

Table S1. Summary of residuals diagnostics between LOI-SOC and DC-SOC for the data segmentations where higher accuracy was observed.

Region	Horizon	Samples with IC	Samples without IC	Treatment	n	MAE	MedAE	RMSE	CCC	SW	KS	Sk	Kt
All	All	X	X	LOI360	423	0.36	0.22	0.57	0.80	1.95E-17	1.77E-08	-0.87	8.78
				LOI400	423	0.39	0.27	0.58	0.79	5.24E-15	6.53E-04	-0.72	7.84
				LOI550	423	0.53	0.42	0.72	0.64	2.62E-10	1.51E-02	-0.34	6.34
All	All		X	LOI360	187	0.30	0.21	0.44	0.88	1.88E-08	0.07	0.02	7.75
				LOI400	187	0.30	0.23	0.41	0.89	2.31E-06	0.12	1.00	5.38
				LOI550	187	0.42	0.32	0.64	0.70	2.55E-13	0.07	-0.93	13.00
All	All	X		LOI360	236	0.38	0.21	0.60	0.70	5.02E-13	1.84E-06	0.06	8.88
				LOI400	236	0.42	0.27	0.63	0.66	2.29E-10	3.50E-03	0.30	7.41
				LOI550	236	0.46	0.31	0.64	0.65	2.53E-07	1.73E-02	0.26	6.51
All	A	X	X	LOI360	203	0.50	0.29	0.74	0.59	1.19E-10	8.28E-05	0.00	6.84
				LOI400	203	0.48	0.28	0.74	0.61	6.05E-12	5.96E-05	-0.13	7.14
				LOI550	203	0.56	0.33	0.85	0.45	1.11E-10	2.67E-03	0.46	7.39
All	A		X	LOI360	134	0.29	0.20	0.42	0.87	1.70E-07	0.13	-0.96	7.57
				LOI400	134	0.29	0.25	0.42	0.86	1.00E-08	0.09	1.67	9.94
				LOI550	134	0.36	0.23	0.64	0.62	7.00E-14	1.66E-03	-0.20	14.79
DML	All	X	X	LOI360	168	0.32	0.14	0.59	0.86	4.57E-16	4.57E-10	-2.28	14.31
				LOI400	168	0.34	0.18	0.59	0.85	2.09E-14	2.22E-05	-1.85	12.75
				LOI550	168	0.50	0.38	0.71	0.78	2.35E-08	1.09E-01	-0.95	7.90
DML	All		X	LOI360	60	0.25	0.19	0.33	0.97	0.06	0.29	0.53	3.50
				LOI400	60	0.28	0.25	0.36	0.96	3.62E-03	0.34	0.82	3.34
				LOI550	60	0.29	0.21	0.40	0.95	0.06	0.32	0.45	4.44
IES	All	X	X	LOI360	134	0.38	0.30	0.50	0.78	1.36E-03	0.20	-0.52	4.48
				LOI400	134	0.38	0.31	0.49	0.79	0.29	0.98	-0.13	3.78
				LOI550	134	0.53	0.43	0.69	0.49	3.98E-04	0.12	-0.30	4.70
IES	All	X		LOI360	52	0.24	0.13	0.39	0.93	4.80E-07	6.54E-04	-1.38	6.05
				LOI400	52	0.32	0.24	0.44	0.91	1.85E-03	0.34	-1.01	4.31
				LOI550	52	0.27	0.17	0.38	0.93	1.29E-03	0.35	-0.66	5.10
NWP	All		X	LOI360	34	0.24	0.16	0.41	0.87	1.45E-07	0.10	3.32	16.67
				LOI400	34	0.26	0.19	0.39	0.88	7.44E-06	0.52	2.58	12.66
				LOI550	34	0.23	0.18	0.31	0.93	0.12	0.84	0.86	4.45
SIDP	All	X	X	LOI360	29	0.11	0.11	0.13	0.98	0.56	0.85	-0.29	2.25
				LOI400	29	0.17	0.12	0.21	0.93	0.91	1.00	0.07	2.93
				LOI550	29	0.21	0.18	0.26	0.89	0.67	1.00	0.18	2.17

Region = Landform Region; IC = inorganic carbon; n = number of samples evaluated. MAE = mean average error; MedAE = median average error; RMSE = root mean square error; CCC = concordance correlation coefficient; SW = Shapiro Wilks test; KS = Kolmogorov-Smirnoff test; SK = skewness; Kt = kurtosis.