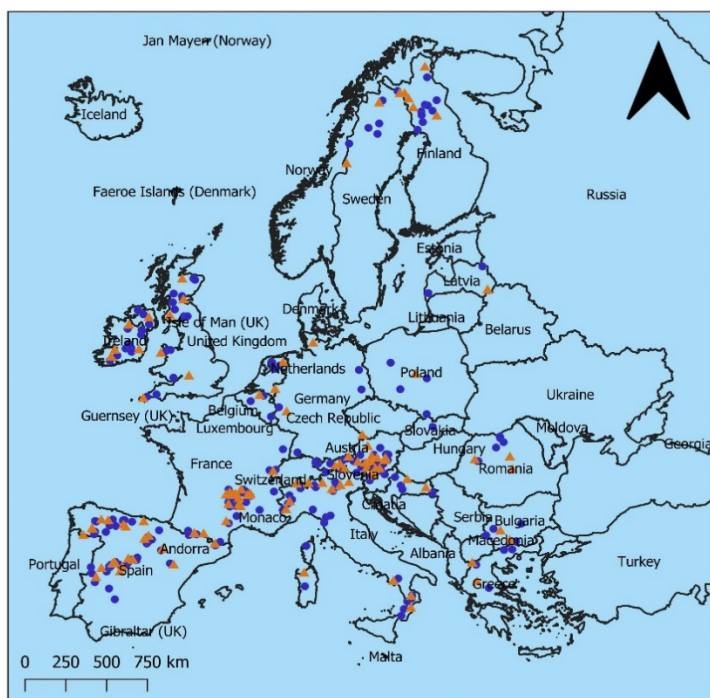
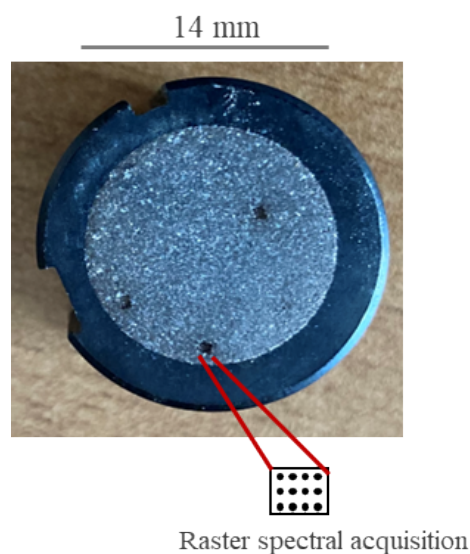


## 1. Supplementary Information



● Calibration (n=203) ▲ Validation (n=102)

**Figure S1.** Distribution across 21 European countries of the 305 soils used in this work and selected from the LUCAS 2015 database, with indication of calibration and validation samples



**Figure S2.** The three-raster points analysis on the pellet surface where the rectangle grid with the 12 (3 x 4) locations on which the three LIBS measurements were acquired.

**Table S1.** Number of samples selected from each European country

No.	Country	Number of selected samples
1	Austria	41
2	Belgium	3
3	Bulgaria	6
4	Croatia	6
5	Finland	14
6	France	50
7	Germany	7
8	Greece	6
9	Ireland	14
10	Italy	37
11	Latvia	3
12	Luxemburg	1
13	Netherlands	5
14	Poland	5
15	Portugal	1
16	Slovakia	1
17	Slovenia	4
18	Spain	61
19	United Kingdom	22
20	Romania	9
21	Sweden	9

**Table S2.** Environmental conditions for measurements performed over five different days

Day	Temperature (°C)	Humidity (%)
1	28	58
14	24	65
22	26	50
40	23	46
54	20	53

**Table S3.** Results from iPLSR and ANN prediction models for clay, silt, sand, and SOC

Property	RMSECV <sup>a</sup> (%)	R <sup>2</sup> cv <sup>b</sup>	RMSEP <sup>c</sup> (%)	R <sup>2</sup> pred <sup>d</sup>	LV <sup>e</sup>	SRMSEP <sup>f</sup>	RPIQ <sup>g</sup>
iPLSR							
Clay	5	0.5	4	0.6	7	0.14	2.0
Silt	9	0.56	10	0.59	7	0.15	2.3
Sand	11	0.64	11	0.66	6	0.13	2.7
SOC	1.51	0.82	2.35	0.71	10	0.13	2.5
ANN							
Clay	6	0.37	4	0.59	-	0.15	2.0
Silt	11	0.42	9	0.64	-	0.14	2.5
Sand	15	0.43	11	0.7	-	0.12	2.8
SOC	2.22	0.63	2.58	0.67	-	0.15	2.2

<sup>a</sup> root mean square error of cross-validation

<sup>b</sup> R<sup>2</sup> of cross-validation

<sup>c</sup> root mean square error of prediction

<sup>d</sup> R<sup>2</sup> of prediction

<sup>e</sup> number of factors (latent variables) applied in the model

<sup>f</sup> standardized root mean square error of prediction

<sup>g</sup> ratio of performance to interquartile distance