Supplementary material

Table S1: Data distribution statistics for each of the six fields (A-F) and the combined data set (All). Concentrations in soil organic C (SOC), Total N and Total C are indicated in g kg^{-1} and permanganate oxidizable C (POXC) in mg kg^{-1}.

Field	Property	n	Mean	SD	CV [%]	Min	1 Quant.	Median	3 Quant.	Max	Skew	Kurtosis
A	SOC	70	22.4	3.7	16.5	15.0	19.7	22.0	24.9	32.1	0.28	-0.32
	POXC		789	108	13.7	524	731	782	863	1047	-0.24	0.01
	Total N		2.25	0.29	13.1	1.66	2.06	2.24	2.42	2.97	0.36	-0.27
	Total C		29.5	9.0	30.6	16.4	21.8	27.3	34.9	50.0	0.67	-0.78
	pH		7.21	0.13	1.8	6.91	7.13	7.22	7.29	7.50	-0.04	-0.34
B	SOC	70	18.7	4.3	22.7	11.7	15.6	18.4	21.1	30.6	0.65	-0.07
	POXC		720	115	15.9	441	634	728	794	1059	0.10	-0.03
	Total N		2.03	0.37	18.2	1.46	1.80	1.96	2.20	3.05	0.84	0.23
	Total C		20.1	4.9	24.3	12.5	16.5	19.4	22.8	33.7	0.68	-0.13
	pH		6.63	0.47	7.1	5.72	6.15	6.84	7.01	7.28	-0.41	-1.32
C	SOC	70	28.8	3.2	11.1	23.2	26.0	28.5	31.5	28.5	0.19	-1.10
	POXC		890	101	11.3	644	830	899	967	1076	-0.35	-0.54
	Total N		2.84	0.27	9.7	2.23	2.66	2.86	3.03	3.42	-0.16	-0.42
	Total C		32.6	5.2	16.1	24.7	28.6	32.6	35.9	46.5	0.75	-0.08
	pH		7.19	0.16	2.2	6.64	7.14	7.24	7.29	7.4	-1.74	3.40
D	SOC	70	20.7	4.9	23.6	12.0	17.9	20.2	24.5	30.7	0.15	-0.84
	POXC		799	154	19.2	424	709	772	953	1034	-0.20	-0.90
	Total N		2.38	0.47	19.6	1.40	2.16	2.35	2.73	3.36	0.02	-0.65
	Total C		24.2	6.2	25.8	13.0	19.9	24.4	29.2	38.2	0.01	-0.89
	pH		6.80	0.59	8.7	5.52	6.26	7.11	7.30	7.49	-0.58	-1.14
E	SOC	53	15.2	2.9	15.1	9.8	12.4	15.1	17.5	21.3	0.04	-1.08
	POXC		635	118	18.5	396	552	655	719	911	-0.29	-0.68
	Total N		1.77	0.31	17.3	1.16	1.47	1.79	2.03	2.30	-0.22	-1.21
	Total C		21.3	9.4	44.0	10.2	12.7	18.4	29.1	39.7	0.55	-1.20
	pH		6.77	0.68	10.1	5.48	6.15	6.99	7.37	7.47	-0.55	-1.29
F	SOC	53	28.6	2.7	9.6	22.4	26.8	29.1	30.7	33.3	-0.51	-0.63
	POXC		661	72	11.0	479	615	664	707	790	-0.18	-0.61
	Total N		1.92	0.22	11.5	1.44	1.73	1.97	2.09	2.30	-0.29	-1.05
	Total C		50.3	2.4	4.8	45.0	48.3	50.5	52.3	54.0	-0.47	-0.85
	pH		7.49	0.04	0.5	7.38	7.47	7.50	7.53	7.56	-0.68	0.15
All	SOC	386	22.4	6.1	27.1	9.8	17.7	22.4	27.3	35.2	0.00	-1.02
	POXC		758	142	18.8	396	661	752	861	1076	0.01	-0.50
	Total N		2.23	0.48	21.6	1.16	1.88	2.17	2.60	3.42	0.32	-0.62
	Total C		29.1	11.6	39.9	10.2	20.0	27.5	35.5	54.0	0.57	-0.64
	pH		7.00	0.51	7.3	5.48	6.88	7.20	7.35	7.56	-1.30	0.60
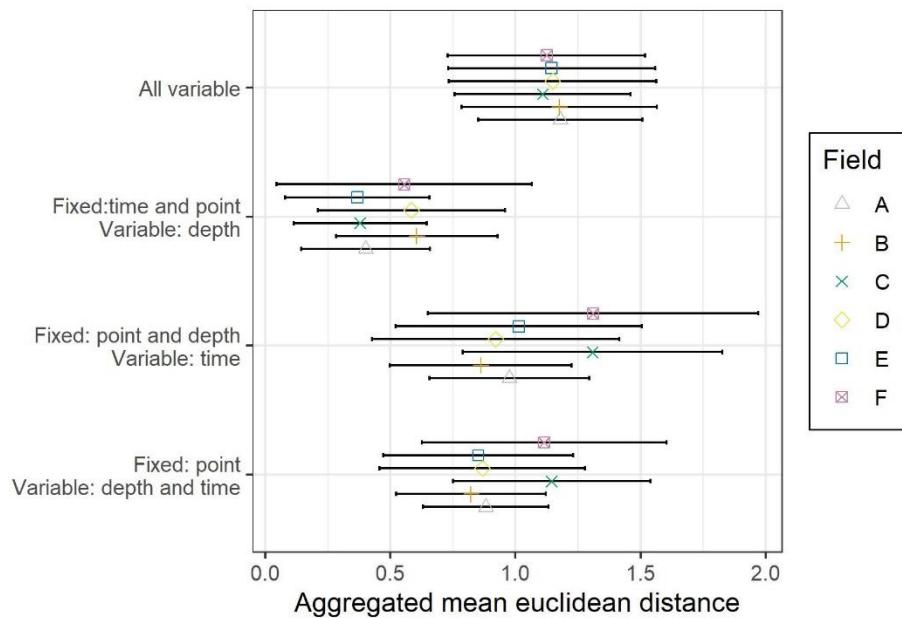
Figure S1: Aggregated mean Euclidean distance of raw reflectance spectra per field between all samples (all variable), between samples at same time and point but different depths (fixed: time and point, variable: depth), between samples at same point and depth but different sampling times (fixed: point and depth, variable. Time) and between samples at the same point but different depth and sampling times (fixed: point, variable: depth and time)
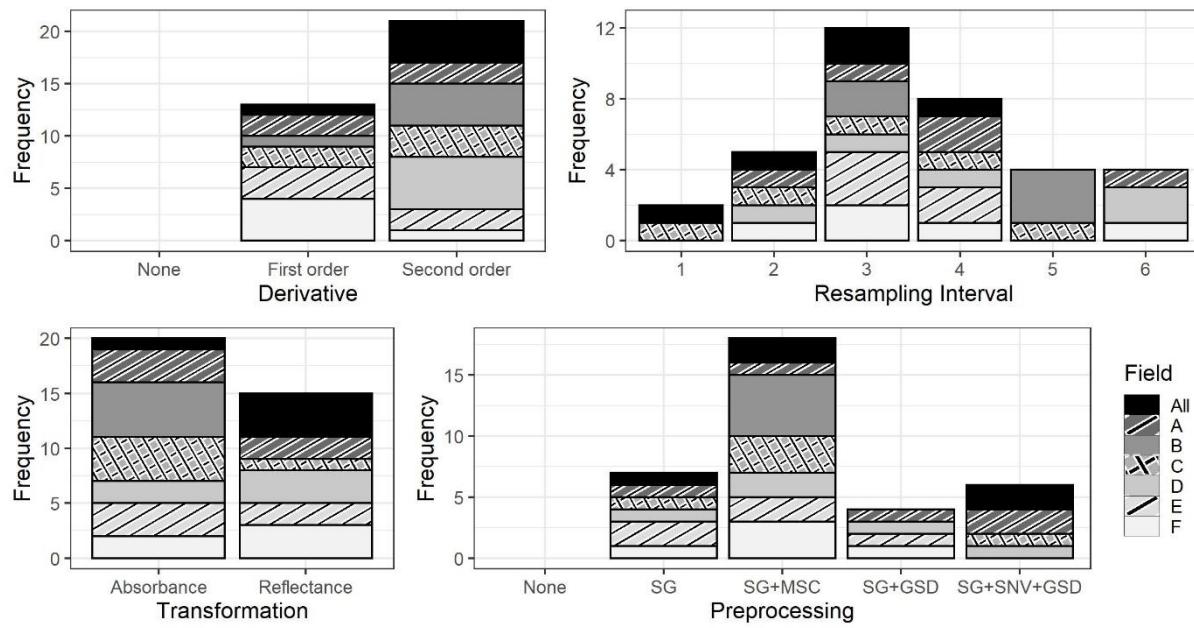
Figure S2: Frequency of applied pre-processing steps to obtain the best model for SOC, total C, total N, POXC and pH for datasets of the six fields and a combined general (All) dataset. Window widths from 5 to 51 were tested. SG = Savitzky-Golay filter (m =

order of derivative, w = window width), SNV = standard normal variate, GSD = gap segment derivative (m = derivative, w = window width, s = segment size), MSC = multiplicative scatter correction

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