

Supplementary Information:

Source of Surface Functionality and Cation Exchange Capacity of Black Carbon

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Table S1. NEXAFS analyses of additional BC-bearing aggregate sections in soil samples from depths A, B and C in the LG depth profile (labeled as A-1, B-1, C-1)

Figure captions

FIGURE S1. Microprobe elemental maps for Ca and C and their superimposed maps of two additional soil aggregate sections from the topsoil horizon A. The lower left images (A-1 and A-2) are the SEM images of the aggregate sections in grey scale.

FIGURE S2. Microprobe elemental maps for Ca and C and their superimposed maps of an additional soil aggregate section from the subsoil horizon C. The lower left image (C-1) is the SEM image of the aggregate sections in grey scale.

TABLE S1. Carbon forms determined by NEXAFS spectral deconvolution of additional BC-bearing aggregate sections

Depth (m)	Spatial location	<i>Un-ox.</i> ------(%)-----	Aro.	<i>Ox.</i>	<i>Un-ox. to Ox.</i> -----(ratio)----	Aro./ <i>Ox.</i>	P5 ------(%)-----	P6	P5+P6
0-0.16	IN	28.9	28.6	33.8	0.9	0.8	6.9	14.1	21.0
A-1	M	30.5	30.5	38.8	0.8	0.8	6.0	14.7	20.7
	OUT	6.6	6.6	50.9	0.1	0.1	11.9	18.6	30.5
0.16-0.43	IN	30.4	26.1	34.5	0.9	0.8	4.3	14.6	19.0
B-1	M	9.0	8.9	44.6	0.2	0.2	11.3	21.6	32.9
	OUT	20.7	19.6	42.1	0.5	0.5	7.4	18.1	25.4
0.43-0.67	IN	29.7	27.2	35.0	0.8	0.8	6.9	14.9	21.8
C-1	M	34.3	29.2	34.0	1.0	0.9	7.5	14.1	21.7
	OUT	24.7	19.7	39.8	0.6	0.5	4.6	16.4	21.0

IN=core/inside region; M=intermediate layer between IN and OUT; OUT=furthest from core.

Un-ox.: Un-oxidized C; Aro.: Aromatic C; *Ox.*: Oxidized C.

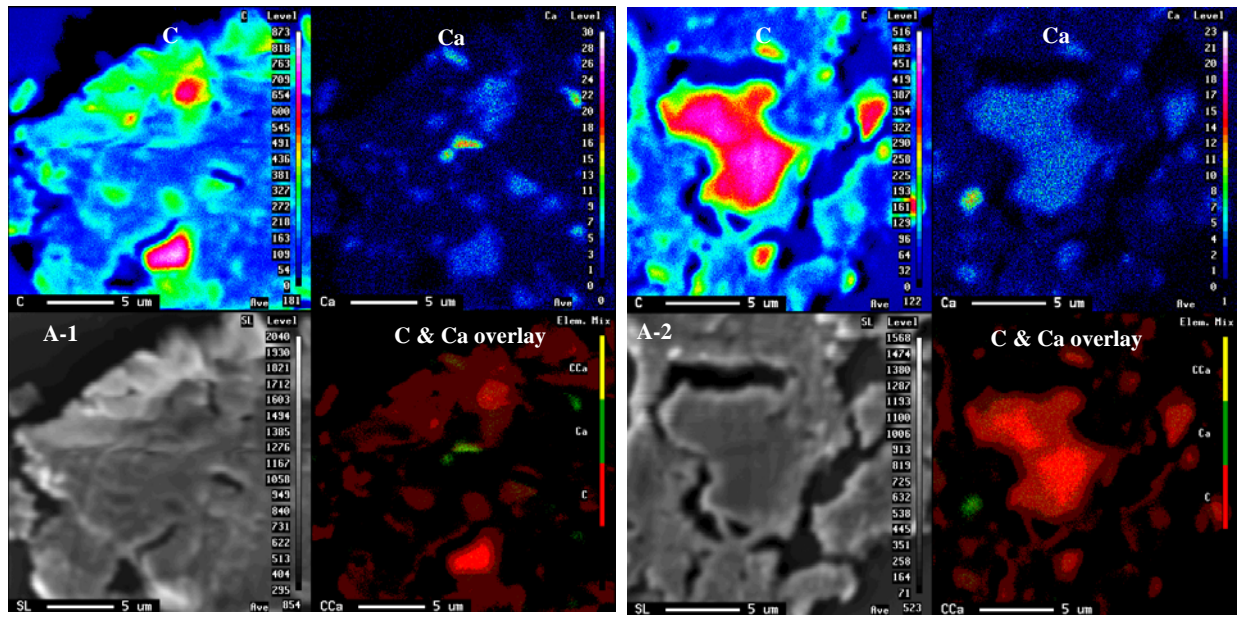


Figure S1.

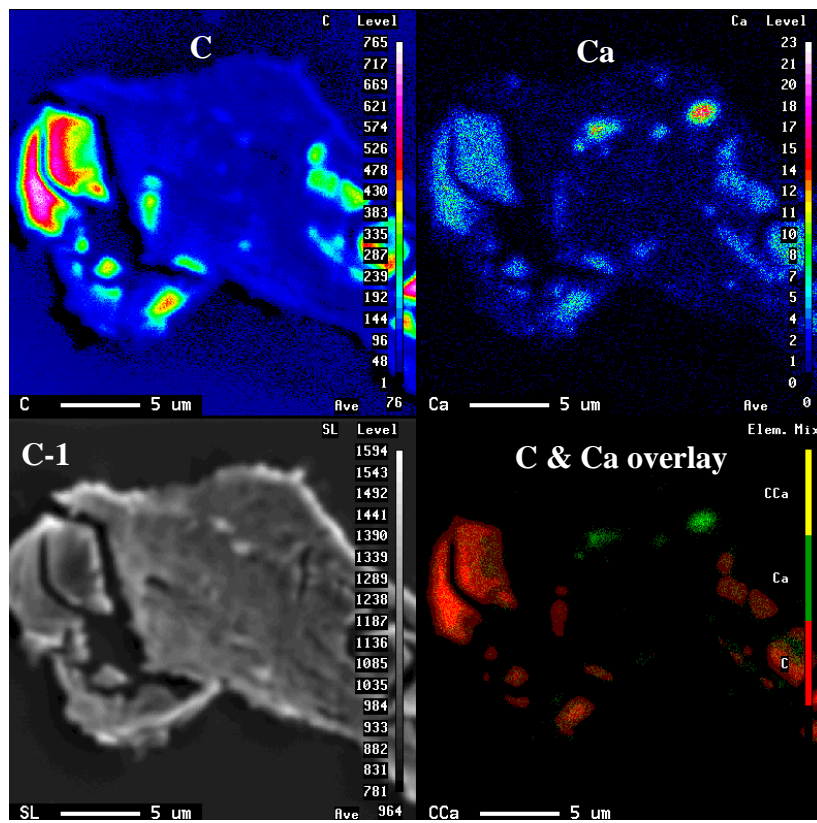


Figure S2.