Supplementary Materials: Normative Mineralogy of 1170 Soil Profiles Across Canada

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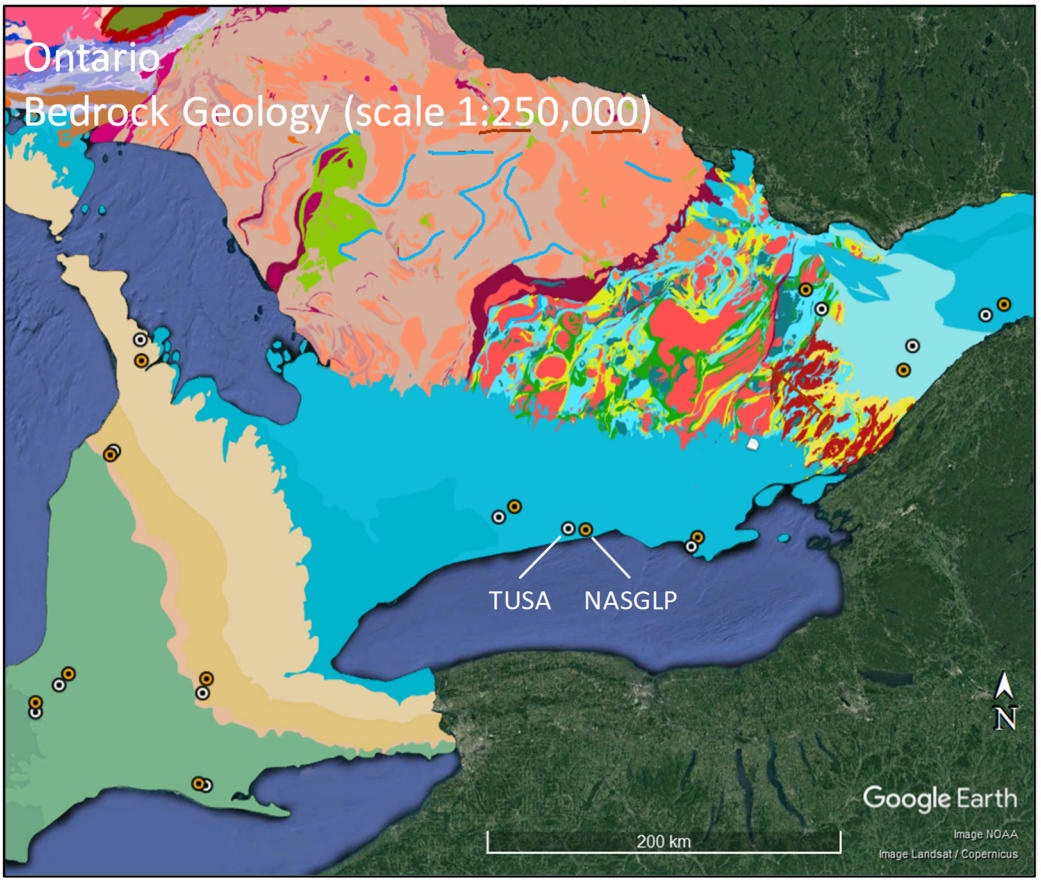

Figure S1. Location of the 12 'paired' Trent University Soil Archive (TUSA; white) and North American Soil Geochemical Landscape Project (NASGLP; orange) sampling sites in Ontario where major oxide content in soil (depth-weighted to a maximum of 50 cm) were compared. The sites are overlaid on the 1:250 000 scale bedrock geology map of Ontario.

Table S1. Statistical comparison (paired t-test) of major oxide content in soil (depth-weighted to a maximum of 50 cm) from the 12 'paired' Trent University Soil Archive (TUSA; T) and North American Soil Geochemical Landscape Project (NASGLP; N) sites in Ontario. See Figure S1 for location of the sites. A $p > 0.05$ indicates no statistical difference between the paired sites.

#	SiO_2		TiO_2		Al_2O_3		Fe_2O_3		MnO		MgO		CaO		K_2O		Na_2O		P_2O_5	
	N	T	N	T	N	T	N	T	N	T	N	T	N	T	N	T	N	T	N	T
1	64.94	72.59	0.60	0.45	11.41	10.98	4.01	3.74	0.07	0.08	3.61	0.64	6.55	1.70	2.65	2.28	1.20	2.35	0.13	0.11
2	72.38	70.07	0.70	0.72	9.56	11.81	5.07	4.47	0.11	0.10	1.00	1.10	2.46	1.27	1.97	2.53	2.13	1.71	0.17	0.10
3	67.65	58.71	0.57	0.14	10.58	4.50	3.85	2.04	0.06	0.05	3.13	2.83	5.29	13.97	2.79	0.92	0.82	0.67	0.09	0.05
4	72.66	65.15	0.47	0.73	10.10	13.92	5.22	5.75	0.17	0.12	1.14	1.54	1.64	0.97	2.14	3.22	1.45	1.01	0.11	0.10
5	73.93	68.46	0.51	0.72	9.53	12.36	4.37	5.42	0.07	0.12	0.98	1.24	3.78	1.75	1.88	2.55	2.53	1.79	0.15	0.15
6	74.37	73.85	0.48	0.48	11.33	11.25	2.80	4.01	0.07	0.11	1.07	0.83	2.94	2.09	2.32	2.27	3.12	2.81	0.19	0.11
7	58.06	65.57	0.43	0.88	7.31	12.42	2.96	6.76	0.06	0.12	1.10	1.69	11.73	2.71	1.35	1.86	1.60	2.37	0.14	0.20
8	65.46	72.09	0.51	0.50	9.47	11.26	3.44	3.73	0.09	0.09	1.43	1.26	9.48	1.70	2.02	2.31	1.17	1.49	0.24	0.10
9	68.58	60.39	0.60	0.68	12.41	14.49	4.52	6.18	0.11	0.12	1.55	2.08	3.32	2.99	2.37	2.04	3.06	2.47	0.19	0.27
10	74.38	68.06	0.41	0.45	9.52	12.13	2.42	3.84	0.05	0.06	0.81	0.88	2.21	2.28	2.02	2.28	2.68	2.34	0.12	0.11
11	70.28	66.68	0.62	0.61	10.85	12.47	3.52	4.72	0.05	0.09	0.91	1.26	2.06	2.82	2.31	2.52	2.47	1.85	0.17	0.26
12	65.98	61.45	0.57	0.61	11.05	12.09	4.12	4.30	0.13	0.06	3.99	1.23	5.72	1.92	2.39	2.41	1.79	1.34	0.17	0.16
p	0.25		0.52		0.12		0.10		0.56		0.35		0.21		0.71		0.39		0.48	

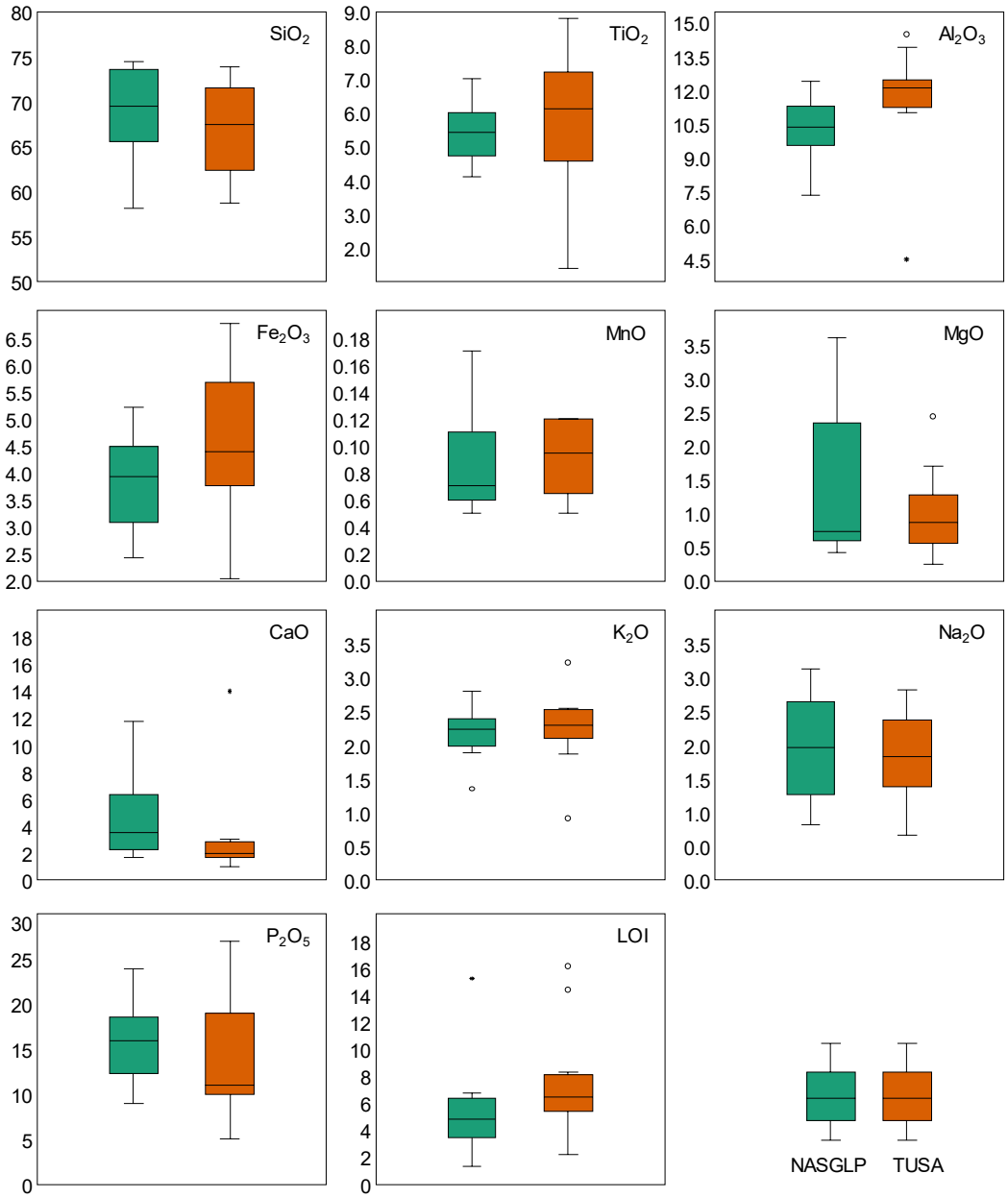

Figure S2. Boxplots of major oxide content in soil (depth-weighted to a maximum of 50 cm) from the 12 'paired' Trent University Soil Archive (TUSA; orange) and North American Soil Geochemical Landscape Project (NASGLP; green) sites in Ontario. See Table S1 for data and Figure S1 for location of the sites.

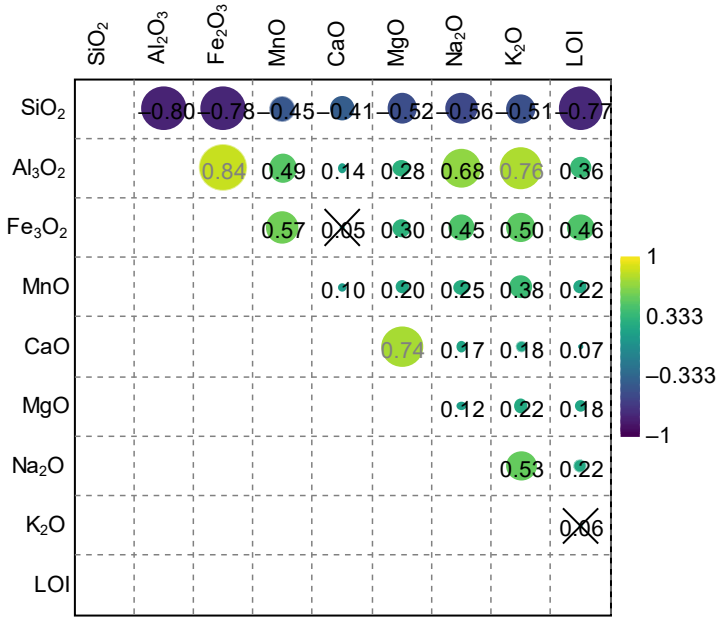

Figure S3. Correlation matrix of major oxide content (wt%) and organic matter content (%LOI) in soil (depth-weighted to a maximum of 50 cm) for study sites across Canada (n=1170) from the Trent University Soil Archive and North American Soil Geochemical Landscape Project. The strength of the correlation (r) is shown, and associations indicated by an '×' are not significant.

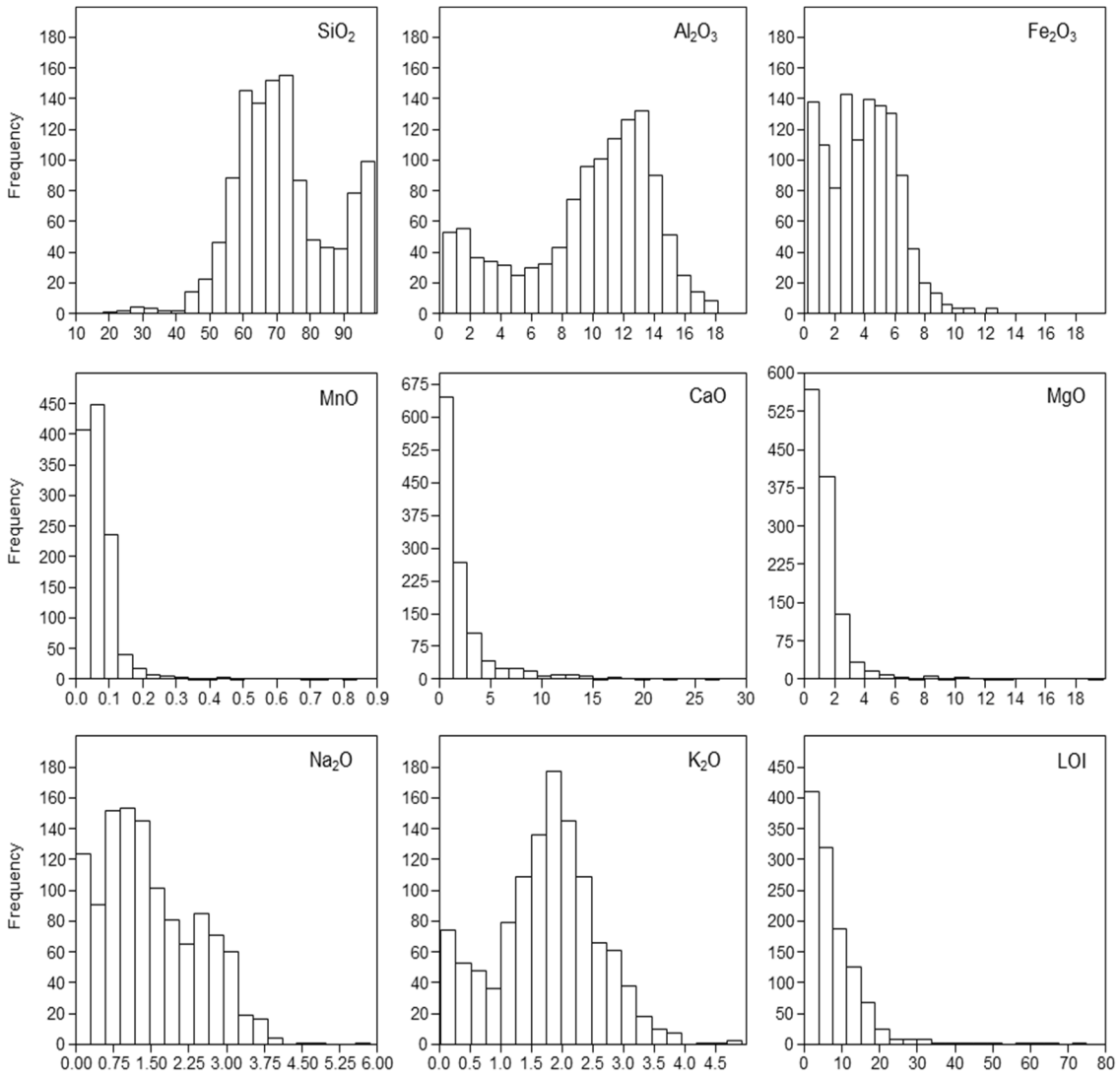

Figure S4. Histograms of major oxide content (wt%) and organic matter content (%LOI) in soil (depth-weighted to a maximum of 50 cm) for study sites across Canada (n = 1170) from the Trent University Soil Archive and the North American Soil Geochemical Landscape Project. All data are not normally distributed (Shapiro-Wilk, $p < 0.05$).

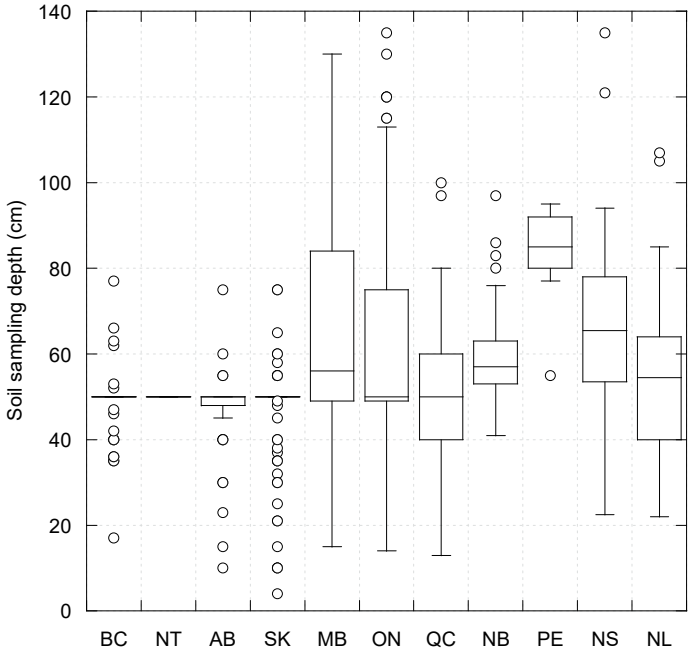

Figure S5. Boxplots showing the distribution of soil sampling depth (cm) by province for study sites across Canada (n = 1170) from the Trent University Soil Archive and North American Soil Geochemical Landscape Project.

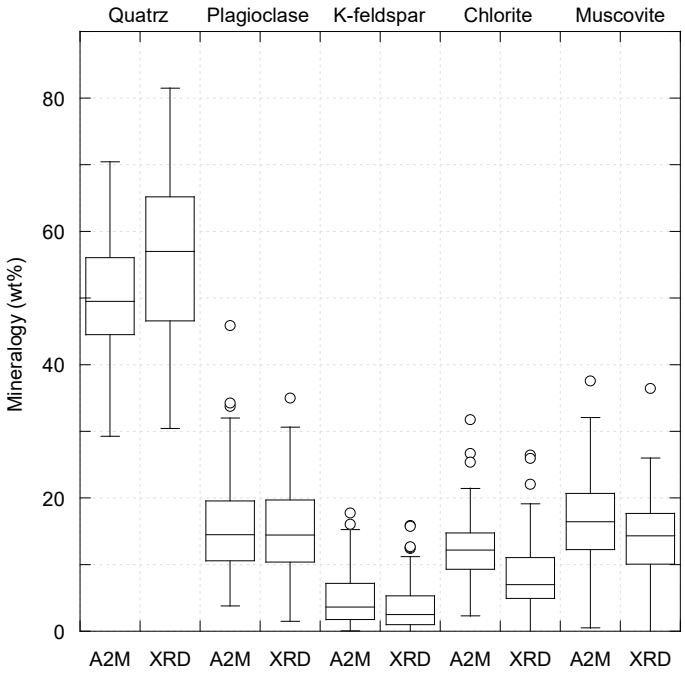

Figure S6. Boxplots showing the distribution of predicted A2M (Analysis-to-Mineralogy) against estimated XRD (X-Ray Diffraction) mineralogy (wt%) at 85 study sites across New Brunswick, Nova Scotia, and Prince Edward Island. See Table 3 for statistical comparison of each dataset.

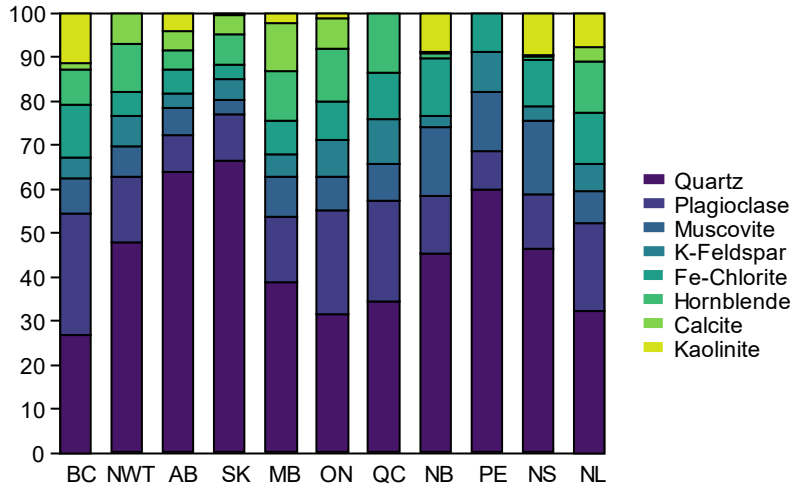

Figure S7. Predicted A2M (Analysis-to-Mineralogy) mineralogy (wt%) in soil (depth-weighted to a maximum of 50 cm) for study sites across Canada (n = 1170) from the Trent University Soil Archive and North American Soil Geochemical Landscape Project. Mineralogy (wt%) is summarised by province scaled as a proportion of 100%.

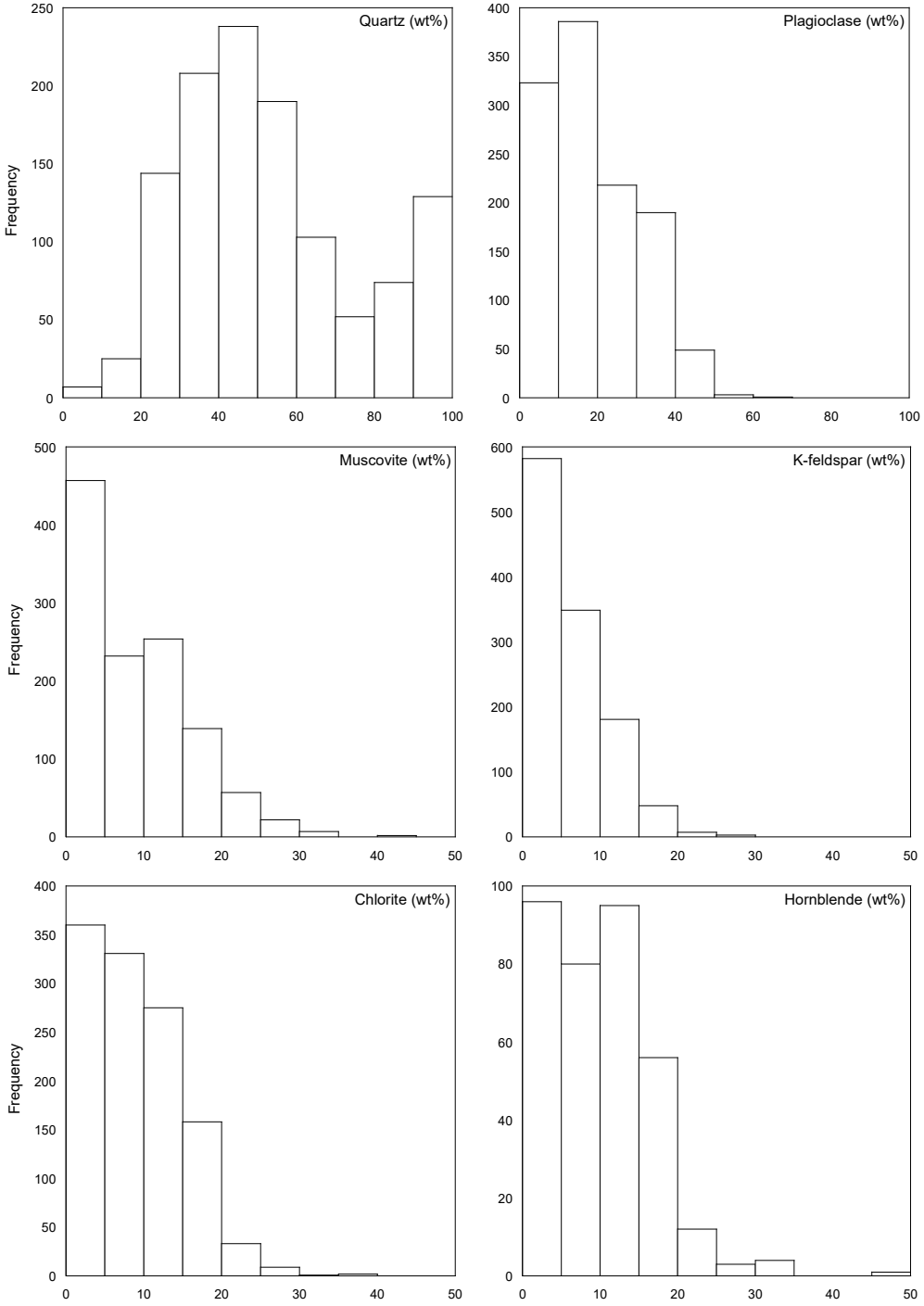

Figure S8. Histograms of A2M (Analysis-to-Mineralogy) predicted major mineralogical content (wt%) in soil (depth-weighted to a maximum of 50 cm) for study sites across Canada (n = 1170) from the Trent University Soil Archive and North American Soil Geochemical Landscape Project. All data are not normally distributed (Shapiro-Wilk, $p < 0.05$).

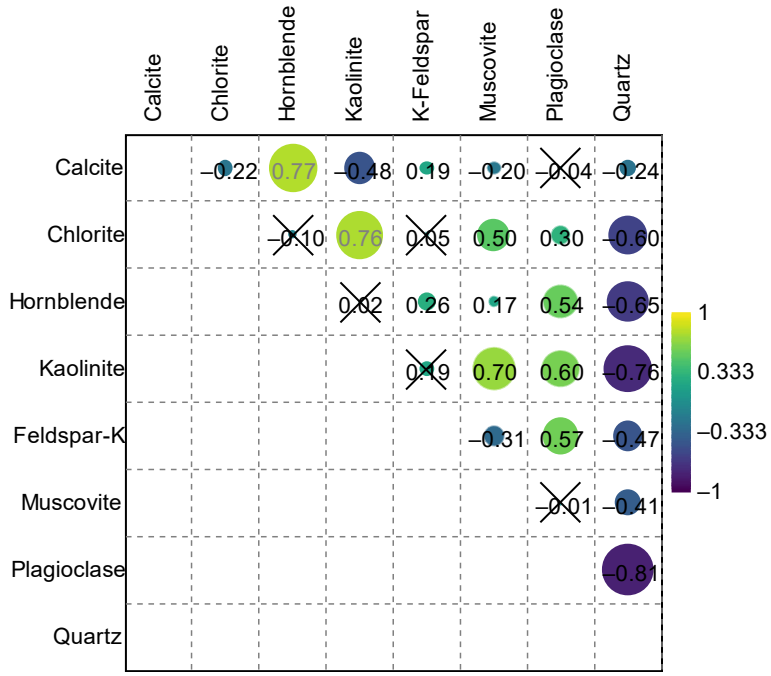

Figure S9. Correlation matrix of A2M (Analysis-to-Mineralogy) predicted major mineralogical content (wt%) in soil (depth-weighted to a maximum of 50 cm) for study sites across Canada (n = 1170) from the Trent University Soil Archive and North American Soil Geochemical Landscape Project. The strength of the correlation (r) is shown, and associations indicated by an '×' are not significant.

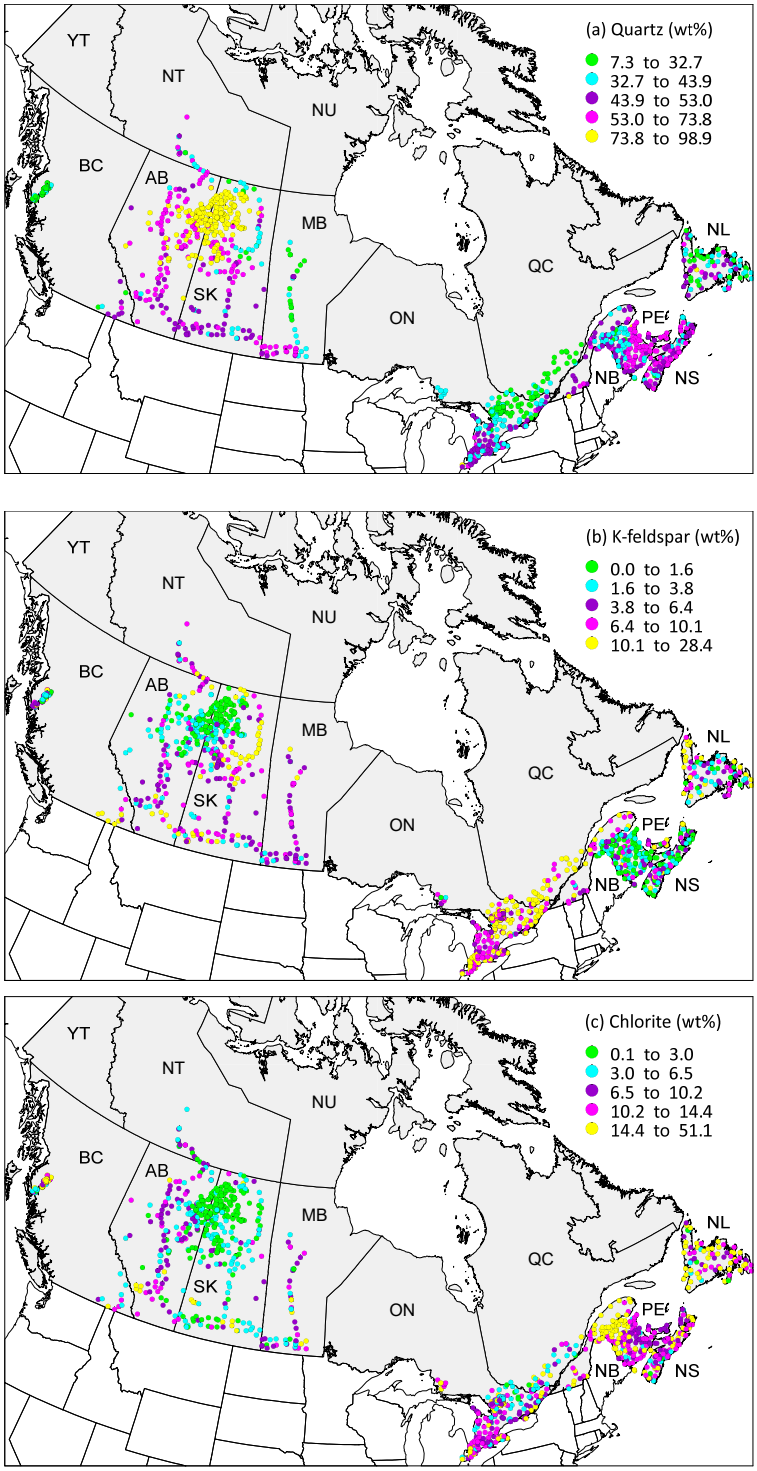

Figure S10. Predicted A2M (Analysis-to-Mineralogy) quantitative mineralogy (wt%) in soil (depth-weighted to a maximum of 50 cm) for (**a**) quartz, (**b**) K-feldspar, and (**c**) chlorite across Canada from the Trent University Soil Archive and North America Soil Geochemical Landscapes Project (n = 1170). Legends were set at equal distribution of sites among five categories.

Table S2. Study sites in Ontario (n = 10), Saskatchewan (n = 46), and Alberta (n = 10) with predicted A2M (Analysis-to-Mineralogy) and estimated XRD (X-Ray Diffraction) mineralogy.

Prov	Quartz		Plagioclase		K-Feldspar		Chlorite		Muscovite		Hornblende	
	XRD	A2M	XRD	A2M	XRD	A2M	XRD	A2M	XRD	A2M	XRD	A2M
ON	34.23	26.46	33.38	31.43	13.91	4.09	0.00	9.56	3.32	15.69	12.47	12.77
ON	43.38	37.98	27.52	24.92	10.47	7.75	1.91	4.98	6.80	12.78	4.63	11.59
ON	45.52	37.57	32.87	33.44	12.47	10.74	0.00	4.33	0.40	6.33	6.42	7.59
ON	51.38	44.14	19.39	20.45	10.45	9.93	2.57	5.93	9.52	8.37	2.65	11.18
ON	34.61	28.43	34.03	33.40	17.83	11.25	0.00	6.39	1.44	9.01	10.04	11.51
ON	36.97	26.20	32.63	33.84	17.37	7.70	2.64	5.76	1.29	13.01	7.91	13.49
ON	43.17	36.63	21.08	18.99	16.63	9.32	3.15	8.82	5.00	12.28	5.54	13.97
ON	44.91	36.50	28.88	32.76	18.29	12.88	0.00	13.60	2.03	4.25	5.45	0.00
ON	50.64	38.56	30.74	32.69	9.99	2.39	2.08	12.43	0.86	13.92	4.45	0.00
ON	30.93	26.76	35.49	28.84	14.04	4.64	0.00	9.90	2.54	16.27	15.39	13.59
SK	39.00	37.11	40.69	40.43	14.50	13.96	0.62	1.36	2.02	2.59	–	–
SK	34.99	29.71	31.40	25.59	17.10	6.51	3.19	6.77	4.30	17.30	–	–
SK	13.54	7.26	20.94	28.52	0.00	1.30	4.01	10.44	9.67	4.40	–	–
SK	94.68	92.29	3.63	4.05	1.29	1.33	0.00	1.32	0.00	1.01	–	–
SK	96.96	96.05	1.78	0.72	0.83	0.02	0.00	1.37	0.00	1.83	–	–
SK	97.73	97.47	1.27	0.07	1.01	0.07	0.00	1.71	0.00	0.69	–	–
SK	98.89	97.89	0.47	0.07	0.00	0.02	0.00	1.19	0.00	0.84	–	–
SK	99.73	97.96	0.00	0.07	0.00	0.07	0.00	1.24	0.00	0.66	–	–
SK	100.0	97.96	0.00	0.07	0.00	0.03	0.00	1.36	0.00	0.60	–	–
SK	93.56	94.38	3.00	1.00	1.70	0.99	0.51	1.88	0.71	1.76	–	–
SK	95.68	94.35	1.13	1.12	1.00	0.02	0.87	1.75	0.98	2.77	–	–
SK	96.51	92.97	1.67	2.53	1.27	0.86	0.00	1.73	0.00	1.92	–	–
SK	95.72	95.86	2.30	1.29	1.31	0.59	0.00	1.37	0.00	0.89	–	–
SK	89.96	91.28	5.29	3.23	2.08	0.73	0.00	1.52	0.76	3.23	–	–
SK	90.64	88.13	4.89	4.60	1.97	0.17	0.29	3.12	0.81	3.98	–	–
SK	46.14	43.30	43.44	42.61	9.17	9.89	0.00	3.88	0.00	0.32	–	–
SK	80.50	79.77	11.30	10.21	5.84	5.38	0.00	2.57	0.76	2.08	–	–
SK	88.04	88.00	5.61	5.29	3.25	2.02	0.89	2.04	1.62	2.64	–	–
SK	96.88	95.56	1.51	0.23	1.52	0.33	0.00	1.48	0.00	1.11	–	–
SK	59.00	52.86	26.73	26.20	10.52	8.51	1.02	5.73	0.41	6.71	–	–
SK	66.97	63.35	21.70	20.77	9.28	7.10	0.38	5.00	0.00	3.78	–	–
SK	96.63	95.81	1.94	0.89	1.43	0.17	0.00	1.52	0.00	1.61	–	–
SK	87.68	84.28	8.47	7.20	2.88	2.08	0.00	3.32	0.22	3.11	–	–
SK	86.42	97.70	8.56	0.07	3.17	0.32	0.56	1.16	0.00	0.75	–	–
SK	98.58	97.53	0.60	0.25	0.82	0.08	0.00	1.13	0.00	1.02	–	–
SK	68.68	63.94	16.40	16.88	7.78	9.83	2.24	6.12	3.08	3.22	–	–
SK	36.81	33.06	32.90	33.45	18.70	18.15	0.57	3.66	4.17	4.76	–	–
SK	96.70	94.55	1.76	1.03	1.33	0.39	0.00	2.78	0.00	1.25	–	–
SK	92.69	89.18	4.56	4.69	2.24	2.56	0.00	2.81	0.00	0.77	–	–
SK	43.06	39.21	33.29	35.03	15.43	14.72	1.62	7.23	2.38	3.81	–	–
SK	28.43	26.22	36.04	39.51	16.49	18.81	3.18	15.31	8.46	0.15	–	–
SK	35.46	31.64	43.40	42.27	5.63	8.10	0.60	3.30	1.60	3.70	–	–
SK	35.04	34.93	33.44	34.47	12.43	8.12	2.19	14.06	8.70	8.43	–	–
SK	95.08	93.11	1.92	7.07	2.05	1.26	0.00	1.90	1.02	11.29	–	–
SK	80.26	77.26	8.78	8.21	4.32	4.71	0.00	4.93	4.72	4.90	–	–
SK	85.59	87.44	7.39	5.64	2.40	3.10	1.12	2.44	1.81	1.38	–	–
SK	72.65	69.62	12.54	13.39	6.75	7.31	1.75	5.00	4.33	4.67	–	–
SK	82.52	92.60	9.17	2.24	5.28	1.01	0.00	2.04	3.12	0.98	–	–
SK	70.03	66.08	14.61	16.71	6.70	9.22	0.36	0.74	2.98	1.39	–	–
SK	81.33	80.37	9.18	8.77	5.14	6.05	0.00	2.96	2.44	1.85	–	–
SK	57.63	58.07	13.58	13.55	7.76	3.90	0.00	8.69	12.18	15.79	–	–

SK	57.21	42.29	22.50	28.38	8.43	6.13	0.00	3.93	5.41	9.12	–	–
SK	62.46	60.03	22.08	22.36	7.87	9.82	0.00	6.04	3.58	1.75	–	–
SK	61.61	59.03	17.10	16.61	6.89	6.36	0.00	8.20	9.08	9.81	–	–
SK	59.86	48.83	18.38	14.58	6.41	8.08	0.00	6.59	3.81	2.40	–	–
SK	54.99	46.61	18.97	13.99	7.05	5.60	0.00	6.71	6.35	7.55	–	–
AB	87.46	84.74	3.86	2.23	4.68	0.30	0.39	3.97	2.50	8.76	–	–
AB	95.48	96.16	1.60	0.35	2.25	0.32	0.67	0.86	0.00	1.10	–	–
AB	91.35	87.38	4.11	5.18	4.15	3.61	0.00	2.41	0.00	1.42	–	–
AB	92.94	91.15	4.00	2.35	2.36	2.23	0.00	3.31	0.11	0.97	–	–
AB	95.03	92.07	2.66	1.80	2.31	0.69	0.00	1.97	0.00	3.46	–	–
AB	85.43	78.13	6.27	7.06	4.41	2.60	1.69	4.59	1.35	7.63	–	–
AB	92.96	90.25	2.95	3.24	2.37	1.75	0.42	2.33	0.77	2.44	–	–
AB	83.49	82.81	6.94	7.33	6.29	3.08	1.20	2.79	1.61	4.00	–	–
AB	82.00	81.97	7.21	7.40	4.33	3.18	0.00	3.25	2.35	4.20	–	–
AB	95.58	91.73	1.94	2.25	2.02	0.93	0.45	1.92	0.00	3.17	–	–

Hornblende was not determined by XRD (X-Ray Diffraction) for sites in Alberta (AB) and Saskatchewan (SK); as such, it was not included in A2M (Analysis-to-Mineralogy) prediction.