Supplement

Table S1. EPMA analyses carried out on chlorites in each area (red dots in Figures 5 and 6).

		SiO_2	TiO_2	Al_2O_3	FeO	MgO	MnO	CaO	Na_2O	K_2O	□
		Oxide wt (%)									
PPV12-07	1	27.05	0.02	23.03	20.26	17.65	0.1	0.04	0	0.04	88.19
Area1	2	27.59	0.01	23.12	20.99	16.84	0.06	0.06	0	0.02	88.68
	3	27.39	0.03	22.57	20.53	16.68	0.12	0.05	0	0.04	87.41
	4	27.1	0.01	22.59	20.63	17.09	0.19	0.05	0.01	0.05	87.73
	5	26.91	0.03	22.64	20.36	16.91	0	0.06	0.08	0.03	87.01
	6	27.36	0.01	23.05	20.48	16.57	0.11	0.04	0	0.04	87.66
	7	26.97	0.02	23	19.95	16.9	0.02	0.04	0	0.02	86.92
	8	26.69	0	22.92	20.39	16.5	0.06	0.04	0.03	0.06	86.7
	9	27.31	0.01	22.68	19.73	17.27	0.18	0.04	0	0.03	87.25
	10	26.86	0.02	23	20.12	17.05	0.08	0.06	0	0.04	87.23
	11	26.95	0.02	23.07	19.8	17.18	0	0.05	0.01	0.04	87.12
	12	27.53	0.05	22.53	19.9	17	0.17	0.07	0.02	0.04	87.31
	13	28.04	0	22.68	19.83	16.59	0.12	0.04	0	0.09	87.4
	14	27.1	0.01	22.69	20.38	17.07	0	0.04	0.03	0.05	87.37
PPV12-07	1	27.56	0.02	22.65	19.32	17.88	0.04	0.04	0.01	0.05	87.56
Area2	2	27.85	0.02	22.42	19.39	17.95	0.04	0.06	0	0.01	87.74
	3	27.49	0	23	20.02	16.93	0.05	0.06	0	0.05	87.59
	4	27.07	0.03	23.57	20.29	16.82	0.04	0.02	0.02	0.04	87.9
	5	26.85	0.02	23.08	19.56	17.72	0.05	0.03	0.01	0.02	87.34
	6	26.59	0.02	22.68	21.07	17.18	0.09	0.07	0	0.02	87.71
	7	26.7	0.03	22.36	20.24	17.09	0.01	0.04	0	0.02	86.48
	8	26.3	0.03	23.13	20.95	16.08	0.06	0.04	0.02	0.03	86.64
	9	26.87	0.01	22.48	20.08	17.78	0.04	0.03	0.03	0.02	87.34
	10	27.19	0.04	22.12	19.08	18.02	0.01	0.01	0.01	0.02	86.51
	11	27.1	0	22.35	19.8	17.05	0.05	0.06	0	0.02	86.42
	12	26.18	0.02	22.62	20.3	16.99	0.04	0.05	0	0.05	86.25
	13	27.38	0.01	23.22	20.37	17.11	0.06	0.03	0.01	0.01	88.2
	14	26.71	0.05	23.14	20.66	16.21	0.07	0.06	0.02	0.02	86.95
	15	27.64	0.04	22.5	19.63	16.83	0.05	0.06	0	0.02	86.77
	16	26.78	0.03	22.47	20.36	15.84	0.07	0.09	0	0.04	85.68
	17	27.19	0	23.1	20.44	16.24	0.05	0.1	0	0.04	87.16
PPV12-05	1	25.94	0.03	22.79	23.69	14.55	0.03	0.05	0	0.01	87.09
Area1	2	26.74	0.03	22.82	23.01	14.45	0.03	0.06	0	0.02	87.16
	3	27.51	0.02	22.03	21.2	16.77	0.04	0.07	0	0	87.64
	4	27.35	0	21.98	21.78	16.09	0.05	0.06	0.04	0.02	87.37
	5	26.41	0.01	22.28	23.87	14.79	0.03	0.04	0.01	0.02	87.46
PPV12-05	1	26.42	0	22.97	22.14	14.86	0.03	0.04	0	0	86.46
Area2	2	26.62	0.01	22.55	21.11	15.67	0.05	0.1	0.02	0.04	86.16
	2	26.72	0.04	22.64	21.89	15.21	0.04	0.06	0	0.02	86.62
	4	26.43	0.01	22.47	21.54	15.26	0.04	0.07	0	0.04	85.86
	5	26.09	0.02	21.99	23.14	14.85	0.06	0.08	0.05	0.01	86.29

Table S2. XANES data obtained on chlorite in each area (blue points on Figures 5 and 6).

		Centroid energy (eV)	Integrated pre-edge intensity	XFe^{3+}
PPV12-07 Area1	1	7113.53	0.1174	0.30
	2	7113.62	0.1054	0.36
	3	7113.51	0.1110	0.29
	4	7113.48	0.1133	0.27
Mean value				*0.31*
St Dev				*0.04*
PPV12-07 Area2	1	7113.58	0.1202	0.34
	2	7113.55	0.1134	0.32
	3	7113.58	0.1034	0.34
	4	7113.43	0.1140	0.24
	5	7113.68	0.1001	0.41
	6	7113.53	0.1080	0.30
Mean value				*0.32*
St Dev				*0.06*
PPV12-05 Area1	1	7113.58	0.0924	0.33
	2	7113.80	0.1171	0.49
	3	7113.51	0.1053	0.29
	4	7113.64	0.0958	0.37
	5	7113.77	0.1192	0.47
Mean value				*0.39*
St Dev				*0.09*
PPV12-05 Area2	1	7113.12	0.0988	0.07
	2	7113.39	0.1204	0.22
	3	7113.23	0.0991	0.12
	4	7113.42	0.1241	0.23
	6	7113.29	0.0998	0.16
Mean value				*0.16*
St Dev				*0.07*

5

Table S3. Structural formulae of newly formed chlorite calculated by coupling XANES and microprobe results.

		Tetrahedral layer		Octahedral layer						
		Si	^{IV}Al	^{VI}Al	Fe^{2+}	Fe^{3+}	Fe_{total}	Mg	Mn	□ Octa
PPV12-07 Area1	1	2.74	1.26	1.49	1.18	0.53	1.72	2.66	0.01	5.88
	2	2.78	1.22	1.53	1.22	0.55	1.77	2.53	0	5.84
	3	2.8	1.2	1.52	1.21	0.54	1.76	2.54	0.01	5.83
	4	2.77	1.23	1.48	1.22	0.55	1.76	2.6	0.02	5.86
	5	2.76	1.23	1.51	1.21	0.54	1.75	2.59	0	5.85
	6	2.79	1.21	1.55	1.2	0.54	1.74	2.52	0.01	5.82
	7	2.76	1.23	1.54	1.18	0.53	1.71	2.58	0	5.84
	8	2.75	1.25	1.54	1.21	0.55	1.76	2.54	0.01	5.84
	9	2.79	1.21	1.52	1.16	0.52	1.68	2.63	0.02	5.84
	10	2.75	1.25	1.52	1.19	0.53	1.72	2.6	0.01	5.85
	11	2.75	1.24	1.54	1.17	0.52	1.69	2.62	0	5.85
	12	2.81	1.19	1.52	1.17	0.53	1.7	2.59	0.01	5.82
	13	2.85	1.15	1.57	1.16	0.52	1.69	2.51	0.01	5.78
	14	2.77	1.23	1.51	1.2	0.54	1.74	2.6	0	5.85
Mean Value		*2.78*	*1.22*	*1.52*	*1.19*	*0.54*	*1.73*	*2.58*	*0.01*	*5.84*
St Dev		*0.03*	*0.03*	*0.02*	*0.02*	*0.01*	*0.03*	*0.05*	*0.01*	*0.02*
PPV12-07 Area2	1	2.79	1.2	1.5	1.11	0.52	1.64	2.7	0	5.84
	2	2.82	1.18	1.49	1.12	0.52	1.64	2.71	0	5.84
	3	2.79	1.21	1.55	1.16	0.54	1.7	2.57	0	5.82
	4	2.75	1.25	1.57	1.17	0.55	1.72	2.54	0	5.84
	5	2.74	1.26	1.51	1.13	0.53	1.67	2.69	0	5.87
	6	2.72	1.28	1.46	1.23	0.58	1.8	2.62	0.01	5.9
	7	2.76	1.24	1.49	1.19	0.56	1.75	2.63	0	5.87
	8	2.72	1.27	1.55	1.23	0.58	1.81	2.48	0.01	5.85
	9	2.75	1.25	1.46	1.17	0.55	1.72	2.71	0	5.89
	10	2.79	1.21	1.47	1.11	0.52	1.64	2.76	0	5.86
	11	2.79	1.21	1.51	1.16	0.55	1.71	2.62	0	5.84
	12	2.72	1.28	1.49	1.2	0.56	1.76	2.63	0	5.89
	13	2.77	1.23	1.54	1.17	0.55	1.72	2.58	0.01	5.84
	14	2.75	1.25	1.56	1.21	0.57	1.78	2.49	0.01	5.83
	15	2.83	1.17	1.55	1.14	0.54	1.68	2.57	0	5.8
	16	2.79	1.2	1.56	1.21	0.57	1.78	2.46	0.01	5.81
	17	2.78	1.22	1.57	1.19	0.56	1.75	2.48	0	5.81
Mean Value		*2.77*	*1.23*	*1.52*	*1.17*	*0.55*	*1.72*	*2.6*	*0*	*5.85*
St Dev		*0.03*	*0.03*	*0.04*	*0.04*	*0.02*	*0.06*	*0.09*	*0*	*0.03*
PPV12-05 Area1	1	2.71	1.28	1.53	1.26	0.81	2.07	2.27	0	5.87
	2	2.78	1.22	1.57	1.22	0.78	2	2.24	0	5.81
	3	2.81	1.18	1.47	1.11	0.71	1.81	2.56	0	5.85
	4	2.82	1.18	1.49	1.14	0.73	1.88	2.47	0	5.84
	5	2.75	1.25	1.49	1.27	0.81	2.08	2.3	0	5.87
Mean Value		*2.78*	*1.22*	*1.51*	*1.2*	*0.77*	*1.97*	*2.37*	*0*	*5.85*
St Dev		*0.04*	*0.04*	*0.04*	*0.07*	*0.05*	*0.12*	*0.14*	*0*	*0.02*

PPV12-05 Area2	1	2.76	1.24	1.58	1.62	0.31	1.93	2.31	0	5.83
	2	2.77	1.22	1.55	1.55	0.29	1.84	2.43	0	5.82
	3	2.78	1.22	1.56	1.6	0.3	1.9	2.36	0	5.82
	4	2.77	1.23	1.55	1.59	0.3	1.89	2.39	0	5.83
	5	2.75	1.25	1.49	1.71	0.33	2.04	2.33	0.01	5.87
Mean Value		*2.77*	*1.23*	*1.54*	*1.61*	*0.31*	*1.92*	*2.36*	*0*	*5.83*
St Dev		*0.01*	*0.01*	*0.04*	*0.06*	*0.01*	*0.07*	*0.05*	*0*	*0.02*

Table S4. Calculated temperatures obtained by (1) the semi-empirical thermometer developed by Inoue (Inoue et al. 2009) with $Fe_{total} = Fe^{2+}$, (2) the semi-empirical thermometer developed by Inoue (Inoue et al. 2009) using the mean value of XFe^{3+} obtained by XANES measurements, (3) the thermodynamical model developed by Vidal et al. (2001, 2005, 2006) and Lanari et al. (2014) and the modelled XFe^{3+}.

		Modeled temperature (°C)			Modeled XFe^{3+}
		$T^{(1)}$	$T^{(2)}$	$T^{(3)}$	$XFe^{3+(3)}$
PPV12-07 Area1	1	367	330	313	18
	2	312	276	266	25
	3	302	266	256	29
	4	344	306	288	24
	5	328	292	282	24
	6	300	264	261	25
	7	320	284	278	22
	8	326	290	286	20
	9	317	281	270	27
	10	339	303	297	19
	11	329	294	291	20
	12	292	257	250	32
	13	251	219	222	36
	14	329	293	282	24
Mean Value		*318*	*282*	*274*	*25*
St Dev		*27*	*26*	*23*	*5*
PPV12-07 Area2	1	316	281	268	30
	2	306	270	252	35
	3	295	260	258	27
	4	322	286	291	17
	5	360	324	313	17
	6	395	356	344	13
	7	352	314	290	23
	8	345	307	313	12
	9	377	339	312	21
	10	337	301	275	31
	11	314	277	265	28
	12	382	344	340	12
	13	322	285	279	22
	14	319	282	285	18
	15	271	237	235	34
	16	287	250	254	26

	17	289	253	259	24
Mean Value		*329*	*292*	*284*	*23*
St Dev		*36*	*35*	*31*	*7*
PPV12-05 Area1	1	367	316	321	10
	2	295	248	261	20
	3	314	267	254	32
	4	304	257	251	31
	5	355	303	291	18
Mean Value		*327*	*278*	*276*	*22*
St Dev		*32*	*30*	*30*	*9*
PPV12-05 Area2	1	311	290	275	17
	2	306	285	270	22
	3	302	280	263	22
	4	309	287	270	21
	5	352	328	292	19
Mean Value		*316*	*294*	*274*	*20*
St Dev		*20*	*19*	*11*	*2*