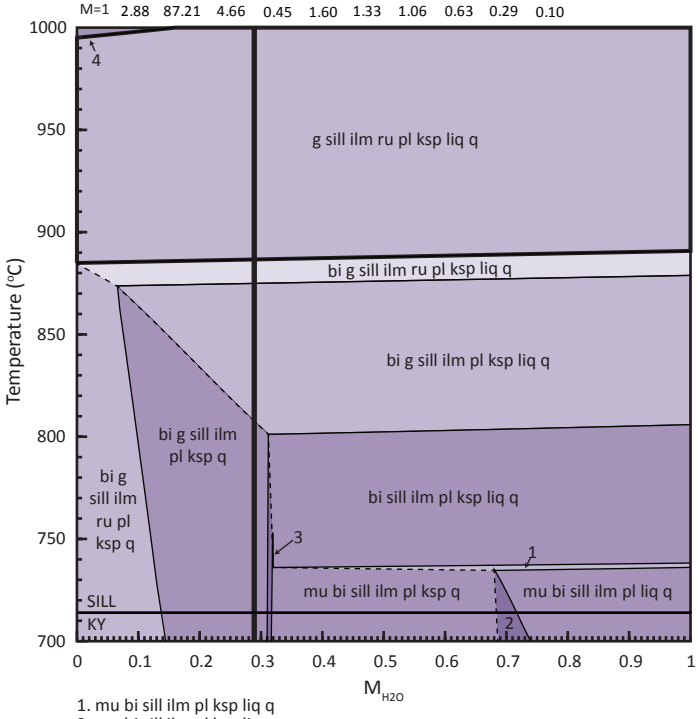
Supplementary Figure S1. T–M_{H2O} diagrams for bulk composition determination.

The H_2O content used in the bulk composition for each sample was estimated from the abundance and composition of hydrous minerals in the observed mineral assemblages. The sensitivity of the selected H_2O content on the boundaries of the peak mineral assemblage fiield to temperature is evaluated for each sample using a calculated T–M_{H2O} diagram (Figs. S1a-c below). The T–M_{H2O} diagrams are presented at the approximate peak pressure of the inferred peak mineral assemblage of each sample (Refer to Fig. 4, main text). The T–M_{H2O} diagrams are shown over the range of a near-anhydrous composition (M=0) to a maximum estimate of the H_2O content as provided by the LOI content (M=1) from whole-rock geochemistry. The inferred peak mineral assemblage stability field of each sample is outlined in bold. The solidus is represented by a dashed line. The selected H_2O content for each sample is represented by the vertical line. Mineral abbreviations refer to Holland and Powell (1998).

(a) 6264 - 8 kbar

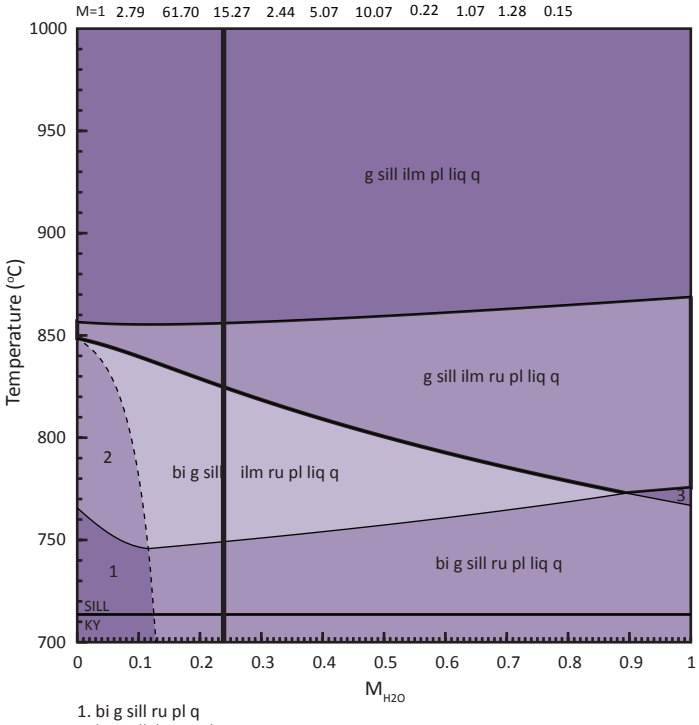
	H_2O	SiO_2	Al_2O_3	CaO	MgO	FeO	K_2O	Na_2O	TiO_2	O
M=0	0.01	89.75	4.80	0.46	1.65	1.37	1.09	0.64	0.29	0.10
M=1	2.88	87.21	4.66	0.45	1.60	1.33	1.06	0.63	0.29	0.10



1. mu bi sill ilm pl ksp liq q
2. mu bi sill ilm pl ksp liq q
3. bi g sill ilm pl ksp liq q
4. g sill ilm pl ksp liq q

(b) 5607 - 8 kbar

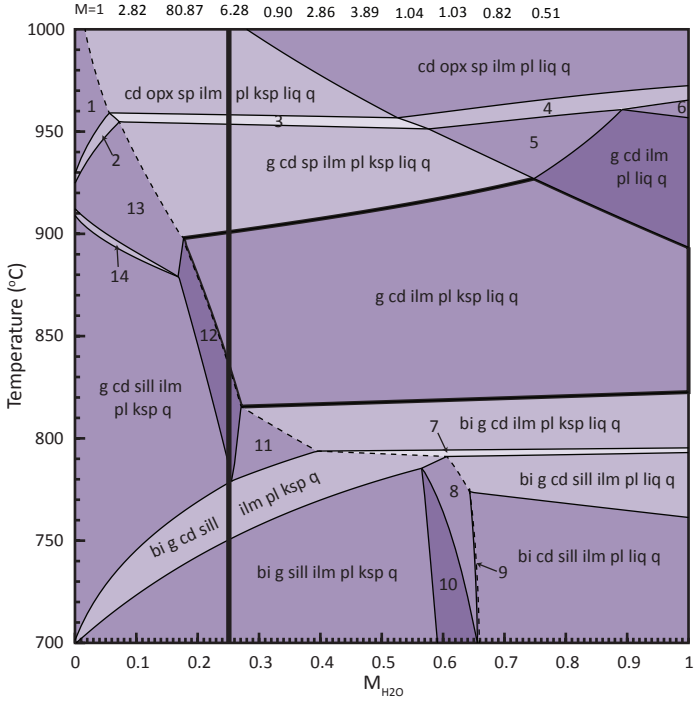
	H_2O	SiO_2	Al_2O_3	CaO	MgO	FeO	K_2O	Na_2O	TiO_2	O
M=0	0.01	63.76	15.65	2.51	5.22	10.35	0.22	1.10	1.31	0.16
M=1	2.79	61.70	15.27	2.44	5.07	10.07	0.22	1.07	1.28	0.15



1. bi g sill ru pl q
2. bi g sill ilm ru pl q
3. g sill ru pl liq q

(c) 6251 - 5.5 kbar

	H_2O	SiO_2	Al_2O_3	CaO	MgO	FeO	K_2O	Na_2O	TiO_2	O
M=0	0.01	83.19	6.46	0.93	2.94	4.00	1.07	1.06	0.84	0.52
M=1	2.82	80.87	6.28	0.90	2.86	3.89	1.04	1.03	0.82	0.51



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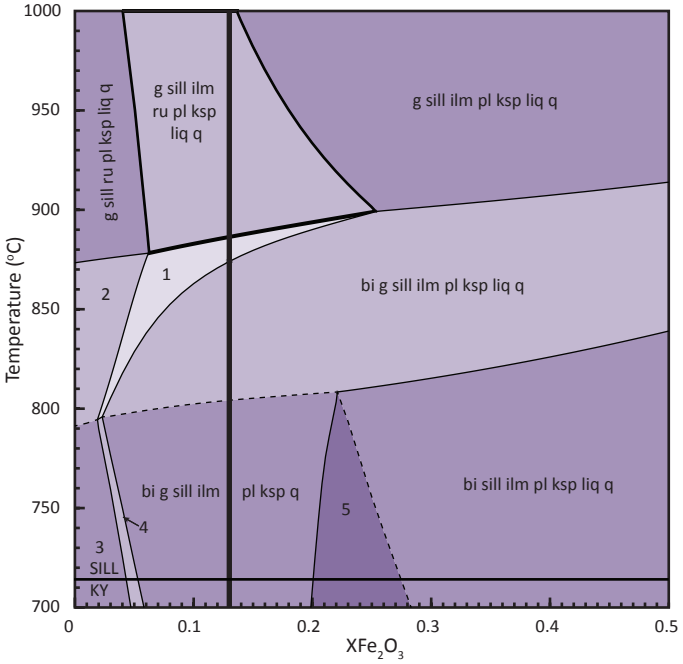
2. g cd opx sp ilm pl ksp q
3. g cd opx sp ilm pl ksp liq q
4. g cd opx sp ilm pl liq q
5. g cd sp ilm pl liq q
6. g cd opx ilm pl liq q
7. bi g cd sill ilm pl ksp liq q
8. bi g cd sill ilm pl q
9. bi g cd sill ilm pl liq q
10. bi g sill ilm pl q
11. bi g cd ilm pl ksp q
12. g cd ilm pl ksp q
13. g cd sp ilm pl ksp q
14. g cd sill sp ilm pl ksp q

Supplementary Figure S2. Temperature–XFe_2O_3 diagrams for bulk composition determination

Temperature–XFe_2O_3 ($XFe_2O_3 = Fe_2O_3/(FeO + Fe_2O_3)$) diagrams constructed for: (a) Sample 6264, (b) Sample 5607, and (c) Sample 6251. The bulk compositions used for the construction of each pseudosection are given below. The T–X sections are shown for the range X = 0 (all Fe as FeO) to X = 0.5 (50 % Fe as Fe_2O_3). The bulk composition used for the corresponding P–T pseudosection for each sample (Fig. 4, main text) is represented by the solid black line. The solidus is represented by a dashed line. Mineral abbreviations from Holland and Powell (1998).

(a) 6264 - 8 kbar

	H_2O	SiO_2	Al_2O_3	CaO	MgO	FeO	K_2O	Na_2O	TiO_2	O
X=0	0.87	88.92	4.75	0.46	1.64	1.36	1.08	0.64	0.29	0.01
X=1	0.88	89.52	4.79	0.46	1.65	1.37	1.09	0.64	0.29	0.68



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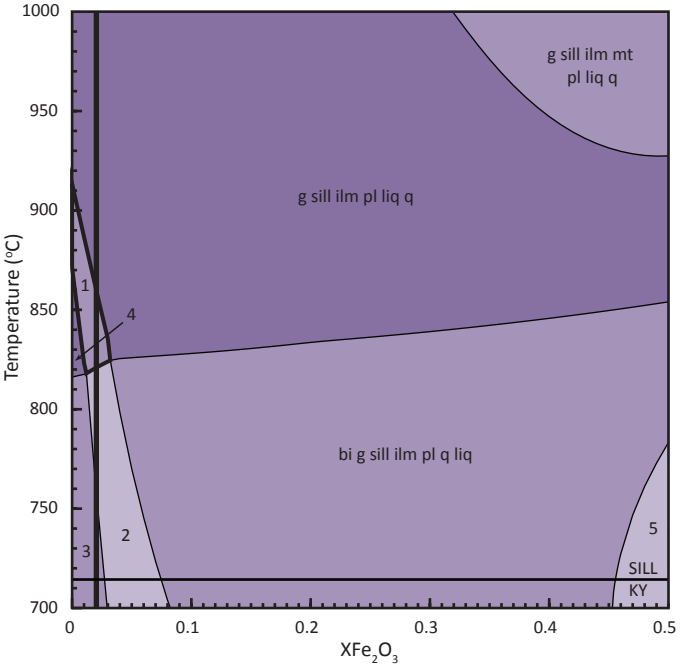
2. bi g sill ru pl ksp liq q
3. bi g sill ru pl ksp q
4. bi g sill ilm ru pl ksp q
5. bi sill ilm pl ksp q

(b) 5607 - 8 kbar

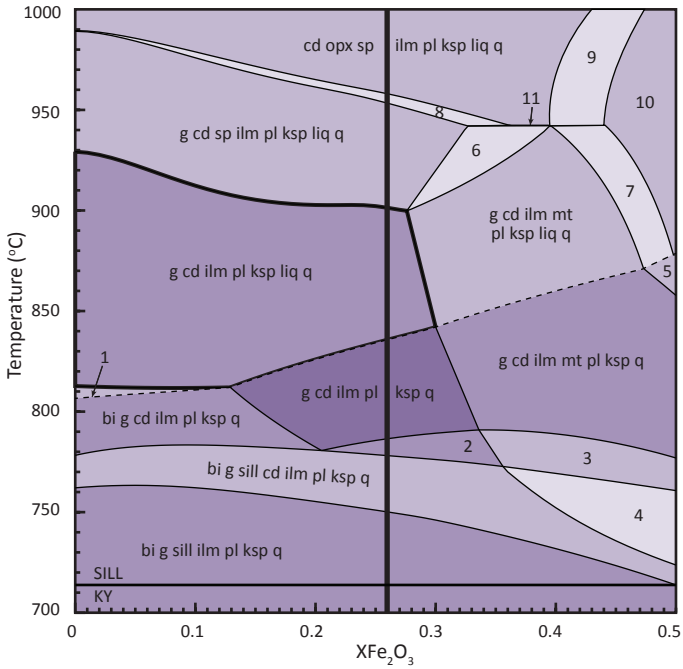
	H_2O	SiO_2	Al_2O_3	CaO	MgO	FeO	K_2O	Na_2O	TiO_2	O
X=0	0.75	63.24	15.52	2.49	5.17	10.27	0.22	1.09	1.30	0.05
X=1	0.79	66.59	16.34	2.62	5.45	10.81	0.23	1.15	1.37	5.35



1. g sill ilm ru pl liq q
2. bi g sill ilm ru pl liq q
3. bi g sill ru pl liq q
4. g sill ru pl liq q
5. bi g sill cd ilm pl liq q

(c) 6251 - 5.5 kbar

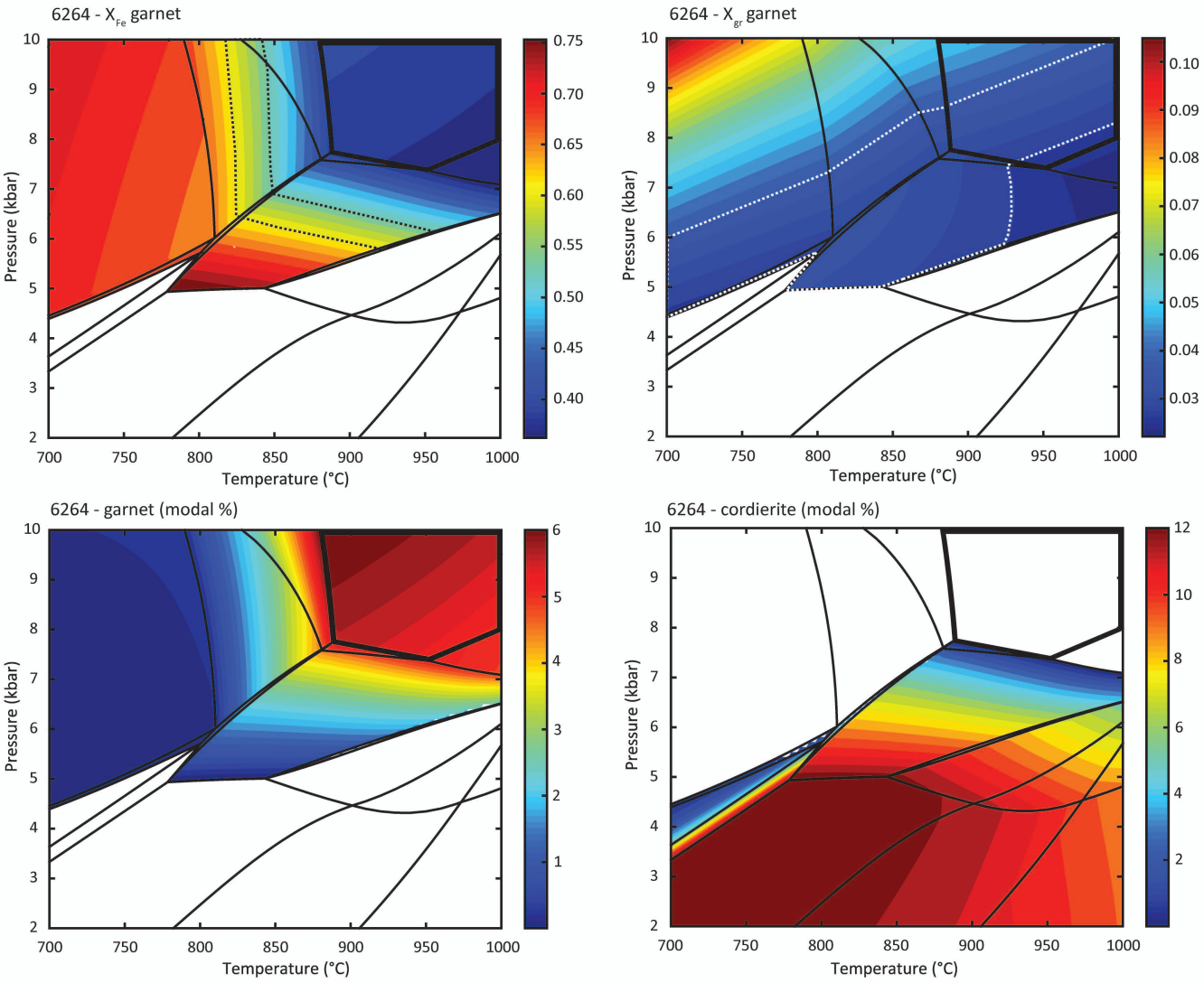
	H_2O	SiO_2	Al_2O_3	CaO	MgO	FeO	K_2O	Na_2O	TiO_2	O
X=0	0.71	82.21	6.39	0.92	2.91	3.95	1.06	1.05	0.83	0.02
X=1	0.72	83.83	6.51	0.94	2.96	4.03	1.08	1.07	0.85	2.00



1. bi g cd ilm pl ksp liq q
2. g sill cd ilm pl ksp q
3. g sill cd ilm mt pl ksp q
4. bi g sill cd ilm mt pl ksp q
5. g cd opx ilm mt pl ksp q
6. g cd sp ilm mt pl ksp liq q
7. g cd opx ilm mt pl ksp liq q
8. g cd opx sp ilm pl ksp liq q
9. cd opx sp ilm mt pl ksp liq q
10. cd opx ilm mt pl ksp liq q
11. g cd opx sp ilm mt pl ksp liq q

Supplementary Figure S3. TCInvestigator (Pearce *et al.,* 2015) contoured P-T pseudosections
Calculated P-T pseudosections are contoured for compositions and modal abundance of relevant phases discussed in the main text.
The approximate measured range of compositional isopleths for garnet are indicated by a dashed outline.
The inferred peak mineral assemblage stability field is outlined in bold.

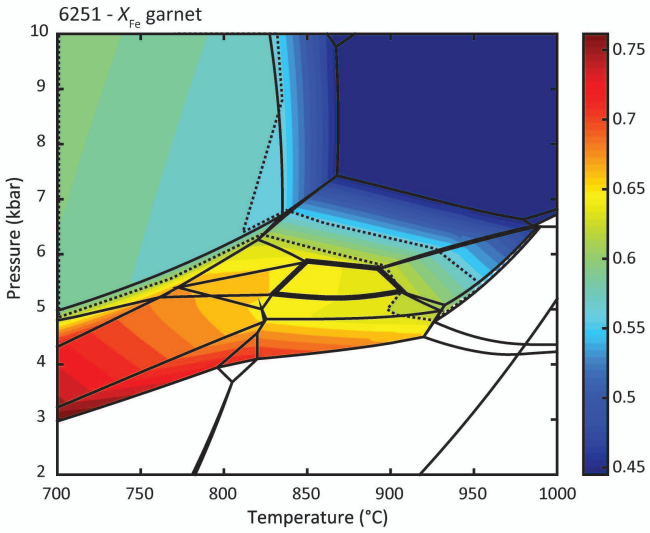
Sample 6264

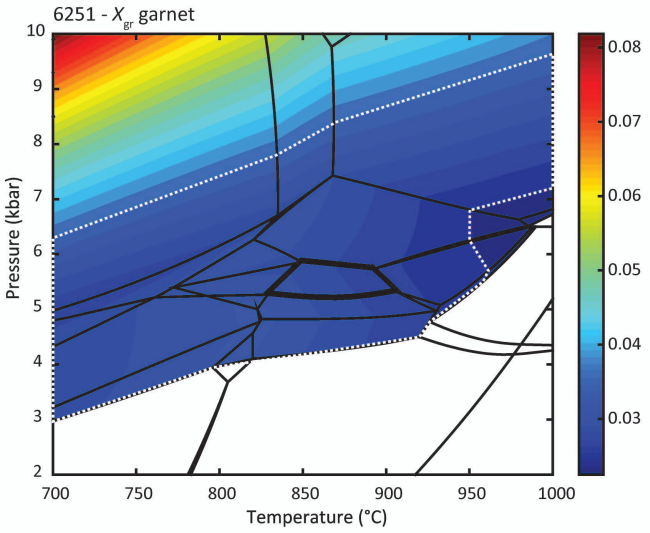


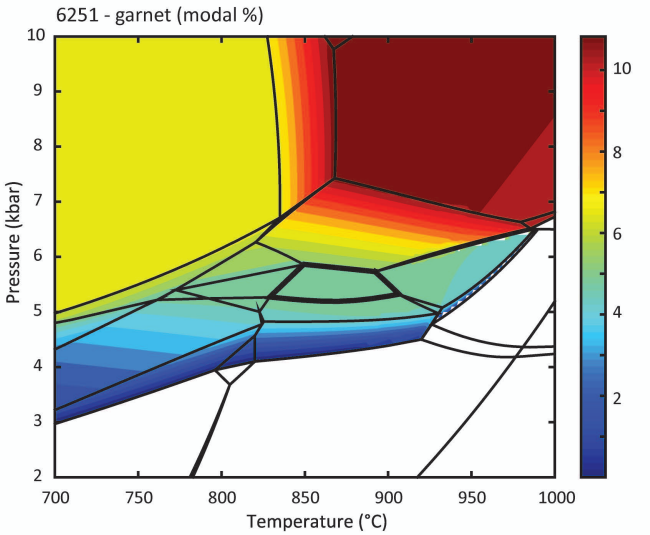
$X_{Fe} = Fe^{2+}/ (Fe^{2+} + Mg)$, $X_{gr} = Ca/(Fe^{2+} + Mg + Ca + Mn)$

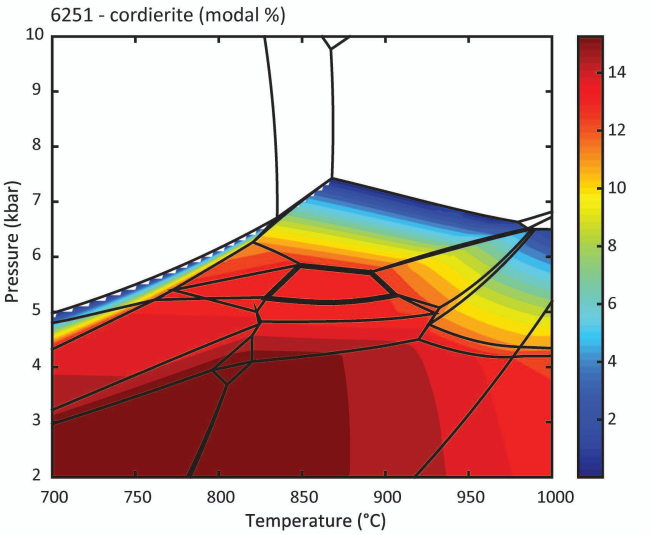
Supplementary Figure S3 cont.

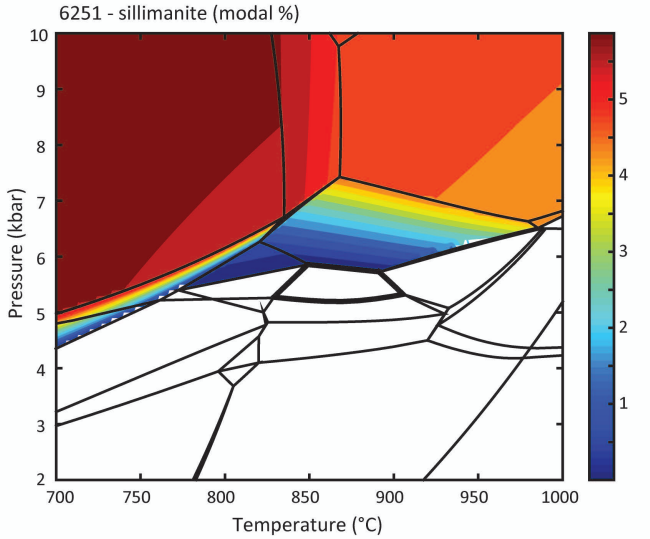
Sample 6251







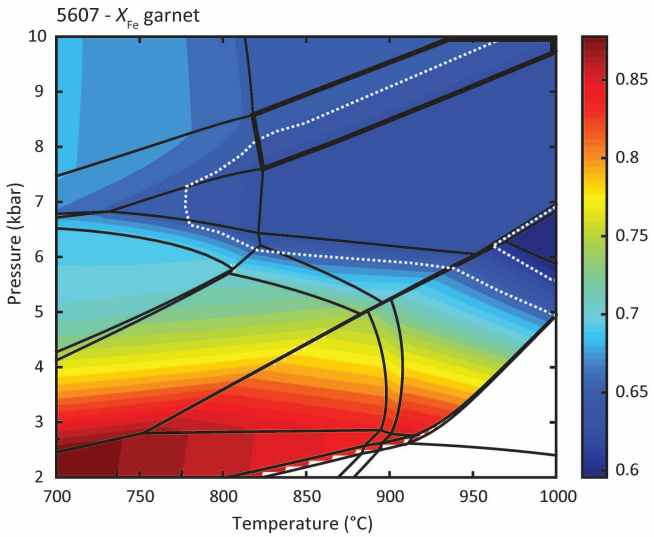


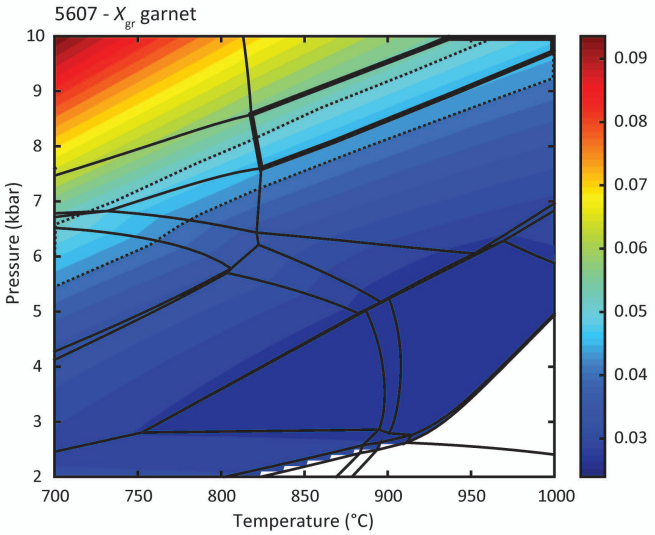


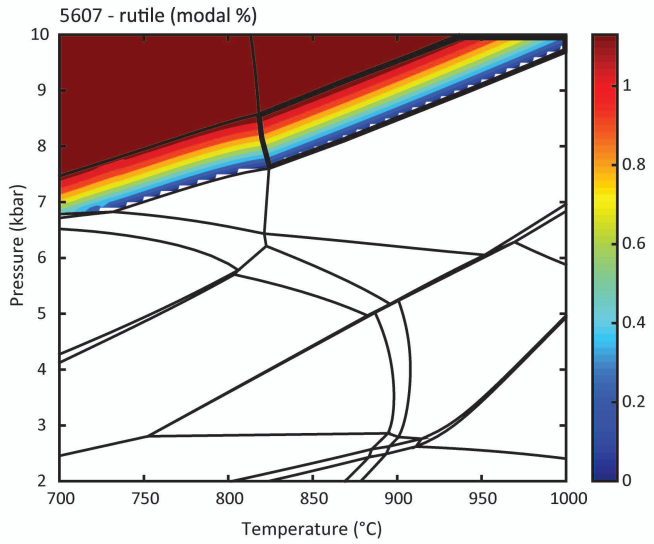
$X_{Fe} = Fe^{2+}/ (Fe^{2+} + Mg)$, $X_{gr} = Ca/(Fe^{2+} + Mg + Ca + Mn)$

Supplementary Figure S3 cont.

Sample 5607







$X_{Fe} = Fe^{2+}/ (Fe^{2+} + Mg)$, $X_{gr} = Ca/(Fe^{2+} + Mg + Ca + Mn)$

Supplementary Table S1. Representative mineral analyses.

Sample	**8628-6264**										**8628-6251**									
Mineral	bi	cd	sill	g (core)	g (rim)	ru	ilm	pl	ksp	q	bi	cd	sill	g (core)	g (rim)	sp	ilm	pl	ksp	q
SiO_2	38.37	48.39	35.59	38.60	38.89	0.00	0.00	57.29	64.20	98.87	36.55	48.52	36.08	38.46	38.25	0.00	0.00	58.97	63.67	99.49
TiO_2	3.77	0.00	0.01	0.03	0.01	99.00	49.83	0.02	0.02	0.05	4.85	0.01	0.03	0.04	0.05	0.01	51.44	0.03	0.03	0.04
Al_2O_3	14.81	33.56	62.80	21.92	22.08	0.06	0.01	26.75	19.11	0.08	15.99	33.59	62.29	21.89	21.77	60.34	0.00	25.38	18.83	0.02
Cr_2O_3	0.01	0.01	0.00	0.01	0.01	0.04	0.05	0.00	0.01	0.02	0.07	0.00	0.04	0.01	0.01	0.25	0.06	0.00	0.00	0.01
FeO	10.50	4.41	1.02	26.93	27.28	0.36	48.08	0.02	0.00	0.02	14.29	4.26	1.57	27.35	30.08	28.19	46.69	0.00	0.00	0.00
MnO	0.00	0.01	0.00	0.59	0.60	0.00	0.18	0.00	0.01	0.00	0.00	0.06	0.02	0.88	1.07	0.06	0.21	0.02	0.00	0.00
MgO	18.34	11.25	0.02	10.56	10.28	0.00	0.65	0.00	0.00	0.01	14.65	11.40	0.02	10.05	8.22	10.15	0.68	0.00	0.00	0.00
ZnO	0.01	0.03	0.00	0.05	0.00	0.00	0.00	0.05	0.01	0.02	0.01	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01
CaO	0.00	0.00	0.00	1.10	1.21	0.00	0.00	8.20	0.16	0.00	0.03	0.00	0.00	1.30	1.05	0.00	0.00	6.80	0.07	0.00
Na_2O	0.10	0.03	0.01	0.00	0.00	0.00	0.00	7.24	1.89	0.01	0.02	0.01	0.01	0.01	0.00	0.02	0.00	8.05	1.31	0.00
K_2O	10.39	0.01	0.00	0.01	0.00	0.00	0.00	0.17	14.33	0.01	10.22	0.01	0.00	0.00	0.01	0.00	0.00	0.16	15.23	0.00
Cl	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
F	2.41	0.00	0.00	0.05	0.01	0.03	0.11	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.02	0.00	0.10	0.00	0.00	0.00
Total	98.78	97.72	99.46	99.85	100.37	99.48	98.92	99.75	99.74	99.06	97.43	97.87	100.06	100.00	100.53	100.02	99.18	99.43	99.14	99.57
No. Oxygens	11	18	5	12	12	2	3	8	8	2	11	18	5	12	12	4	3	8	8	2
Si	2.45	4.91	0.97	2.96	2.97	0.00	0.00	2.56	2.95	1.00	2.38	4.91	0.98	2.95	2.96	0.00	0.00	2.63	2.95	1.00
Ti	0.18	0.00	0.00	0.00	0.00	0.99	0.95	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00
Al	1.11	4.01	2.01	1.98	1.98	0.00	0.00	1.41	1.03	0.00	1.23	4.00	1.99	1.98	1.98	1.93	0.00	1.33	1.03	0.00
Cr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fe^{3+}				0.09	0.08		0.09							0.12	0.09	0.07	0.03			
Fe^{2+}	0.56	0.37	0.02	1.63	1.66	0.00	0.93	0.00	0.00	0.00	0.78	0.36	0.04	1.63	1.86	0.56	0.96	0.00	0.00	0.00
Mn^{2+}	0.00	0.00	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.07	0.00	0.00	0.00	0.00	0.00
Mg	1.74	1.70	0.00	1.21	1.17	0.00	0.02	0.00	0.00	0.00	1.42	1.72	0.00	1.15	0.95	0.41	0.03	0.00	0.00	0.00
Zn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.00	0.09	0.10	0.00	0.00	0.39	0.01	0.00	0.00	0.00	0.00	0.11	0.09	0.00	0.00	0.33	0.00	0.00
Na	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.63	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.12	0.00
K	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.84	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.90	0.00
Cl	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.49	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cations	6.90	11	3	8	8	1	2	5	5	1	6.90	11	3	8	8	3	2	5	5	1
XMg	0.76	0.82		0.43	0.41						0.65	0.83		0.41	0.34					
Xalm				0.55	0.56									0.55	0.63					
Xpy				0.41	0.39									0.39	0.32					
Xspss				0.01	0.01									0.02	0.02					
Xgr				0.03	0.03									0.04	0.03					
Xan								0.38	0.01									0.32	0.00	
Xor								0.01	0.83									0.01	0.88	

Sample			**8628-5607**					
Mineral	bi	sill	g (core)	g (rim)	ilm	ru	pl	q
SiO_2	37.55	36.11	38.32	38.11	0.00	0.00	55.96	99.48
TiO_2	4.76	0.06	0.45	0.02	52.43	99.75	0.03	0.08
Al_2O_3	15.76	62.82	21.78	21.80	0.02	0.00	27.58	0.03
Cr_2O_3	0.11	0.31	0.06	0.06	0.09	0.21	0.00	0.01
FeO	10.17	0.27	28.66	29.63	45.29	0.05	0.02	0.00
MnO	0.00	0.00	0.37	0.36	0.10	0.00	0.00	0.00
MgO	17.96	0.01	9.16	7.95	1.85	0.00	0.00	0.00
ZnO	0.04	0.00	0.00	0.10	0.08	0.02	0.03	0.02
CaO	0.01	0.00	1.47	1.93	0.00	0.00	9.40	0.00
Na_2O	0.11	0.00	0.00	0.00	0.02	0.00	6.68	0.01
K_2O	9.70	0.00	0.00	0.01	0.00	0.00	0.21	0.01
Cl	0.09	0.00	0.00	0.01	0.00	0.00	0.00	0.01
F	0.37	0.00	0.00	0.00	0.12	0.02	0.00	0.00
Total	96.62	99.58	100.28	99.97	100.00	100.04	99.91	99.64
No. Oxygens	11	5	12	12	3	2	8	2
Si	2.41	0.98	2.95	2.96	0.00	0.00	2.50	1.00
Ti	0.23	0.00	0.03	0.00	0.98	1.00	0.00	0.00
Al	1.19	2.01	1.98	2.00	0.00	0.00	1.45	0.00
Cr	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Fe^{3+}			0.07	0.07	0.03			
Fe^{2+}	0.54	0.01	1.78	1.85	0.92	0.00	0.00	0.00
Mn^{2+}	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00
Mg	1.72	0.00	1.05	0.92	0.07	0.00	0.00	0.00
Zn	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Ca	0.00	0.00	0.12	0.16	0.00	0.00	0.45	0.00
Na	0.01	0.00	0.00	0.00	0.00	0.00	0.58	0.00
K	0.79	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Cl	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F	0.08	0.00	0.00	0.00	0.01	0.00	0.00	0.00
Cations	6.90	3	8	8	2	1	5	1
XMg	0.76		0.37	0.33				
Xalm			0.60	0.63				
Xpy			0.35	0.31				
Xspss			0.01	0.01				
Xgr			0.04	0.05				
Xan							0.43	
Xor							0.01	