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Supplement of

Hot regions of labile and stable soil organic carbon in Germany – Spatial variability and driving factors

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Supplementary Material

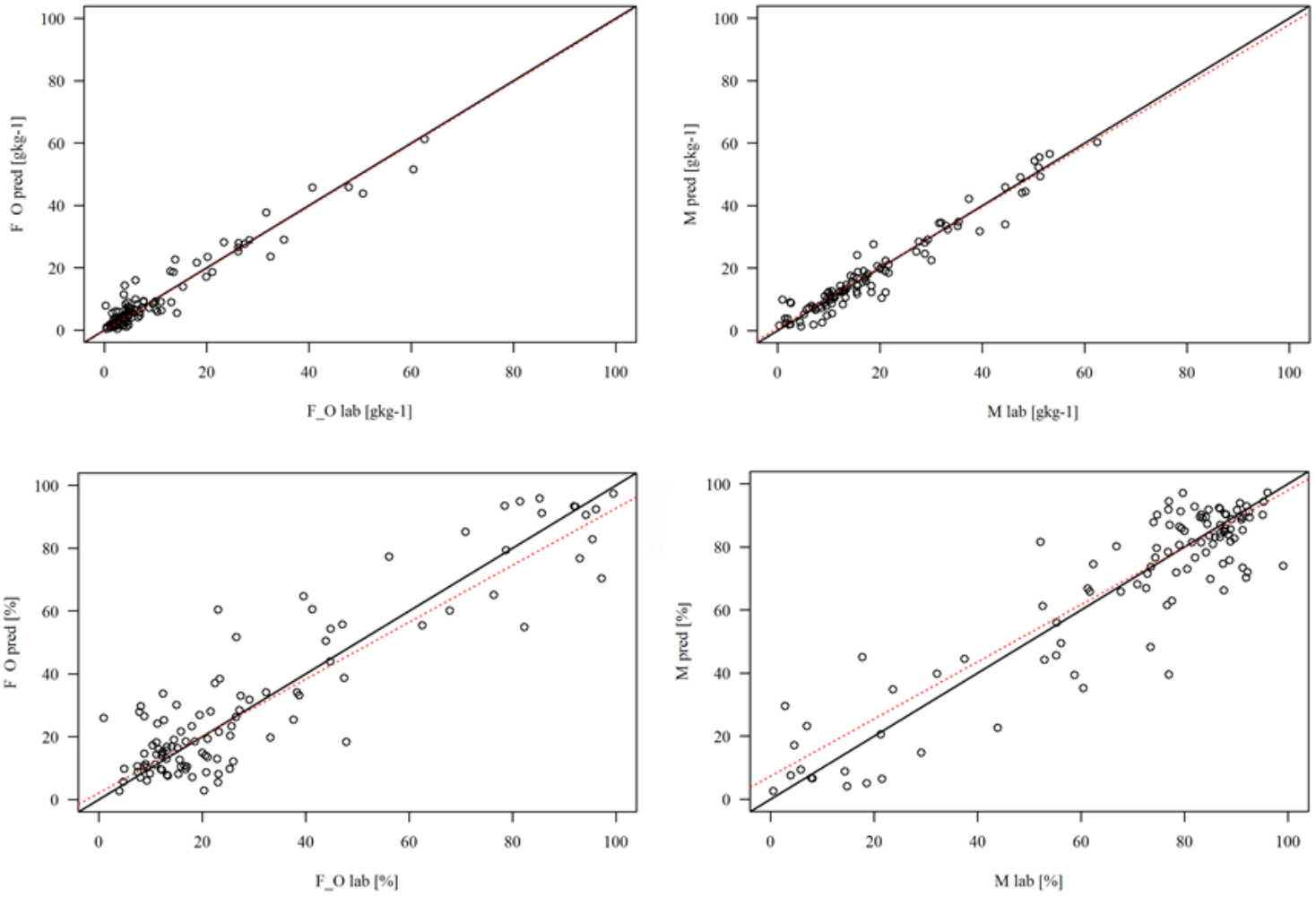

Figure S1: Measured (lab) versus predicted (pred) values for absolute content (g/kg) and proportion (%) of soil organic carbon (SOC) in fractions. M denotes the MOM fraction, whereas FO denotes the light fraction (iPOM and oPOM)

S2: Table of all predictors used for the cforest prediction

Driver	Variable type (no. of categories)	Explanation
Preuss_Nutzung1	categorical (6)	Historical land-use (1870-1900)
K1950_Nutzung1	categorical (6)	Historical land-use (1950)
K1970_Nutzung1	categorical (6)	Historical land-use (1970)
K1990_Nutzung1	categorical (6)	Historical land-use (1990)
BT_Bewirtet	integer	Length of time that the present farmer has farmed this field
BT_OekoWirt	categorical (2)	Conventional or organic farming
BP_Kalkung	categorical (2)	Does the soil receive lime?
BP_Stickstoff	categorical (2)	Does the soil receive mineral N fertiliser?
Landnutzung_aktuell	categorical (2)	Current land-use
EC_H2O	numeric	Soil electrical conductivity
pH_CaCl2	numeric	Soil pH measured in $CaCl_2$
TOC	numeric	Soil SOC content
C_N_Verhaeltnis	numeric	Soil C/N ratio
CaCO3	numeric	Soil carbonate content
TRD_FB	numeric	Soil bulk density
Wassergehalt	numeric	Soil water content
Neigung	integer	Slope of sample point
Exposition	categorical (8)	Exposition of sample point
Woelbung	categorical (9)	Curvature of sample point
Microrelief	categorical (7)	Microrelief of sample point
LageImRelief	categorical (9)	Relief position of sample point
BodenAbtrag	categorical (3)	Has there been soil removal?
AnthropoVeraen	categorical (5)	Have anthropogenic disturbances taken place?
Bodenfeuchte	categorical (5)	Soil moisture at sampling
Gefuegeform1	categorical (11)	Soil aggregation1: Spatial distribution of aggregates
Gefuegeform2	categorical (13)	Soil aggregation2: Type of aggregates
Risse	categorical (8)	Width of cracks in soil horizon
RoehrenArt	categorical (5)	Type of tubes in soil horizon
RoehrenBelebt	categorical (7)	Are tubes in soil horizon occupied?
RoehrenFlaeche	categorical (7)	Surface proportion of tubes in soil horizon
Feinwurzel	numeric	Mass proportion of fine roots
GrobWurzel	numeric	Mass proportion of thick roots
SumSkelett	numeric	Estimated stone content in soil horizon
Substanziell1	categorical (2)	Substantial soil inhomogeneities
Strukturell1	categorical (4)	Structural soil inhomogeneities
Stratigraphie	categorical (18)	Stratigraphy
GrundwaStufe	categroical (8)	Groundwater class
GrundwaStand	numeric	Groundwater table

Moormaechtig	numeric	Peat thickness
BodentypKlasse	categorical (14)	Class of soil type
chep	numeric	C export through main crop products
cnep	numeric	C inputs through byproduct
cewr	numeric	C inputs through roots
cod	numeric	C inputs through organic fertiliser
nhep	numeric	N export through main crop products
nnep	numeric	N inputs through byproducts
newr	numeric	N inputs through roots
nod	numeric	N inputs through organic fertilisers
nmin	numeric	N inputs through mineral fertilisers
EvapotransPot	numeric	Potential evapotranspiration
EvapotransReal	numeric	Real evapotranspiration
DroughtIndexMean	numeric	Drought index
PrecYearMean	numeric	Mean annual precipitation (30 y mean)
TempYearMean	numeric	Mean annual temperature (30 y mean)
SoilMoistSummer	numeric	Soil moisture in 5 cm soil depth in summer
SoilTempSummer	numeric	Soil temperature in 5 cm depth in summer
NDVI_July	numeric	Mean NDVI in July
slope_100	numeric	Slope from digital elevation model with resolution 100m
topoidx_100	numeric	Topographical wetness index from digital elevation model with resolution 100 m
BodenAusMatKlasse	categorical (14)	Class of parent material
LN	categorical (7)	Reported land-use changes
MR	categroical (5)	Meliorative management measures
Jahre_wendend	integer	Number of years with full inversion tillage over the past 10 years
Jahrenichtwendend	integer	Number of years with reduced tillage over the past 10 years
Jahre_Getreide	integer	Number of years with grains in the rotation over the past 10 years
Jahre_FeldgrasKlee	integer	Number of years with clover in the rotation in the last 10 years
gleicheKultur5Jahre	integer	Where there five or more consecutive years with the same crop grown?
Anz_Kulturgruppen	integer	Number of different crops grown in last 10 years
Schluff	numeric	Soil silt content
Ton	numeric	Soil clay content
Sand	numeric	Soil sand content

Table S3:
Indicators of model performance for soil C fractions particulate organic carbon (POM) and mineral associated organic carbon (MOM) with calibration and independent validation dataset (mean values of 100 iterations with random selection). Table a) is for values in g C kg soil^{-1} and table b) is for the proportion (relative values).

a)

	Calibration dataset						Validation dataset					
	Q^2	**RMSECV,** g C kg soil^{-1}	**ρc_c***	**Bias,** g C kg soil^{-1}	**RPD**	**RPIQ**	**R^2**	**RMSEP,** g C kg soil^{-1}	**ρc_v**	**Bias,** g C kg soil^{-1}	**RPD**	**RPIQ**
POM	0.83	4.92	0.91	0.34	2.5	1.8	0.82	5.38	0.89	0.44	2.5	2.0
MOM	0.87	4.92	0.93	-0.34	2.9	2.9	0.85	5.38	0.91	-0.44	2.7	2.6

ρc^* - Lin's concordance correlation coefficient

b)

	Calibration dataset						Validation dataset					
	Q^2	**RMSECV,** %	**ρc_c***	**Bias,** %	**RPD**	**RPIQ**	**R^2**	**RMSEP,** %	**ρc_v**	**Bias,** %	**RPD**	**RPIQ**
POM	0.78	13.15	0.88	1.07	2.09	2.56	0.73	15.04	0.84	1.6	1.9	2.4
MOM	0.78	13.15	0.88	-1.07	2.00	2.48	0.72	15.04	0.83	-1.6	2.0	2.3

ρc^* - Lin's concordance correlation coefficient