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Supplement of

Age distribution, extractability, and stability of mineral-bound organic carbon in central European soils

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Supplementray tables and figures.

Table S1: Basic soil properties of the study sites (means of the three replicated samples analyzed for mineral associated carbon per soil depth with standard deviations in brackets). Values of selected cores are adopted from Schrumpf et al. 2013 (Ci: inorganic carbon, CN: OC-to-total nitrogen ratio, Feo: acid oxalate-extractable Fe, Alo: acid oxalate-extractable Al, Fed: dithionite-extractable Fe).

Site and soil depth	pH (H ₂ O)	OC g kg ⁻¹	CN	Ci g kg ⁻¹	Sand g kg ⁻¹	Clay g kg ⁻¹	Feo g kg ⁻¹	Fed g kg ⁻¹	Alo g kg ⁻¹
Hainich (Cambisol, beech)									
0-5	6.1 (0.9)	73 (11)	13.0 (0.5)	0	22 (4)	546 (5)	3.0 (1.0)	14.0 (0.8)	1.9 (1.1)
10-20	6.7 (0.5)	27 (6)	10.7 (0.4)	0	28 (4)	514 (5)	2.0 (0.4)	15.3 (1.0)	1.8 (0.6)
30-40	7.4 (0.2)	11 (1)	9.0 (0.4)	0	23 (7)	731 (7)	n.d.	n.d.	n.d.
Hesse (Luvisol, beech)									
0-5	4.6 (0.7)	31 (6)	13.9 (0.6)	0	68	342	1.8 (0.3)	11.8 (1.3)	1.1 (0.2)
10-20	4.5 (0.3)	14 (4)	11.8 (0.5)	0	56 (12)	315 (11)	1.4 (0.5)	11.5 (1.1)	1.0 (0.1)
30-40	n.d.	6 (0)	8.3 (0.0)	0	55(3)	371 (22)	n.d.	n.d.	n.d.
Laqueuille (Andosol, grassland)									
0-5	5.3 (0.2)	126(11)	11.1 (0.2)	0	186 (36)	263 (28)	12.7 (0.1)	24.0 (0.6)	19.3 (0.7)
10-20	5.6 (0.3)	66(7)	10.2 (0.2)	0	259 (58)	215 (8)	16.4 (3.0)	20.3 (0.9)	24.0 (2.6)
30-40	n.d.	50 (4)	10.7 (0.3)	0	236 (21)	225 (22)	15.8 (1.7)	20.6 (1.1)	27.6 (2.3)
Wetzstein (Podzol, spruce)									
0-10	3.5 (0.0)	76 (15)	24.6 (2.2)	0	264 (164)	250 (165)	9.2 (6.2)	17.0 (10.4)	1.5 (0.8)
10-30	3.8 (0.3)	60 (29)	22.0 (3.6)	0	219 (40)	344 (123)	24.9 (15.5)	37.0 (12.6)	4.4 (0.8)
30-50	4.2 (0.3)	45 (24)	19.1 (2.3)	0	221 (46)	364 (63)	17.4 (16.6)	27.4 (16.1)	7.8 (2.6)
Gebesee (Chernozem, cropland)									
0-5	6.8 (0.1)	26 (2)	11.3 (0.9)	0	28 (5)	345 (5)	1.4 (0.1)	6.9 (0.3)	1.3 (0.1)
10-20	7.0 (0.4)	22 (2)	10.5 (0.1)	0	26 (3)	336 (2)	1.4 (0.2)	6.9 (0.3)	1.4 (0.1)
30-40	n.d.	17 (1)	11.1 (0.2)	1.6 (0.9)	21 (1)	368 (1)	n.d.	n.d.	n.d.

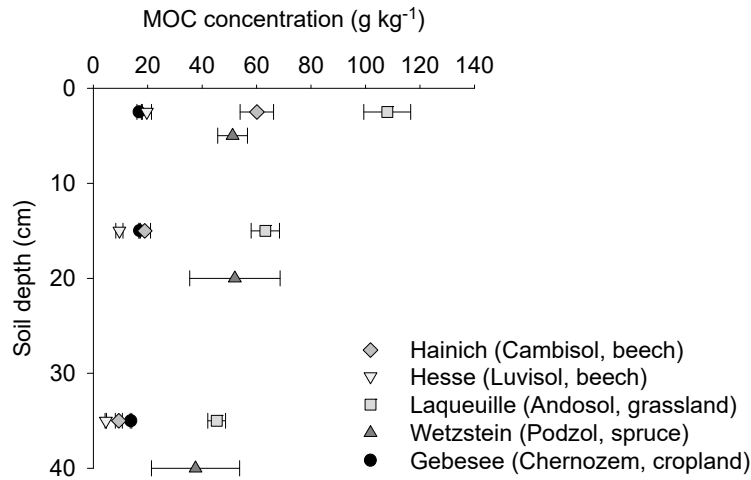


Figure S1: Original concentration of OC in mineral association (MOC, means and standard deviation) of the studied soil samples from 5 sites (data adopted from Schrumpf et al. 2013). Symbols indicate mid-points of integrated sampled depth intervals (Table 1).

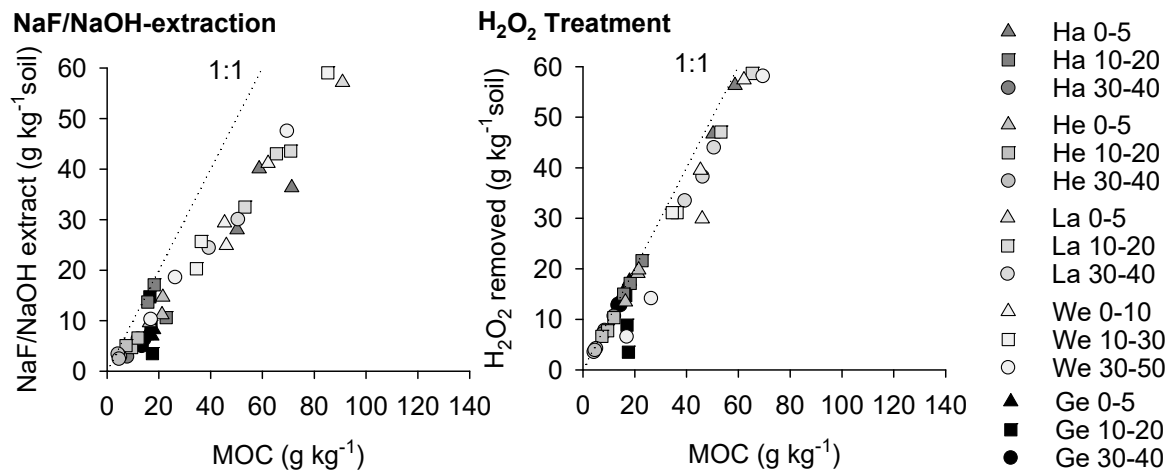


Figure S2: Dependency of removed OC from original concentrations of mineral-associated OC for the NaF/NaOH extraction (left) or the H_2O_2 oxidation (right).

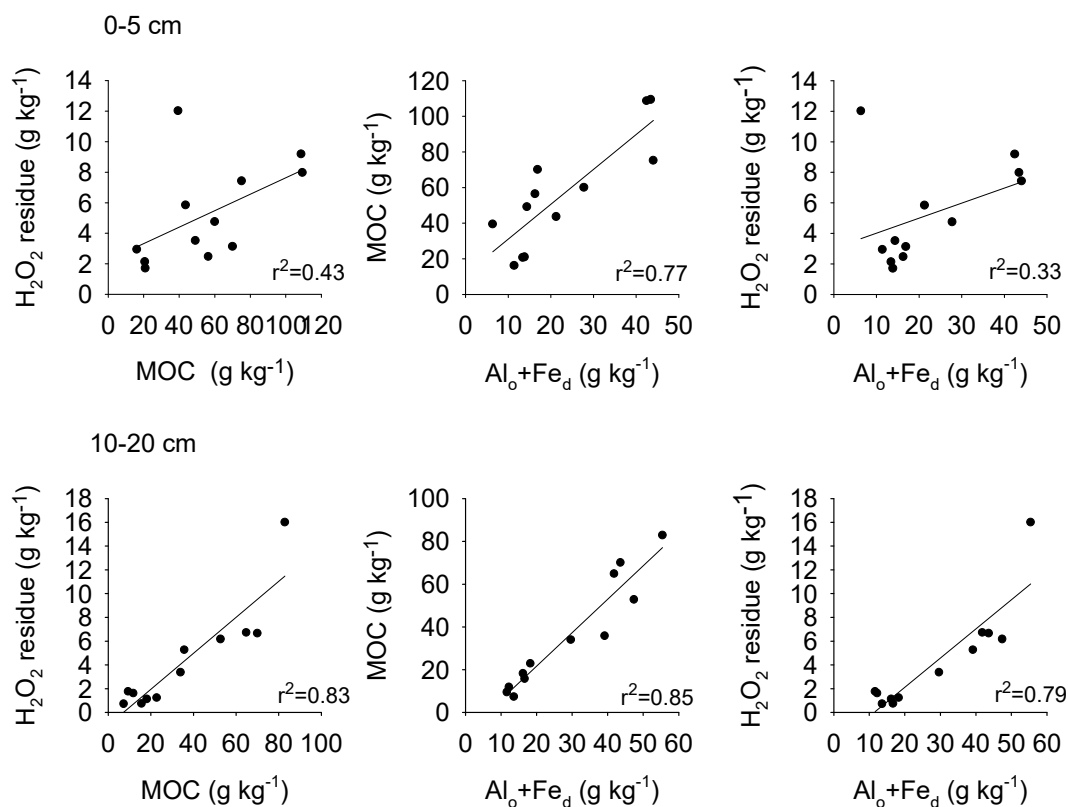


Figure S3: Relations between OC in mineral association (MOC), the amount of OC left from MOC after the H₂O₂ treatment (H₂O₂ residue) and the content of oxalate-extractable Al (Al_o) and dithionite-extractable Fe (Fe_d) for two soil depths (Al_o and Fe_d data were taken from Schrumpf et al. (2013)).

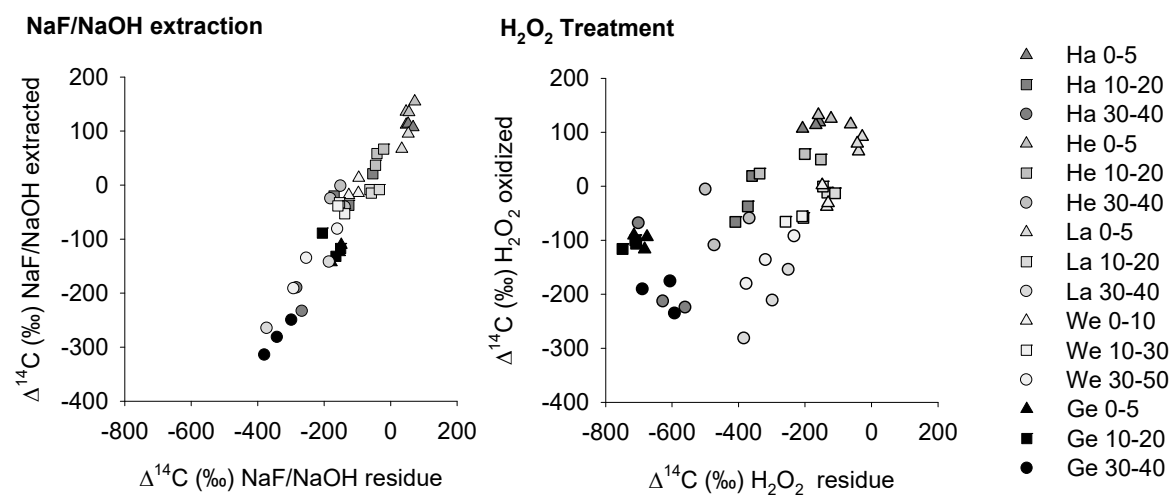


Figure S4: Correlation between ¹⁴C contents of NaF/NaOH extracts and extraction residues of HF-OC (left) and between oxidized OC and residue OC following treatment of HF-OC with heated H₂O₂ (right).

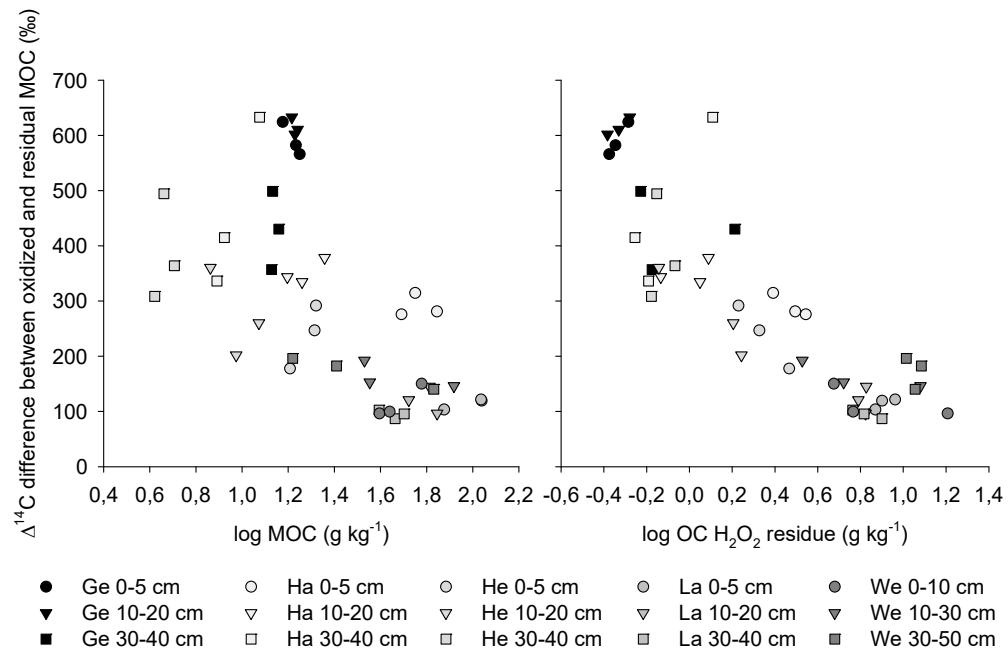


Figure S5: Decline in ^{14}C differences between oxidized and residual OC after H_2O_2 treatment with increasing OC amounts in total MOC and OC left in H_2O_2 residues across sites and depths.

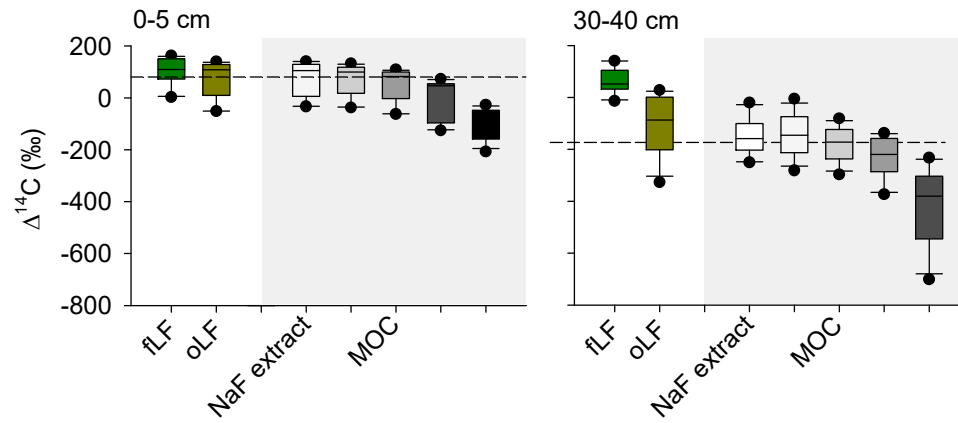


Figure S6: Box-plots giving an overview of ^{14}C contents in all OC fractions separated from bulk samples in 0-5 cm (left) and 30-40 cm (right) depth for the non-arable samples (dashed line denotes the median of the ^{14}C in bulk MOC). fLF: free light fraction, oLF: occluded light fraction, fLF and oLF values adopted from Schrumpf et al. (2013).