This DR Item accompanies Vye-Brown, C., Barry, T.L., and Self, S., 2018, Revealing emplacement dynamics of a simple fl ood basalt eruption unit using systematic compositional heterogeneities, *in* Poland, M.P., Garcia, M.O., Camp, V.E., and Grunder, A., eds., Field Volcanology: A Tribute to the Distinguished Career of Don Swanson: Geological Society of America Special Paper 538, p. 21–39, https://doi.org/10.1130/2018.2538(02).

Figure DR-A. Compilation diagram of major oxides (wt %) and trace element (ppm) variations within the N Snake middle (PF_2) lobe of the Palouse Falls flow field. Pale gray bands in the upper crust indicate vesicle-rich layers.

Figure DR-B. Compilation diagram of major oxides (wt %) and trace element (ppm) variations within the N Snake middle-distal (PF_3) lobe of the Palouse Falls flow field. The dark gray band within the core denotes a finely jointed zone, whereas the pale gray bands in the upper crust indicate vesicle-rich layers.

Figure DR-C. Compilation diagram of major oxides (wt %) and trace element (ppm) variations within the Lower Monumental Dam (PF_4) lobe of the Palouse Falls flow field. The dark gray band within the core denotes a finely jointed zone, whereas the pale gray bands in the upper crust indicate vesicle-rich layers.

Figure DR-D. Compilation diagram of major oxides (wt %) and trace element (ppm) variations within the W of Ginkgo Dyke (PF_5) lobe of the Palouse Falls flow field. Grey bands indicate vesicle-rich layers.

Figure DR-E. Compilation diagram of major oxides (wt %) and trace element (ppm) variations within the DC8 borehole core (PF_7) lobe of the Palouse Falls flow field. Grey bands indicate areas of vesicle-rich banding in contrast with vesicle-poor portions of the lobe.

Table DR-1. Major and trace element results of samples from the Palouse Falls flow field. Grey areas indicate samples that lie within the core of a lobe while clear areas indicate samples from the upper and lower crusts.

TABLE DR-1

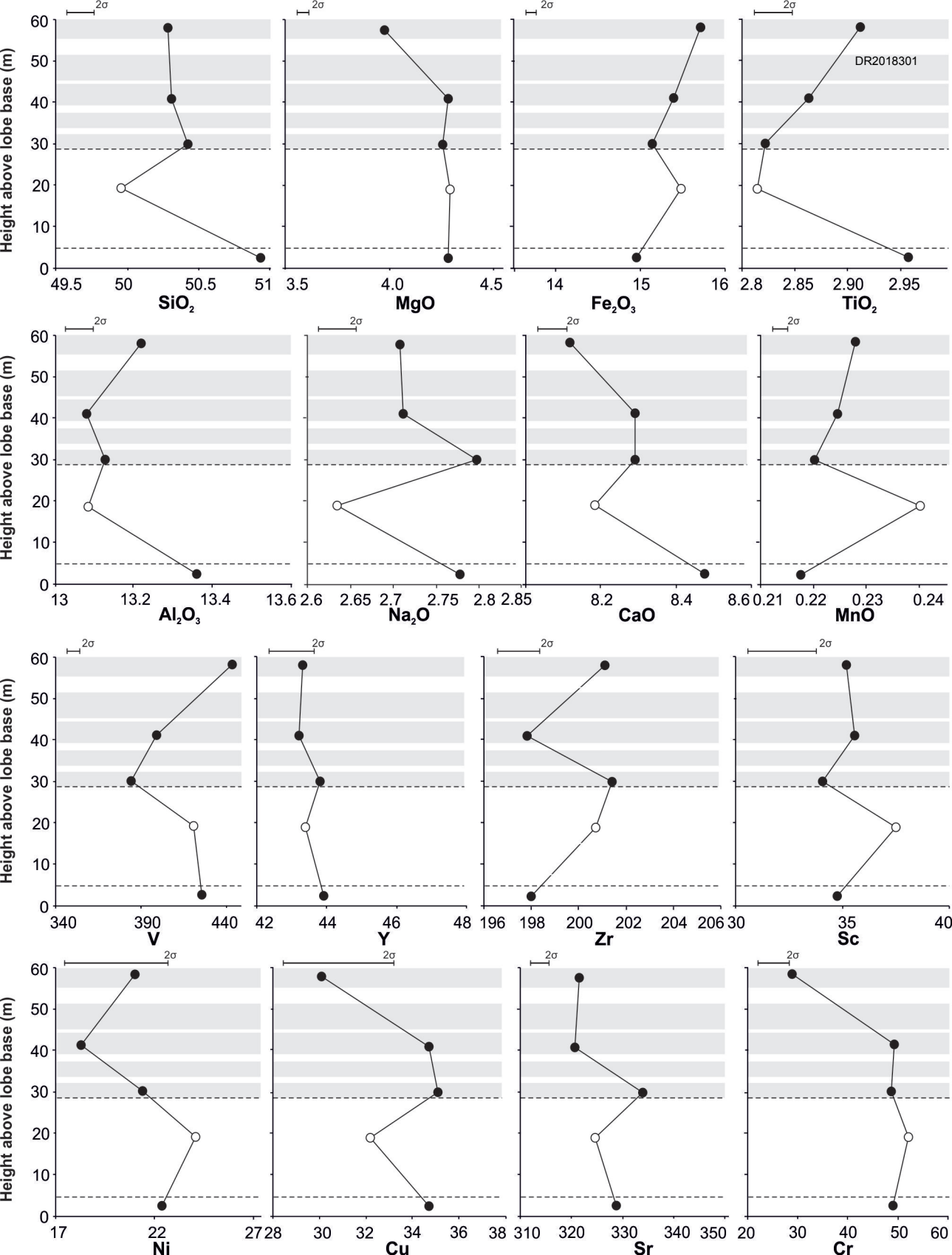
Sample locality	PF_1 Winn Lake Canyon									PF_2 N Snake A				
Sample no.	CRB06-287	CRB06-288	CRB06-289	CRB06-290	CRB06-291	CRB06-292	CRB06-293	CRB06-294	CRB06-295	CRB06-059	CRB06-060	CRB06-061	CRB06-062	CRB06-063
Section No.	PF_1	PF_1	PF_1	PF_1	PF_1	PF_1	PF_1	PF_1	PF_1	PF_2	PF_2	PF_2	PF_2	PF_2
Height in flow (m)	2.0	8.5	11.5	22.0	26.0	30.0	39.5	47.5	52.0	2.5	19.0	30.0	41.0	58.0
Distance from source (km)	5	5	5	5	5	5	5	5	5	12	12	12	12	12
Oxide wt. %														
SiO2	49.98	49.22	50.23	50.58	50.41	50.81	50.49	50.43	50.60	50.93	49.94	50.42	50.31	50.28
TiO2	3.06	3.14	2.88	2.91	2.89	2.83	2.86	2.92	2.95	2.96	2.81	2.82	2.86	2.91
Al2O3	13.26	13.57	13.20	13.17	13.16	13.12	13.12	13.19	13.25	13.36	13.08	13.13	13.08	13.22
Fe2O3	15.77	15.77	15.54	15.59	15.38	15.25	15.33	15.19	14.87	14.95	15.48	15.13	15.38	15.70
MnO	0.23	0.25	0.23	0.25	0.24	0.24	0.25	0.24	0.22	0.22	0.24	0.22	0.22	0.23
MgO	4.25	4.31	4.36	4.34	4.23	4.11	4.19	4.22	4.16	4.29	4.29	4.26	4.28	3.97
CaO	8.43	8.61	8.24	8.23	8.19	8.12	8.24	8.39	8.46	8.47	8.19	8.29	8.29	8.12
Na2O	2.74	2.71	2.68	2.69	2.73	2.75	2.57	2.67	2.65	2.78	2.63	2.80	2.71	2.71
K2O	0.98	0.90	1.38	1.32	1.30	1.30	1.22	1.05	1.18	1.39	1.39	1.24	1.23	1.22
P2O5	0.50	0.52	0.54	0.55	0.53	0.55	0.54	0.54	0.55	0.56	0.54	0.54	0.54	0.56
LOI	0.61	0.70	0.11	-0.01	0.24	0.43	0.85	1.16	0.80	0.13	0.07	0.82	0.68	0.43
Total	99.82	99.71	99.37	99.61	99.31	99.50	99.67	100.01	99.68	100.04	98.67	99.66	99.60	99.36
Element ppm														
Rb	24	24	35	34	37	36	34	30	32	35	37	32	32	26
Sr	313	321	328	326	328	327	316	323	323	329	325	334	321	322
Y	42.1	44.0	42.1	43.2	42.4	43.4	42.0	42.3	42.4	43.9	43.4	43.8	43.2	43.3
Zr	172	176	198	198	201	207	201	199	199	198	201	201	198	201
Nb	12.2	13.1	15.4	15.9	15.4	15.5	15.4	13.8	15.4	15.1	14.9	15.4	15.7	15.2
Ba	576	574	563	556	704	573	539	499	529	569	554	605	509	575
Pb	6	4	6	7	9	6	6	6	4	7	9	8	8	9
Th	6	5	4	7	3	6	7	7	7	6	6	2	4	6
U	2	0	0	0	3	1	2	0	1	0	0	2	2	1
Sc	41	47	34	35	36	35	36	36	38	35	38	34	36	35
V	380	400	413	423	412	395	411	412	422	425	421	384	399	444
Cr	51	48	53	54	55	52	50	51	52	49	52	49	49	29
Co	36	35	35	37	36	32	38	36	39	35	29	33	34	33
Ni	33	31	21	25	22	22	20	26	21	22	24	21	18	21
Cu	47	43	34	34	33	34	33	31	32	35	32	35	35	30
Zn	133	147	136	147	147	148	145	144	146	137	138	134	142	137
Ga	22	22	22	22	23	22	22	21	24	24	21	23	21	21
Mo	0	0	1	2	1	1	1	1	1	2	2	2	2	2
As	0	4	5	0	2	0	1	1	0	0	7	2	4	2
S	42	100	460	295	365	321	283	446	309	343	392	355	314	487

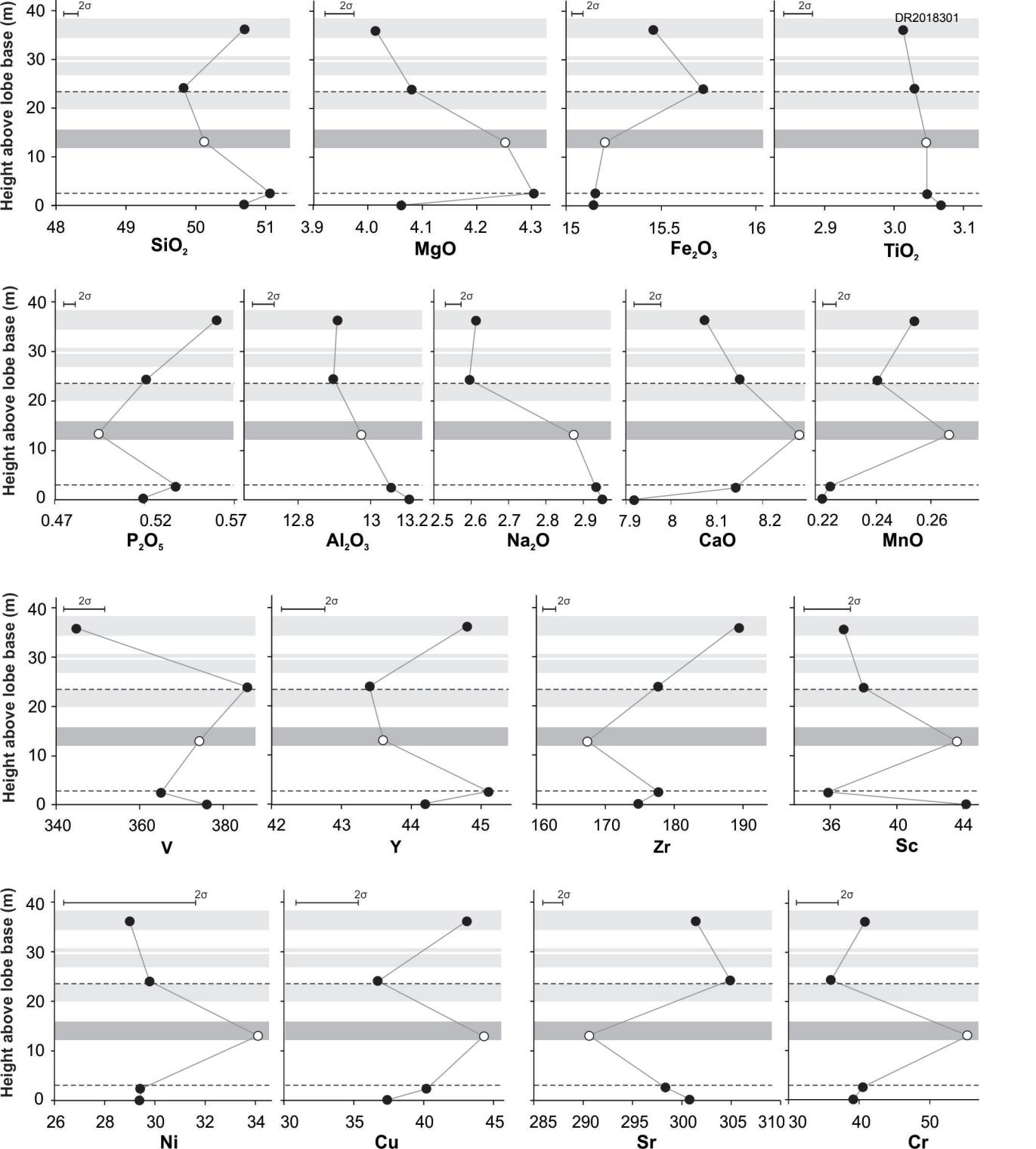
Sample locality	PF_3 N Snake B					PF_4 Lower Monumental Dam								
Sample no.	CRB06-048	CRB06-049	CRB06-051	CRB06-053	CRB06-055	CRB06-080	CRB06-081	CRB06-084	CRB06-085	CRB06-086	CRB06-087	CRB06-088	CRB06-089	CRB06-090
Section No.	PF_3	PF_3	PF_3	PF_3	PF_3	PF_4	PF_4	PF_4	PF_4	PF_4	PF_4	PF_4	PF_4	PF_4
Height in flow (m)	0.1	2.5	13.0	24.0	36.0	2.0	3.5	10.0	13.0	15.5	18.0	19.0	20.0	27.0
Distance from source (km)	22	22	22	22	22	30	30	30	30	30	30	30	30	30
Oxide wt. %														
SiO2	50.68	51.05	50.12	49.81	50.69	50.29	50.34	49.59	50.72	49.98	49.84	50.14	50.36	50.43
TiO2	3.07	3.05	3.05	3.03	3.01	3.08	2.98	2.96	3.07	3.06	3.12	3.14	3.13	3.14
Al2O3	13.11	13.06	12.97	12.90	12.91	13.04	12.97	12.81	13.17	13.01	12.96	13.12	12.98	13.00
Fe2O3	15.28	15.29	15.33	15.77	15.55	15.41	15.42	15.82	15.02	15.35	15.45	15.13	16.05	15.38
MnO	0.22	0.22	0.27	0.24	0.25	0.23	0.24	0.26	0.23	0.23	0.25	0.24	0.25	0.26
MgO	4.06	4.31	4.25	4.08	4.01	3.94	4.08	4.20	4.20	4.33	4.22	4.22	4.16	4.10
CaO	7.92	8.09	8.23	8.10	8.02	8.25	8.13	8.04	8.30	8.33	8.47	8.46	8.29	8.34
Na2O	2.95	2.93	2.87	2.60	2.61	2.79	2.85	2.76	2.95	2.83	2.80	2.78	2.73	2.68
K2O	1.27	1.25	1.16	1.28	1.67	1.10	1.12	1.17	1.21	1.02	0.98	1.21	1.19	1.28
P2O5	0.52	0.54	0.49	0.52	0.56	0.52	0.51	0.50	0.52	0.49	0.49	0.51	0.52	0.52
LOI	0.25	0.32	0.70	0.54	0.15	0.76	0.52	0.39	0.42	1.02	0.79	0.63	0.29	0.49
Total	99.34	100.11	99.44	98.85	99.45	99.41	99.15	98.50	99.81	99.67	99.37	99.58	99.95	99.62
Element ppm														
Rb	34	31	32	31	36	31	25	30	32	16	20	28	31	28
Sr	301	298	291	305	301	312	308	299	300	300	318	318	311	309
Y	44.2	45.1	43.6	43.4	44.8	42.6	43.1	43.4	44.0	43.2	41.8	43.2	43.1	42.9
Zr	175	178	167	178	189	178	174	173	173	169	173	179	178	177
Nb	12.7	12.7	12.6	13.8	15.2	13.5	12.6	13.7	13.4	12.8	12.3	12.6	13.9	13.9
Ba	595	611	565	538	620	602	586	578	585	581	569	575	525	604
Pb	8	9	4	12	8	7	5	4	7	7	6	5	7	6
Th	8	4	7	5	5	5	3	4	2	4	7	5	6	4
U	0	0	0	2	2	1	1	0	2	3	1	3	1	0
Sc	44	36	44	38	37	37	41	38	41	39	42	38	38	41
V	376	365	374	386	345	375	376	384	386	367	398	397	383	397
Cr	39	41	55	36	41	39	39	49	45	50	44	43	44	36
Co	36	34	38	33	35	31	35	36	33	38	39	39	38	35
Ni	29	29	34	30	29	28	31	37	36	32	34	34	30	26
Cu	37	40	44	37	43	38	38	40	41	41	39	36	37	36
Zn	141	138	136	150	145	131	136	135	132	133	144	146	153	150
Ga	19	21	22	22	20	22	21	22	21	22	22	21	22	19
Mo	1	1	2	1	2	1	1	3	2	2	0	1	0	1
As	0	0	1	0	0	1	2	2	0	2	0	0	0	2
S	235	216	157	655	304	31	207	210	246	441	596	795	475	496

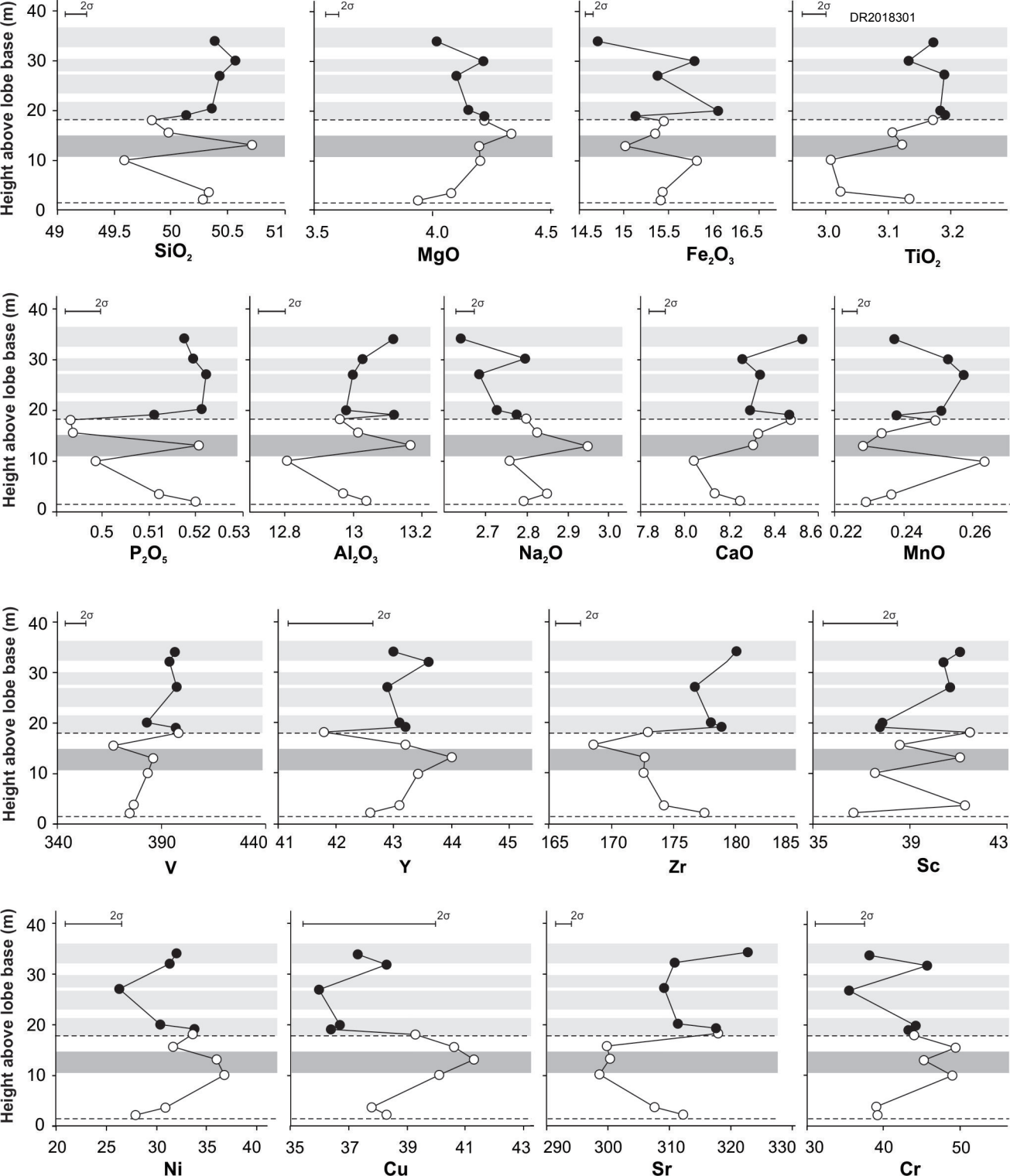
Sample locality	PF_5 W of Gingko dyke									PF_7 DC8 borehole			
Sample no.	CRB06-091	CRB06-092	CRB06-093	CRB06-380	CRB06-381	CRB06-382	CRB06-383	CRB06-384	CRB06-385	CRB05-096	CRB05-097	CRB05-098	CRB05-099B
Section No.	PF_4	PF_4	PF_4	PF_5	PF_5	PF_5	PF_5	PF_5	PF_5	PF_7	PF_7	PF_7	PF_7
Height in flow (m)	30.0	32.0	34.0	0.1	8.0	11.0	17.0	23.0	32.0	27.0	21.0	11.0	0.1
Distance from source (km)	30	30	30	40	40	40	40	40	40	80	80	80	80
Oxide wt. %													
SiO2	50.57	-	50.39	51.25	50.94	50.60	50.44	50.38	49.54	48.68	49.56	50.41	50.88
TiO2	3.08	-	3.13	3.10	3.12	3.08	3.18	3.11	3.13	3.04	3.01	3.06	3.14
Al2O3	13.03	-	13.11	13.26	12.93	13.11	13.09	12.96	13.00	12.99	13.10	12.96	13.37
Fe2O3	15.79	-	14.71	15.98	15.47	15.97	16.11	16.02	16.05	16.79	15.51	16.01	15.02
MnO	0.25	-	0.24	0.23	0.22	0.25	0.24	0.24	0.24	0.33	0.23	0.23	0.25
MgO	4.21	-	4.02	3.24	3.97	4.23	4.08	4.13	3.95	4.30	4.18	3.99	3.31
CaO	8.26	-	8.52	7.74	8.11	8.28	8.31	8.26	8.23	8.35	8.43	7.94	7.93
Na2O	2.80	-	2.64	3.01	2.93	2.72	2.82	2.61	2.56	2.68	2.94	2.91	3.12
K2O	1.31	-	1.44	1.18	1.24	1.35	1.05	1.35	0.99	0.82	0.84	1.21	1.26
P2O5	0.52	-	0.52	0.56	0.54	0.55	0.54	0.54	0.55	0.49	0.50	0.51	0.55
LOI	-0.04	-	0.62	0.86	0.39	0.16	0.63	0.44	1.15	1.48	1.38	0.45	1.02
Total	99.78	-	99.34	100.41	99.85	100.31	100.49	100.05	99.39	99.95	99.69	99.68	99.85
Element ppm													
Rb	-	32	29	32	30	33	30	33	27	25	13	30	32
Sr	-	311	323	319	312	319	318	317	305	303	305	298	303
Y	-	43.6	43.0	44.3	43.4	43.7	44.5	43.6	46.1	41.7	41.3	42.2	44.5
Zr	-	179	180	187	180	182	181	181	182	168	169	171	181
Nb	-	14.2	12.8	14.0	13.4	13.7	14.6	13.8	12.8	13.4	12.4	12.6	15.4
Ba	-	537	579	644	607	553	608	563	514	416	602	605	618
Pb	-	6	4	5	8	4	6	6	9	7	7	8	10
Th	-	5	5	5	5	6	6	5	5	6	5	4	5
U	-	2	2	0	2	0	2	3	1	0	1	2	0
Sc	-	40	41	38	39	37	41	37	39	40	38	38	42
V	-	394	397	342	378	349	374	367	365	367	361	378	407
Cr	-	46	38	33	31	33	37	34	34	35	35	29	28
Co	-	33	45	32	36	34	33	35	37	35	35	33	37
Ni	-	31	32	23	25	27	27	27	23	24	26	23	26
Cu	-	38	37	37	40	39	37	38	37	36	39	39	36
Zn	-	155	144	149	140	141	152	145	150	127	138	131	153
Ga	-	21	21	21	21	23	22	22	20	21	20	23	23
Mo	-	2	0	0	0	1	0	0	0	1	2	1	2
As	-	4	2	1	0	0	4	1	0	1	5	2	2
S	-	424	145	75	263	329	303	344	210	186	423	50	241

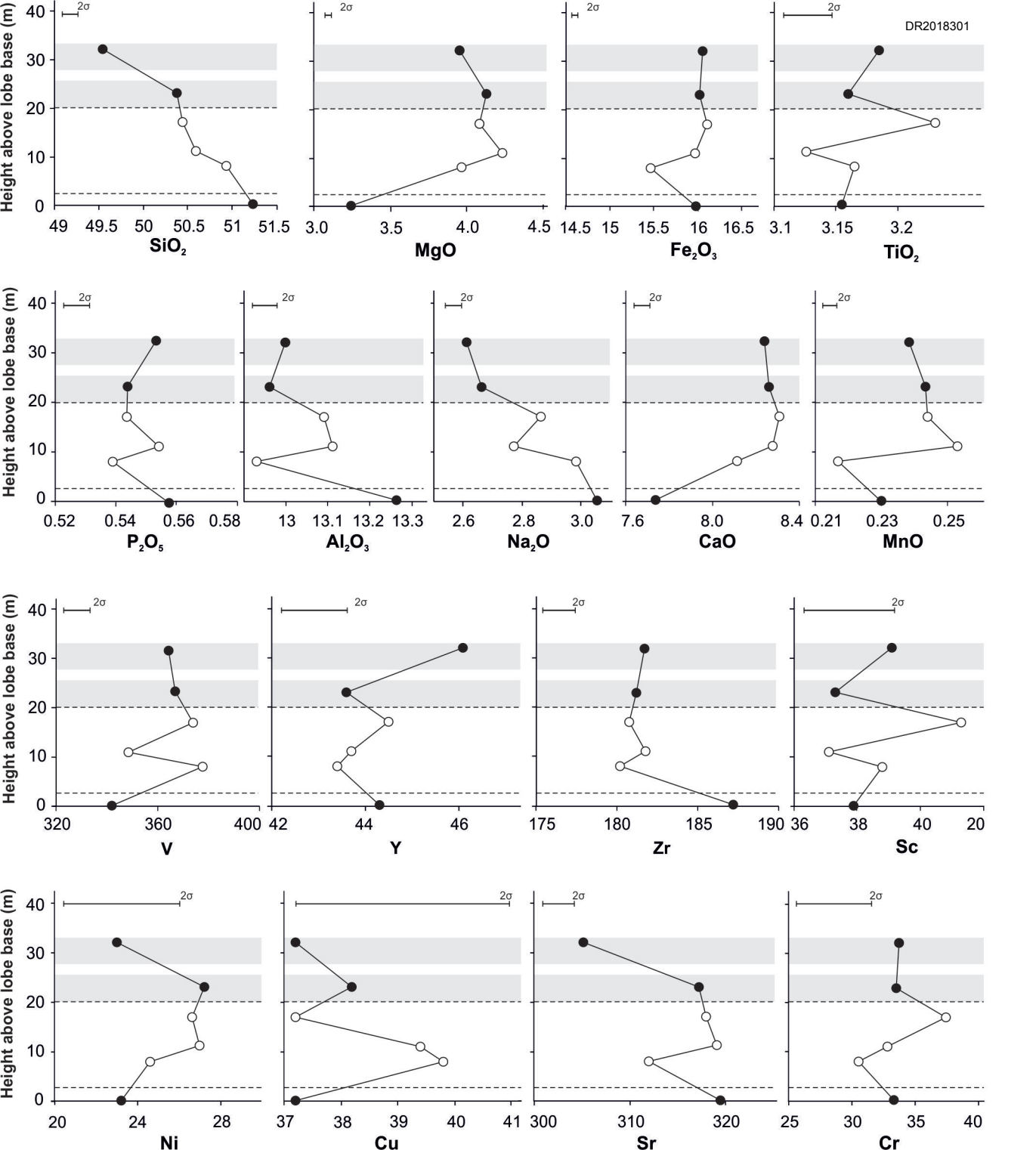
Sample locality	Basal interval high density sampling						High interval - Starbuck road						
Sample no.	CRB05-099T	CRB06-314	CRB06-315	CRB06-316	CRB06-317	CRB06-318	CRB06-304	CRB06-305	CRB06-306	CRB06-307	CRB06-308	CRB06-309	CRB06-310
Section No.	PF_7	SH_8	SH_8	SH_8	SH_8	SH_8	GR-N2	GR-N2	GR-N2	GR-N2	GR-N2	GR-N2	GR-N2
Height in flow (m)	0.3	0.8	0.4	0.3	0.2	0.1	0.0	0.8	1.1	1.3	1.9	2.4	3
Distance from source (km)	80	-	-	-	-	-	-	-	-	-	-	-	-
Oxide wt. %													
SiO2	50.56	50.52	50.85	51.61	50.84	50.89	52.76	52.72	52.76	52.89	52.32	52.51	52.37
TiO2	3.07	2.92	2.92	3.00	2.93	3.04	1.884	1.876	1.865	1.890	1.862	1.869	1.858
Al2O3	12.99	13.06	13.20	13.62	13.28	13.56	13.86	13.93	13.85	13.92	13.85	13.94	13.79
Fe2O3	16.06	15.67	15.52	14.57	15.20	14.42	12.64	13.14	12.96	12.80	12.94	12.99	12.99
MnO	0.23	0.22	0.23	0.23	0.23	0.23	0.206	0.227	0.221	0.213	0.208	0.211	0.212
MgO	3.41	4.19	4.28	3.63	3.93	3.49	4.72	4.80	4.60	4.82	4.95	4.78	4.63
CaO	7.87	8.19	8.33	8.57	8.35	8.54	8.72	8.78	8.77	8.86	8.85	8.82	8.71
Na2O	2.94	2.76	2.71	2.84	2.73	2.70	2.89	2.88	2.83	2.72	2.68	2.79	2.79
K2O	1.24	1.26	1.40	1.38	1.35	1.38	1.05	0.98	1.00	0.97	0.84	0.87	0.93
P2O5	0.53	0.54	0.55	0.57	0.56	0.58	0.270	0.278	0.273	0.276	0.273	0.279	0.263
LOI	0.83	0.03	-0.18	0.05	-0.05	0.40	0.32	0.49	0.64	0.78	1.12	0.75	0.94
Total	99.73	99.37	99.81	100.08	99.35	99.24	99.33	100.10	99.76	100.15	99.90	99.81	99.49
Element ppm													
Rb	33	33	37	35	36	35	25	24	27	26	24	25	25
Sr	294	327	325	335	327	332	333	327	325	326	327	332	326
Y	42.9	42.8	42.3	43.9	42.5	45.6	34.7	33	32.6	33.3	33.0	34.5	33.9
Zr	175	199	202	204	197	205	161	162	160	163	160	162	161
Nb	13.1	15.1	15.7	15.9	15.7	16.2	12.0	12.0	11.4	12.1	11.8	11.4	11.6
Ba	588	572	552	576	537	577	474	465	456	429	410	437	436
Pb	11	8	4	8	7	5	5	4	5	2	2	4	3
Th	6	5	5	2	6	6	5	6	2	3	5	5	6
U	3	0	2	1	0	2	2	1	1	1	0	0	0
Sc	41	37	37	40	36	43	36	34	35	35	33	35	36
V	379	403	407	439	421	441	328	325	334	337	337	333	329
Cr	31	50	56	54	52	59	34	38	41	39	34	38	36
Co	38	37	39	38	39	34	41	38	38	43	41	41	35
Ni	27	26	24	24	24	18	17	19	16	18	15	17	17
Cu	37	35	35	34	32	33	37	36	34	35	34	34	35
Zn	148	140	144	150	146	159	111	112	117	114	113	118	115
Ga	23	22	21	23	22	23	21	22	20	22	20	21	22
Mo	1	1	0	0	0	0	1	0	1	0	1	0	0
As	0	0	3	0	4	0	0	0	0	0	0	0	2
S	305	406	367	383	333	504	160	146	260	133	80	139	172

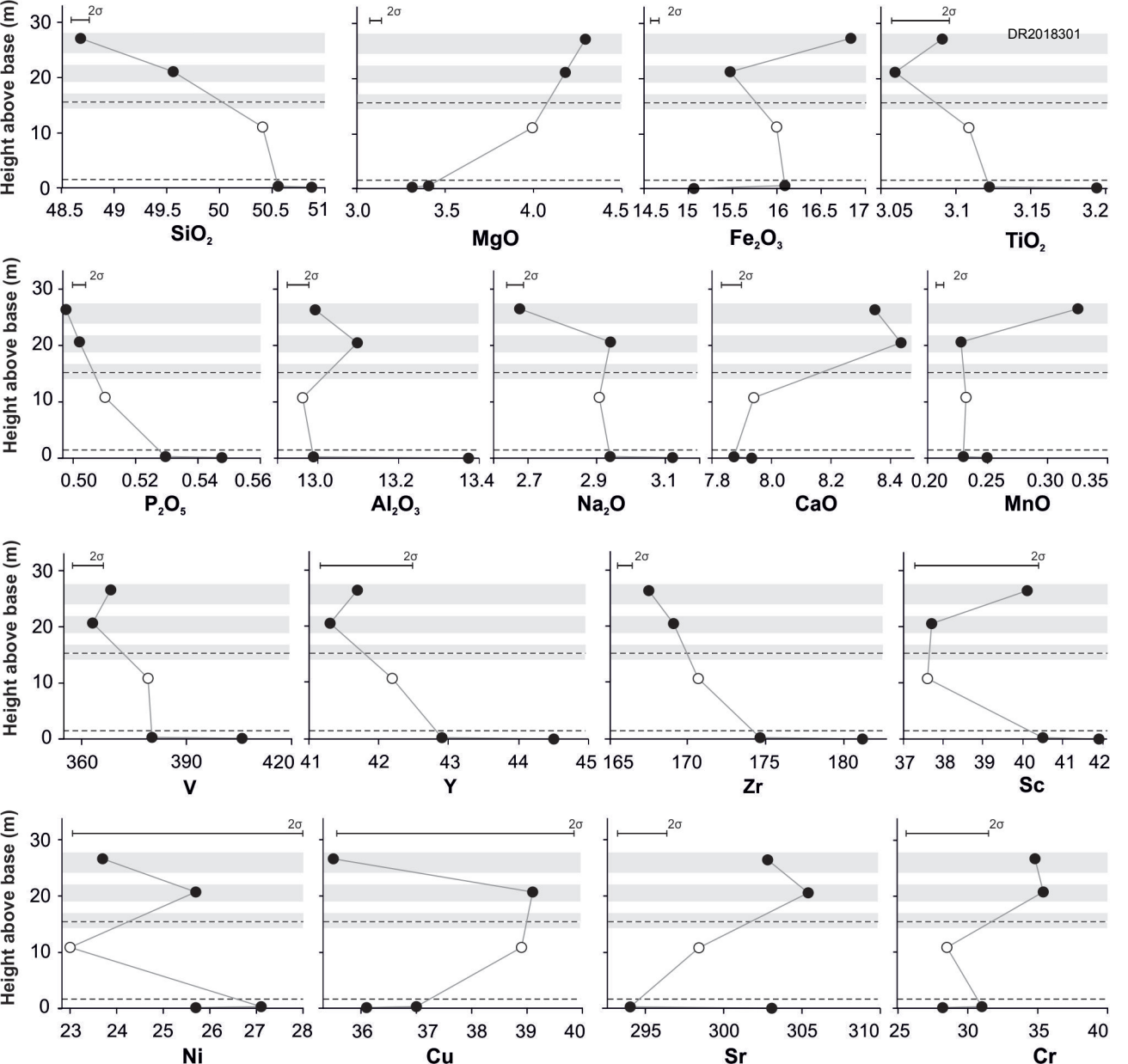
Sample locality	Lateral heterogeneity											
Sample no.	CRB06-311	CRB06-312	CRB06-313	CRB06-351	CRB06-353	CRB06-352	CRB06-354	CRB06-355	CRB06-356	CRB06-357	CRB06-358	CRB06-359
Section No.	GR-N2	GR-N2	GR-N2	Wanapum	Wanapum	Wanapum	Wanapum	Wanapum	Wanapum	Wanapum	Wanapum	Wanapum
Height in flow (m)	3.6	3.9	4.3	-	-	-	-	-	-	-	-	-
Distance from source (km)	-	-	-	-	-	-	-	-	-	-	-	-
Oxide wt. %												
SiO2	52.19	52.85	52.34	50.55	50.86	50.63	50.19	50.04	50.40	50.37	50.10	50.51
TiO2	1.907	1.921	1.897	3.006	3.065	3.052	2.986	2.986	2.881	2.963	2.907	2.933
Al2O3	13.94	13.87	13.95	13.45	13.74	13.64	13.48	13.66	13.56	13.30	13.06	13.11
Fe2O3	13.50	13.22	12.85	14.25	13.91	13.71	14.52	14.78	14.42	15.11	16.10	15.17
MnO	0.247	0.236	0.229	0.223	0.227	0.212	0.223	0.200	0.214	0.224	0.237	0.208
MgO	4.85	4.60	4.53	4.19	3.60	3.99	4.39	4.37	4.44	4.28	4.36	4.04
CaO	8.81	8.72	8.79	8.60	8.79	8.78	8.69	8.99	8.63	8.35	8.24	8.19
Na2O	2.77	2.88	2.80	2.68	2.78	2.65	2.59	2.52	2.58	2.78	2.71	2.77
K2O	0.81	0.96	0.97	1.32	1.23	1.23	1.15	0.82	1.31	1.13	1.10	1.19
P2O5	0.280	0.287	0.277	0.555	0.586	0.568	0.503	0.505	0.543	0.549	0.563	0.543
LOI	0.63	0.67	0.71	0.89	0.95	0.99	0.80	1.53	0.86	0.59	0.65	0.71
Total	99.93	100.21	99.35	99.71	99.73	99.45	99.51	100.40	99.84	99.64	100.02	99.38
Element ppm												
Rb	22	27	26	31	29	30	27	23	28	28	29	38
Sr	325	324	334	337	340	339	338	336	335	333	328	330
Y	35.0	35.4	35.8	43	46	45	41	40	44	44	43	43
Zr	165	164	166	204	208	208	188	181	196	204	205	199
Nb	13.0	12.1	12.1	15.9	16.4	16.1	14.9	14.3	14.3	14.6	15	15
Ba	417	476	447	556	554	586	466	434	521	620	598	704
Pb	4	6	5	6	8	4	7	6	6	5	6	6
Th	4	5	6	5	5	7	6	7	8	6	3	7
U	2	1	0	4	3	3	2	2	1	1	2	1
Sc	36	38	37	33	35	34	33	35	34	35	31	33
V	341	331	336	412	425	420	414	422	402	411	392	407
Cr	40	35	33	45	44	45	49	49	47	46	46	43
Co	39	40	42	41	40	36	38	39	43	41	36	41
Ni	18	16	19	20	22	20	21	25	21	22	20	23
Cu	40	36	35	34	35	33	32	30	34	35	35	33
Zn	120	120	119	148	151	160	150	119	143	141	138	150
Ga	22	23	20	23	22	24	21	24	24	21	20	22
Mo	2	0	1	0	1	0	0	0	0	0	0	0
As	2	0	0	0	0	1	1	0	0	0	0	4
S	176	224	101	276	125	301	508	119	157	348	290	426


DR2018301
Height above lobe base (m)
2σ
SiO2
MgO
Fe2O3
TiO2
Al2O3
Na2O
CaO
MnO
V
Y
Zr
Sc
Ni
Cu
Sr
Cr


DR2018301
Height above lobe base (m)
2σ
SiO2
MgO
Fe2O3
TiO2
P2O5
Al2O3
Na2O
CaO
MnO
V
Y
Zr
Sc
Ni
Cu
Sr
Cr


DR2018301
Height above lobe base (m)
2σ
SiO2
MgO
Fe2O3
TiO2
P2O5
Al2O3
Na2O
CaO
MnO
V
Y
Zr
Sc
Ni
Cu
Sr
Cr


DR2018301
Height above lobe base (m)
2σ
SiO2
MgO
Fe2O3
TiO2
P2O5
Al2O3
Na2O
CaO
MnO
V
Y
Zr
Sc
Ni
Cu
Sr
Cr


DR2018301
Height above base (m)
2σ
SiO2
MgO
Fe2O3
TiO2
P2O5
Al2O3
Na2O
CaO
MnO
V
Y
Zr
Sc
Ni
Cu
Sr
Cr