	HGR2 core #75	25Mb core#91	25Mb rim#86
SiO <sub>2</sub>	37.57	37.59	37.35	37.39	38.52	37.52	36.64	36.42
TiO <sub>2</sub>	0.26	0.26	0.58	0.37	0.30	0.30	0.25	0.10
Al <sub>2</sub> O <sub>3</sub>	21.12	21.15	20.43	21.65	21.89	21.89	20.48	20.70
FeOt <sub>tot</sub>	25.20	25.24	23.70	23.39	22.69	24.17	8.93	22.51
MnO	1.17	1.36	3.01	2.79	2.03	2.46	27.35	12.10
MgO	5.46	5.12	4.32	4.37	4.75	4.04	0.17	0.55
CaO	8.71	8.91	10.34	10.67	11.11	10.21	7.17	7.63
Na <sub>2</sub> O	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl
K <sub>2</sub> O	bdl	bdl	bdl	bdl	bdl	bdl	bdl	bdl
Total	99.48	99.63	99.74	100.63	101.29	100.59	100.99	100.01
Cations on the basis of 8 oxygens								
Si	2.941	2.968	2.936	2.910	2.963	2.920	2.948	2.931
Ti	0.015	0.015	0.034	0.041	0.021	0.018	0.021	0.005
Al	1.949	1.943	1.893	1.947	1.963	2.008	1.928	2.000
Fe <sup>2+</sup>	1.650	1.645	1.558	1.522	1.460	1.573	0.601	1.515
Mn	0.078	0.090	0.201	0.184	0.132	0.162	1.864	0.825
Mg	0.637	0.595	0.507	0.507	0.545	0.469	0.020	0.066
Ca	0.730	0.744	0.871	0.890	0.916	0.851	0.618	0.658
Na	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
K	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alm	53	54	50	49	48	51	19	49
Py	21	19	16	16	18	15	1	2
Grs	24	24	28	29	30	28	20	21
Sps	3	3	6	6	4	5	60	27





(B)

