

Table S1. Estimated absorbance for principal vibrational directions based on Johnson and Rossman (2003)

Sample	Oriented band areas (cm <sup>-2</sup> )			Total band area (cm <sup>-2</sup> )
	x	y	z	
Andesine GRR1389	2455	1064	596	4115
Oligoclase GRR580	999	394	117	1511
Oligoclase GRR1280	2356	1310	215	3880
Sanidine GRR638	753	269	542	1564
Anorthite GRR1968	120	944	175	1239
Microcline GRR1281	10917	2485	5986	19389
Microcline GRR968	6892	1983	4704	13579

x, y, z: principal vibrational directions

Table S2. The volume percentage, magnesium numbers,  $Al_2O_3$  in orthopyroxene and clinopyroxene and CaO in plagioclase and clinopyroxene in samples SQ-16, SQW-75, SQW-114 and SQW-110.

Xenolith	SQ-16	SQW-75	SQW-114
<i>Vol%</i>			
Plg	43.8	50.1	15.9
Cpx	19.7	32.2	19.5
Sp	13.0	2.2	13.0
Ol	22.5	2.0	23.7
Opx	–	14.0	27.9
Total	99.0	100.5	100.0
<i>Xmg</i>			
Cpx	0.97	0.82	0.83
Sp	0.59	0.55	0.65
Ol	0.82	0.75	0.80
Opx	–	0.75	0.82
<i>Al<sub>2</sub>O<sub>3</sub></i>			
Cpx	0.16	0.10	0.07
Opx	–	0.04	0.01
<i>CaO</i>			
Plg	0.85	0.94	0.32
Cpx	0.89	0.91	0.75

Opx is on a 3 oxygen basis

Table S3. Representative mineral compositions

SAMPLE	SQ-16	SQW-75	SQW-110	SQW-114	SQW-115	SQW-76	SQL-48
<b>OLIVINE</b>							
<i>wt. %</i>							
SiO <sub>2</sub>	40.14	38.02	33.19	38.51	36.98		36.56
FeO	14.89	19.61	47.78	17.82	28.38		29.82
Fe <sub>2</sub> O <sub>3</sub>	0.000	0.56	0.33	1.22	0.33		0.00
MnO	0.18	0.30	1.05	0.25	0.48		0.40
MgO	44.85	40.04	16.92	41.64	33.33		31.66
CaO	0.22	0.25	0.40	0.26	0.27		0.53
Sum	100.28	98.78	99.66	99.70	99.78		98.96
<i>cations per 4 oxygen atoms</i>							
Si	1.00	0.99	0.99	0.99	1.00		0.99
Fe <sup>2+</sup>	0.31	0.42	1.20	0.38	0.64		0.68
Fe <sup>3+</sup>	0.00	0.02	0.01	0.02	0.01		0.00
Mn	0.00	0.01	0.03	0.01	0.01		0.01
Mg	1.67	1.55	0.76	1.59	1.34		1.28
Ca	0.01	0.01	0.01	0.08	0.01		0.02
Sum	2.99	3.00	2.99	3.00	3.00		2.97
X <sub>Mg</sub>	0.84	0.78	0.39	0.80	0.67		0.65
<b>ORTHOPYROXENE</b>							
<i>wt. %</i>							
SiO <sub>2</sub>	52.57	52.53	50.31	55.75	51.71	50.33	51.41
TiO <sub>2</sub>	0.03	0.08	0.10	0.03	0.15	0.12	0.08
Al <sub>2</sub> O <sub>3</sub>	3.39	4.01	2.27	1.31	3.49	2.22	2.93
FeO	14.59	15.01	26.42	10.95	17.64	26.15	20.27
Fe <sub>2</sub> O <sub>3</sub>	1.11	0.78	1.78	0.40	1.56	1.11	2.22
MnO	0.36	0.32	0.79	0.24	0.38	2.11	0.48
MgO	26.49	26.19	17.74	29.31	24.01	17.26	22.35
CaO	0.61	0.81	1.01	2.16	0.82	1.03	0.55
Na <sub>2</sub> O	0.01	0.02	0.03	0.04	0.03	0.06	0.01
Sum	99.16	99.73	100.44	100.20	99.79	100.40	100.29
<i>cations per 3 oxygen atoms</i>							
Si	0.95	0.95	0.96	0.96	0.99	0.95	0.95
Ti	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Al	0.07	0.09	0.05	0.05	0.03	0.08	0.06
Fe <sup>2+</sup>	0.22	0.23	0.42	0.42	0.16	0.27	0.31
Fe <sup>3+</sup>	0.02	0.01	0.02	0.03	0.01	0.02	0.03
Mn	0.01	0.01	0.03	0.01	0.00	0.01	0.01
Mg	0.72	0.71	0.49	0.51	0.77	0.66	0.62
Ca	0.01	0.02	0.02	0.02	0.04	0.02	0.01
Na	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	2.00	2.00	2.00	2.00	2.00	2.00	2.00
X <sub>Mg</sub>	0.75	0.75	0.53	0.53	0.82	0.69	0.64

SAMPLE	SQ-16	SQW-75	SQW-110	SQW-114	SQW-115	SQW-76	SQL-48
<b>CLINOPYROXENE</b>							
<i>wt. %</i>							
SiO <sub>2</sub>	48.92	51.23	50.50	52.83	49.74		49.93
TiO <sub>2</sub>	0.83	0.29	0.36	0.06	0.62		0.65
Al <sub>2</sub> O <sub>3</sub>	7.17	4.66	3.61	3.27	5.09		4.92
FeO	4.63	4.16	11.80	5.71	6.41		6.44
Fe <sub>2</sub> O <sub>3</sub>	0.77	1.67	1.78	1.10	2.68		2.44
MnO	0.12	0.13	0.41	0.20	0.22		0.23
MgO	13.67	14.37	11.76	17.24	13.19		12.88
CaO	22.47	23.07	19.67	19.33	21.38		22.38
Na <sub>2</sub> O	0.28	0.44	0.52	0.38	0.54		0.44
Sum	98.86	100.01	100.41	100.12	99.86		100.30
<i>cations per 6 oxygen atoms</i>							
Si	1.82	1.88	1.90	1.93	1.85		1.86
Ti	0.02	0.01	0.01	0.00	0.02		0.02
Al	0.31	0.20	0.16	0.14	0.22		0.22
Fe <sup>2+</sup>	0.14	0.13	0.37	0.17	0.20		0.20
Fe <sup>3+</sup>	0.02	0.05	0.05	0.03	0.08		0.07
Mn	0.00	0.00	0.01	0.01	0.01		0.01
Mg	0.76	0.79	0.66	0.94	0.73		0.71
Ca	0.89	0.91	0.79	0.76	0.85		0.89
Na	0.02	0.03	0.04	0.03	0.04		0.03
Sum	3.99	4.00	4.00	4.00	3.99		4.00
X <sub>Mg</sub>	0.82	0.82	0.61	0.82	0.73		0.73
<b>SPINEL</b>							
<i>wt. %</i>							
TiO <sub>2</sub>	0.18	0.04		0.02			
Al <sub>2</sub> O <sub>3</sub>	60.14	60.16		61.38			
Cr <sub>2</sub> O <sub>3</sub>	1.13	0.03		0.90			
FeO	18.98	17.64		14.72			
Fe <sub>2</sub> O <sub>3</sub>	4.44	6.11		4.45			
MnO	0.19	0.15		0.09			
MgO	14.96	15.41		17.45			
CaO	0.06	0.02		0.04			
Sum	100.08	99.56		99.02			
<i>cations per 4 oxygen atoms</i>							
Ti	0.00	0.00		0.00			
Al	1.87	1.88		1.89			
Cr	0.02	0.00		0.02			
Fe <sup>2+</sup>	0.42	0.39		0.32			
Fe <sup>3+</sup>	0.09	0.12		0.09			
Mn	0.00	0.00		0.00			
Mg	0.59	0.61		0.68			
Ca	0.00	0.00		0.00			
Sum	3.00	3.00		3.00			
X <sub>Mg</sub>	0.54	0.55		0.62			

SAMPLE	SQ-16	SQW-75	SQW-110	SQW-114	SQW-115	SQW-76	SQL-48
<b>PLAGIOCLASE (Recrystallized grains)</b>							
<i>wt. %</i>							
SiO <sub>2</sub>	43.65	44.31		44.31	46.23	60.08	44.58
Al <sub>2</sub> O <sub>3</sub>	36.32	34.96		34.84	33.44	25.80	34.55
FeO	0.00	0.00		0.00	0.00	0.00	0.00
Fe <sub>2</sub> O <sub>3</sub>	0.00	0.00		0.00	0.00	0.00	0.00
MgO	0.00	0.01		0.04	0.04	0.02	0.01
CaO	19.92	19.01		19.28	17.73	7.68	19.09
Na <sub>2</sub> O	0.30	0.77		0.74	1.53	7.02	0.79
K <sub>2</sub> O	0.01	0.00		0.00	0.03	0.31	0.05
Sum	100.18	99.06		99.21	99.00	100.91	99.08
<i>cations per 8 oxygen atoms</i>							
Si	2.02	2.07		2.07	2.15	2.65	2.08
Al	1.98	1.92		1.91	1.83	1.34	1.90
Fe <sup>2+</sup>	0.00	0.00		0.00	0.00	0.00	0.00
Fe <sup>3+</sup>	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
Ca	0.99	0.95		0.96	0.88	0.36	0.95
Na	0.03	0.07		0.07	0.14	0.60	0.07
K <sub>2</sub> O	0.00	0.00		0.00	0.00	0.02	0.00
Sum	5.01	5.01		5.01	5.00	4.98	5.01
<b>PLAGIOCLASE (Symplectites/melt)</b>							
<i>wt. %</i>							
SiO <sub>2</sub>	46.95	47.51		59.98	52.72		
Al <sub>2</sub> O <sub>3</sub>	34.06	32.66		15.32	28.66		
FeO	0.00	0.31		2.15	0.00		
Fe <sub>2</sub> O <sub>3</sub>	0.00	0.00		3.64	0.00		
MgO	0.17	0.21		3.21	0.16		
CaO	17.37	16.73		6.39	12.43		
Na <sub>2</sub> O	1.62	1.90		5.50	4.43		
K <sub>2</sub> O	0.01	0.02		1.08	0.21		
Sum	100.18	99.33		97.26	98.61		
<i>cations per 8 oxygen atoms</i>							
Si	2.15	2.20		2.80	2.42		
Al	1.84	1.78		0.84	1.55		
Fe <sup>2+</sup>	0.00	0.00		0.08	0.00		
Fe <sup>3+</sup>	0.00	0.01		0.13	0.00		
Mg	0.01	0.01		0.23	0.01		
Ca	0.85	0.83		0.32	0.61		
Na	0.14	0.17		0.50	0.40		
K <sub>2</sub> O	0.00	0.00		0.06	0.01		
Sum	5.00	5.00		4.97	5.01		

Table S4. Results of two-pyroxene geothermometry

Sample	T (°C) calculated at a pressure of 6 kbar			
	2-Px BK <sup>a</sup>	2-Px T <sup>c</sup>	2-Px Avg	1 std dev
SQ-16	732	770	751	27
SQL-48	739	790	765	36
SQW-75	741	777	759	25
SQW-110	824	947	886	87
SQW-114	863	908	886	32
SQW-115	834	874	854	28

<sup>a</sup>Brey and Köhler (1990); <sup>c</sup>Taylor [1998]

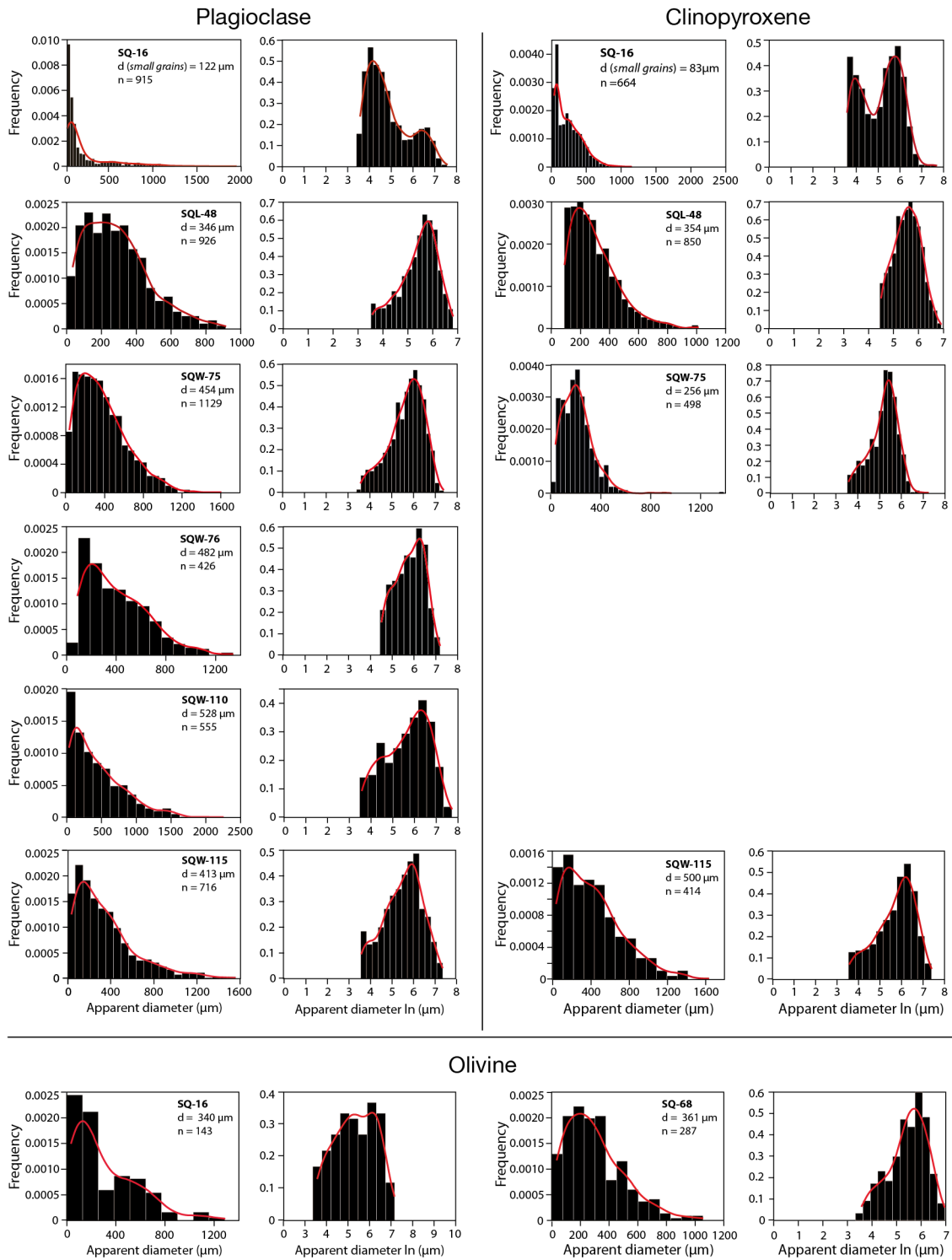


Figure S5. Recrystallized grain size distributions of plagioclase, clinopyroxene and olivine for granulites SQ-16, SQL-48, SQW-75, SQW-76, SQW-110 and SQW-115, as well as Iherzolite SQ-68 xenoliths. The red lines show the lognormal distribution fit to the distributions.

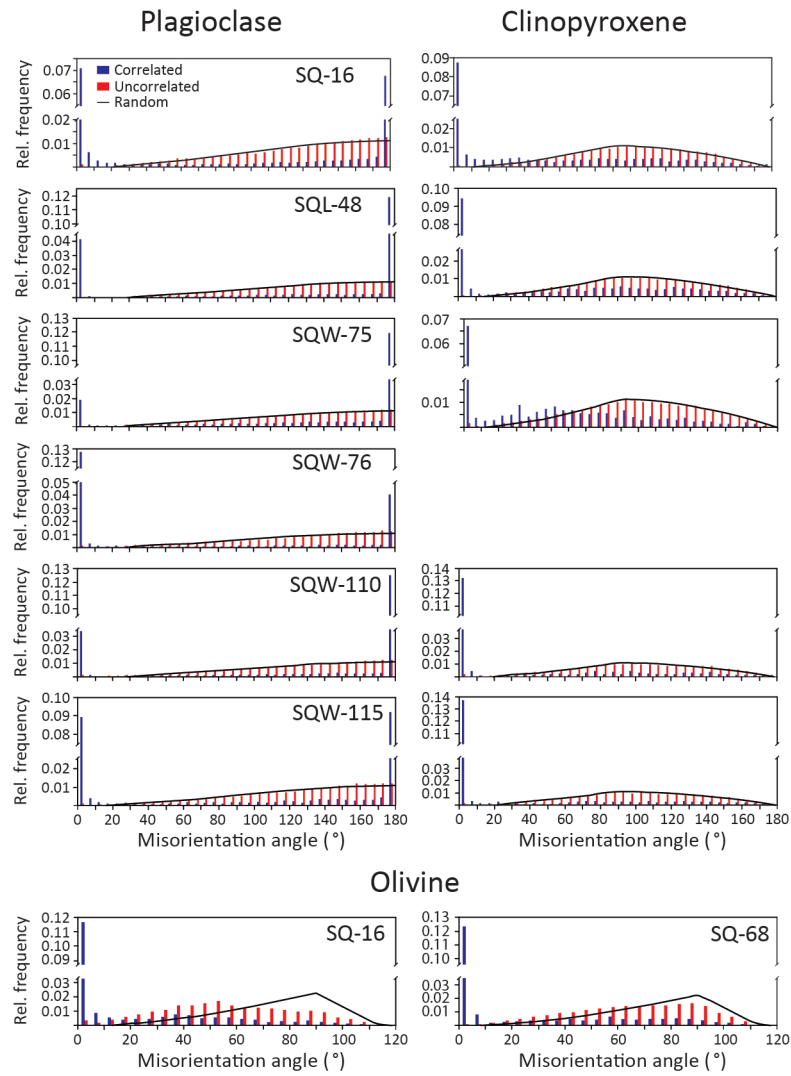


Figure S6. Misorientations histograms for the correlated and uncorrelated distributions of plagioclase, clinopyroxene and olivine.