

Methodological approaches in the development of a quantified Czech soil classification system

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Electronic Supplementary Material (ESM)

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SOIL ORGANIC CARBON AND CaCO₃ CONTENT

Table S1. Distribution of soil organic carbon (SOC) content (%) in černožem soil profiles

SOC content (%)	Count	Share (%)
< 0.8	366	8
0.8–1.0	580	14
1.0–1.2	866	20
1.2–1.5	1 178	27
> 1.5	1 352	31

Table S2. Distribution of depth (cm) of humus-horizon in černožem soil profiles

Depth of humus-horizon	Count	Share (%)
< 30	924	21.3
30–40	437	10.1
40–60	1 765	40.6
60–100	985	22.7
> 100	231	5.3

Table S3. Descriptive statistics of soil organic carbon (SOC) (%) for the first four horizons in smonice soil profiles

Horizon order	Mean SOC	Median SOC	SD	Count
1	1.8	1.7	0.6	61
2	1.2	1.2	0.5	61
3	0.7	0.6	0.5	56
4	0.5	0.3	0.5	5

Table S4. soil organic carbon (SOC) content (%) in individual horizons of rendzina soil profiles

Horizon	Minimum	Maximum	Mean	Median	SD	Count
topsoil	0.3	3.2	1.7	1.7	0.6	60
A	0.2	3.9	1.7	1.8	1.1	14
A/substrate	0.3	2.3	0.8	0.6	0.5	27

Table S5. soil organic carbon (SOC) content (%) in individual horizons of pararendzina soil profiles

Horizon	Minimum	Maximum	Mean	Median	SD	Count
topsoil	0.1	5.3	1.4	1.4	0.5	1 407
A	0.1	3.9	1.2	1.2	0.7	314
A/substrate	0.0	5.8	0.6	0.6	0.4	869

Table S6. CaCO₃ content (%) in rendzina horizons

Horizon	Minimum	Maximum	Mean	Median	SD	Count
topsoil	0	40	4.6	1.2	7.4	53
lower A	0	46	10.0	2.8	15.2	13
cambic	0	18	2.5	0.0	5.8	12
substrate	0	76	11.3	4.7	17.6	38
bedrock	6	43	24.5	24.5	26.2	2

Table S7. CaCO₃ content (%) in pararendzina horizons

Horizon	Minimum	Maximum	Mean	Median	SD	Count
topsoil	0	59	6.4	3.0	8.6	1 045
lower A	0	57	7.6	3.0	9.9	243
cambic	0	44	3.8	0.6	8.1	102
cambic/substrate	0	60	14.7	12.0	13.2	790
substrate	0	90	20.9	18.0	15.8	1 523

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TEXTURAL DIFFERENTIATION

Table S8. Textural differentiation in hnědozem and luvizem soil profiles calculated as the ratio of maximum clay content in the luvic horizon to minimum clay content in the overlying horizon

Soil unit	Minimum	Maximum	Mean	Median	SD	CV	Count
hnědozem	1.0	4.9	1.7	1.6	0.5	30.9	3 199
luvizem	1.0	5.0	2.1	2.0	0.7	31.8	1 558

Table S9. Distribution of hnědozem and luvizem profiles under alternative working criteria of textural differentiation

Working criteria	Soil unit	Count
1.3/1.8+E	hnědozem	3 764
1.3/1.8+E	luvizem	1 000
1.4/1.8+E	hnědozem	3 291
1.4/1.8+E	luvizem	1 000
1.4/1.8+E OR 2.2	hnědozem	2 799
1.4/1.8+E OR 2.2	luvizem	1 540
1.4/2.2 OR E	hnědozem	2 383
1.4/2.2 OR E	luvizem	2 152
1.4/2.2+E	hnědozem	3 793
1.4/2.2+E	luvizem	498

HYDROMORPHIC FEATURES

Table S10. The upper limits of layers with hydromorphic features in different soil units

Feature	Soil unit	Minimum	Maximum	Mean	Median	SD	Count
g	glej	0	90	21	17	20	88
g	černice	0	118	44	40	27	89
g	pseudoglej	0	92	23	22	10	2 832
(g)	glej	0	80	6	0	14	83
(g)	černice	0	100	29	24	22	125
(g)	pseudoglej	0	130	23	0	34	1 438
G	glej	0	130	21	18	17	1 208
G	černice	0	150	65	62	28	433
G	pseudoglej	0	128	50	44	33	70
(G)	glej	0	126	3	0	10	818
(G)	černice	0	144	41	35	25	690
(G)	pseudoglej	0	120	27	0	39	49

g – pronounced stagnic features; (g) – less developed stagnic features; G – pronounced gleyic features; (G) – less developed gleyic features

DIAGNOSTIC HORIZONS THICKNESS

Table S11. Descriptive statistics for thickness (cm) of spodic horizons

Horizon	Minimum	Maximum	Mean	Median	SD	Count
Humus-sesquioxidic	1	65	13	10	10	449
Ortstein	1	50	9	5	12	18
Rusty	3	110	28	24	17	300
Sesquioxidic	1	140	39	36	21	1 427

Table S12. Descriptive statistics for thickness (cm) of cambic horizons

Horizon	Minimum	Maximum	Mean	Median	SD	Count
Cambic	0	660	26	22	33	14 461
Cambic – combined	0	660	33	27	34	14 461
Cambic/substrate	2	660	80	68	47	14 461

Table S13. Descriptive statistics for thickness (cm) of eluvial horizons

Horizon	Minimum	Maximum	Mean	Median	SD	CV	Count
Eluvial	0	108	13	14	13	100.0	5 216
Eluvial – combined	4	300	28	24	15	54.0	5 216
Eluvial/substrate	4	300	28	24	15	54.0	5 216

Table S14. Descriptive statistics for thickness (cm) of stagnic horizons

Horizon	Minimum	Maximum	Mean	Median	SD	CV	Count
Stagnic	0	405	60	60	52	87.0	1 222
Stagnic – combined	0	420	104	110	62	60.0	1 222
Stagnic/substrate	12	555	139	150	45	32.0	1 222

Table S15. Descriptive statistics for thickness (cm) of gleyic horizons

Horizon	Minimum	Maximum	Mean	Median	SD	CV	Count
Gleyic	0	330	36	31	30	83.0	2 884
Gleyic – combined	0	370	61	58	34	56.0	2 884
Gleyic/substrate	18	384	134	130	34	25.0	2 884

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NEOFORMATIONS

Table S16. Frequency of neoformations divided into the main process groups

Process group	Neoformation	Count
Decalcification	CaCO ₃ concretions	295
Decalcification	CaCO ₃ spots	310
Decalcification	white veins	89
Decalcification	Ca mycelia	97
Decalcification	pseudomycelia	210
Decalcification	light-coloured mottles and coatings	182
Decalcification	veins	262
Lessivage	colloidal coatings (films)	10 623
Lessivage	humus infillings and spots	1 216
Lessivage	infillings	351
Lessivage	brown mottles and coatings	174
Lessivage	light-coloured infillings	41
Stagnic/gleytic features	Fe-Mn nodules	3 734
Stagnic/gleytic features	rusty mottles and coatings	4 055
Stagnic/gleytic features	mottling	3 351
Stagnic/gleytic features	blue-grey mottles and coatings	36
Stagnic/gleytic features	Mn coatings	327
Stagnic/gleytic features	green-grey mottles and coatings	77

SKELETAL CONTENT

Table S17. Skeletal content categories in ranker soil profiles

Horizon position	Skeletal content category	Count
First horizon	no coarse fragments	5
First horizon	< 5%	5
First horizon	5–10%	2
First horizon	10–25%	3
First horizon	25–50%	3
Second horizon	no coarse fragments	4
Second horizon	< 5%	2
Second horizon	5–10%	2
Second horizon	10–25%	1
Transition horizon	no coarse fragments	2
Transition horizon	< 5%	3
Transition horizon	5–10%	1
Transition horizon	10–25%	4
Transition horizon	25–50%	1
Substrate	no coarse fragments	5
Substrate	< 5%	1
Substrate	5–10%	1
Substrate	25–50%	1

Table S18. Skeletal content categories in rendzina soil profiles

Horizon position	Skeletal content category	Count
First horizon	no coarse fragments	10
First horizon	< 5%	16
First horizon	5–10%	37
First horizon	10–25%	5
First horizon	25–50%	2
Second horizon	no coarse fragments	2
Second horizon	< 5%	9
Second horizon	5–10%	9
Second horizon	10–25%	8
Second horizon	25–50%	1
Transition horizon	no coarse fragments	4
Transition horizon	< 5%	6
Transition horizon	5–10%	6
Transition horizon	10–25%	20
Transition horizon	25–50%	12
Substrate	no coarse fragments	5
Substrate	< 5%	4
Substrate	5–10%	4
Substrate	10–25%	10
Substrate	25–50%	39

Table S19. Skeletal content categories in pararendzina soil profiles

Horizon position	Skeletal content category	Count
First horizon	no coarse fragments	619
First horizon	< 5%	536
First horizon	5–10%	228
First horizon	10–25%	57
First horizon	25–50%	10
Second horizon	no coarse fragments	234
Second horizon	< 5%	151
Second horizon	5–10%	52
Second horizon	10–25%	39
Second horizon	25–50%	9
Transition horizon	no coarse fragments	518
Transition horizon	< 5%	280
Transition horizon	5–10%	139
Transition horizon	10–25%	121
Transition horizon	25–50%	80
Substrate	no coarse fragments	634
Substrate	< 5%	277
Substrate	5–10%	94
Substrate	10–25%	105
Substrate	25–50%	213

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Table S20. Skeletal content categories in kambizem profiles

Horizon position	Skeletal content category	Count
First horizon	no coarse fragments	3 218
First horizon	< 5%	5 573
First horizon	5–10%	5 118
First horizon	10–25%	636
First horizon	25–50%	62
Second horizon	no coarse fragments	2 690
Second horizon	< 5%	4 052
Second horizon	5–10%	3 364
Second horizon	10–25%	1 587
Second horizon	25–50%	136
Transition horizon	no coarse fragments	3 417
Transition horizon	< 5%	2 886
Transition horizon	5–10%	2 556
Transition horizon	10–25%	3 256
Transition horizon	25–50%	2 459
Substrate	no coarse fragments	3 977
Substrate	< 5%	1 125
Substrate	5–10%	562
Substrate	10–25%	773
Substrate	25–50%	3 407