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Updated European hydraulic pedotransfer functions with communicated uncertainties in the predicted variables (euptfv2)

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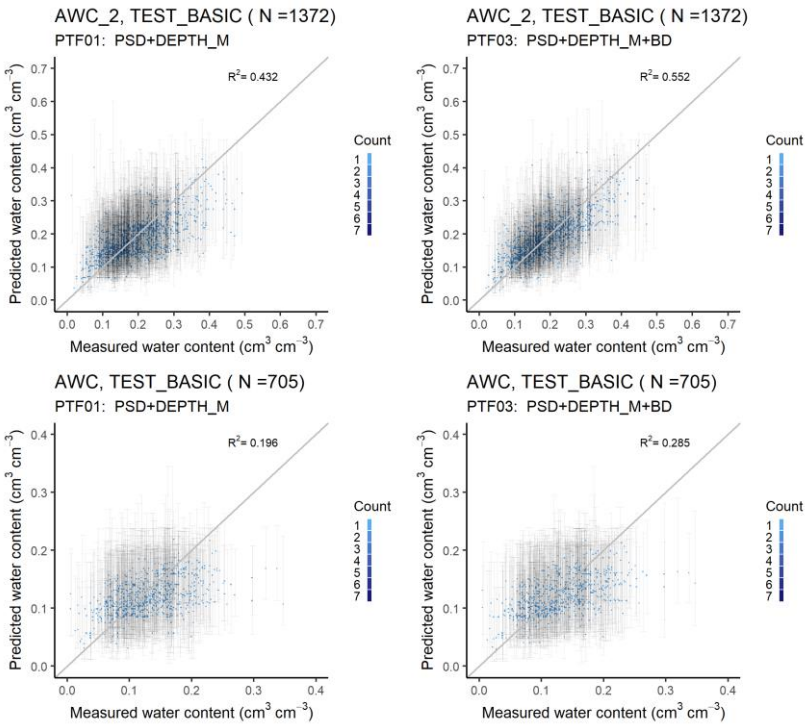

Figure S1. The scatter plot of the measured versus predicted plant available water content values of the worst and best performing PTF with 90% prediction interval on test datasets. AWC_2: plant available water content based on filed capacity at -100 cm matric potential head (PTF01 vs. PTF03); AWC: plant available water content based on filed capacity at -330 cm matric potential head (PTF01 vs. PTF03); PSD: particle size distribution (sand, 50–2000 μm; silt, 2–50 μm; clay, <2 μm (mass %)); DEPTH_M: mean soil depth (cm); BD: bulk density (g cm^{-3}); Count: the number of cases in each rectangle.

Table S1. Performance of pedotransfer functions (PTF) by input combination on training and test datasets to predict the plant available water content of the soil (AWC_2) belonging to the -100 cm matric potential head. N: number of samples, RMSE: root mean square error **(**cm^3 cm^{-3}**)**, and R^2: determination coefficient, TEST_BASIC: samples with measured PSD, DEPTH, OC and BD; TEST_CHEM+: samples with measured PSD, DEPTH, OC, BD, CACO3, PH_H2O and CEC. Recommended PTFs are highlighted in bold.

		Training set			Test set			Sign. difference[2]		
Name of PTF in euptfv2	**Predictor variables[1]**	**N**	**RMSE**	**R^2**	**N**	**RMSE**	**R^2**	**TEST_BASIC set**	**TEST_CHEM + set**	**Recommended PTF**
PTF01	**PSD+DEPTH**	3528	0.062	0.446	1372	0.060	0.432	a	ab	PTF01
PTF02	**PSD+DEPTH+OC**	3208	0.055	0.540	1372	0.054	0.544	b	abcd	PTF02
PTF03	**PSD+DEPTH+BD**	3472	0.054	0.581	1372	0.053	0.552	b	abcd	PTF03
PTF04	PSD+DEPTH+CACO3	1548	0.050	0.326	274	0.055	0.219	-	abcd	PTF01
PTF05	PSD+DEPTH+PH_H2O	1849	0.058	0.463	274	0.055	0.216	-	a	PTF01
PTF06	PSD+DEPTH+CEC	1550	0.059	0.512	274	0.060	0.050	-	abcd	PTF01
PTF07	PSD+DEPTH+OC+BD	3197	0.051	0.609	1372	0.051	0.588	b	abcd	PTF03
PTF08	PSD+DEPTH+OC+CACO3	1464	0.048	0.353	274	0.053	0.257	-	abcd	PTF02
PTF09	PSD+DEPTH+OC+PH_H2O	1615	0.055	0.490	274	0.053	0.270	-	abc	PTF02
PTF10	PSD+DEPTH+OC+CEC	1358	0.054	0.563	274	0.053	0.278	-	abcd	PTF02
PTF11	PSD+DEPTH+BD+CACO3	1545	0.044	0.470	274	0.048	0.396	-	d	PTF03
PTF12	PSD+DEPTH+BD+PH_H2O	1796	0.052	0.565	274	0.048	0.406	-	abcd	PTF03
PTF13	PSD+DEPTH+BD+CEC	1498	0.053	0.598	274	0.048	0.398	-	abcd	PTF03
PTF14	PSD+DEPTH+CACO3+PH_H2O	1195	0.051	0.341	274	0.052	0.284	-	abcd	PTF01
PTF15	PSD+DEPTH+CACO3+CEC	726	0.050	0.286	274	0.052	0.303	-	abcd	PTF01
PTF16	PSD+DEPTH+PH_H2O+CEC	1255	0.058	0.539	274	0.051	0.331	-	abcd	PTF01
PTF17	PSD+DEPTH+OC+BD+CACO3	1464	0.044	0.465	274	0.048	0.390	-	bcd	PTF03
PTF18	PSD+DEPTH+OC+BD+PH_H2O	1607	0.051	0.556	274	0.048	0.407	-	abcd	PTF03
PTF19	PSD+DEPTH+OC+BD+CEC	1349	0.052	0.593	274	0.046	0.441	-	abcd	PTF03
PTF20	PSD+DEPTH+OC+CACO3+PH_H2O	1130	0.050	0.367	274	0.051	0.309	-	abcd	PTF02
PTF21	PSD+DEPTH+OC+CACO3+CEC	683	0.049	0.305	274	0.050	0.359	-	abcd	PTF02
PTF22	PSD+DEPTH+OC+PH_H2O+CEC	1067	0.054	0.561	274	0.049	0.367	-	abcd	PTF02
PTF23	PSD+DEPTH+BD+CACO3+PH_H2O	1192	0.046	0.471	274	0.049	0.375	-	bcd	PTF03
PTF24	PSD+DEPTH+BD+CACO3+CEC	725	0.045	0.420	274	0.046	0.444	-	d	PTF03
PTF25	PSD+DEPTH+BD+PH_H2O+CEC	1204	0.052	0.621	274	0.046	0.456	-	abcd	PTF03
PTF26	PSD+DEPTH+CACO3+PH_H2O+CEC	684	0.049	0.318	274	0.048	0.388	-	abcd	PTF01
PTF27	PSD+DEPTH+OC+BD+CACO3+PH_H2O	1130	0.045	0.475	274	0.049	0.367	-	abcd	PTF03
PTF28	PSD+DEPTH+OC+BD+CACO3+CEC	683	0.045	0.408	274	0.045	0.466	-	bcd	PTF03
PTF29	PSD+DEPTH+OC+BD+PH_H2O+CEC	1059	0.052	0.603	274	0.045	0.473	-	bcd	PTF03
PTF30	PSD+DEPTH+OC+CACO3+PH_H2O+CEC	641	0.049	0.330	274	0.048	0.393	-	abcd	PTF02
PTF31	PSD+DEPTH+BD+CACO3+PH_H2O+CEC	683	0.044	0.450	274	0.045	0.480	-	cd	PTF03
PTF32	PSD+DEPTH+OC+BD+CACO3+PH_H2O+CEC	641	0.045	0.425	274	0.045	0.471	-	cd	PTF03

[1]PSD: particle size distribution (sand, 50–2000 μm; silt, 2–50 μm; clay, <2 μm (mass %)); DEPTH: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

[2]Different letters indicate significant differences at the 0.05 level between the accuracy of the methods based on the squared error; for example performance indicated with the letter c is significantly better than the one noted with letters b and a.

Table S2. Performance of pedotransfer functions (PTF) by input combination on training and test datasets to predict the plant available water content of the soil (AWC) belonging to the -330 cm matric potential head. N: number of samples, RMSE: root mean square error **(**cm^3 cm^{-3}**)**, and R^2: determination coefficient, TEST_BASIC: samples with measured PSD, DEPTH, OC and BD; TEST_CHEM+: samples with measured PSD, DEPTH, OC, BD, CACO3, PH_H2O and CEC. Recommended PTFs are highlighted in bold.

		Training set			Test set			Sign. difference[2]		
Name of PTF in euptfv2	**Predictor variables[1]**	**N**	**RMSE**	**R^2**	**N**	**RMSE**	**R^2**	**TEST_BASIC set**	**TEST_CHEM + set**	**Recommended PTF**
PTF01	**PSD+DEPTH**	1863	0.042	0.312	705	0.048	0.196	a	a	PTF01
PTF02	PSD+DEPTH+OC	1650	0.041	0.337	705	0.045	0.288	ab	a	PTF01
PTF03	**PSD+DEPTH+BD**	1849	0.040	0.374	705	0.045	0.285	ab	a	PTF01
PTF04	PSD+DEPTH+CACO3	1531	0.040	0.366	279	0.050	0.199	-	a	PTF01
PTF05	PSD+DEPTH+PH_H2O	1245	0.042	0.344	279	0.048	0.238	-	a	PTF01
PTF06	PSD+DEPTH+CEC	1092	0.041	0.356	279	0.053	0.078	-	a	PTF01
PTF07	PSD+DEPTH+OC+BD	1645	0.040	0.381	705	0.043	0.337	b	a	PTF03
PTF08	PSD+DEPTH+OC+CACO3	1336	0.041	0.345	279	0.049	0.219	-	a	PTF01
PTF09	PSD+DEPTH+OC+PH_H2O	1074	0.042	0.345	279	0.048	0.242	-	a	PTF01
PTF10	PSD+DEPTH+OC+CEC	998	0.039	0.413	279	0.051	0.147	-	a	PTF01
PTF11	PSD+DEPTH+BD+CACO3	1522	0.038	0.428	279	0.048	0.258	-	a	PTF01
PTF12	PSD+DEPTH+BD+PH_H2O	1236	0.039	0.429	279	0.047	0.287	-	a	PTF01
PTF13	PSD+DEPTH+BD+CEC	1088	0.038	0.429	279	0.049	0.231	-	a	PTF01
PTF14	PSD+DEPTH+CACO3+PH_H2O	1230	0.041	0.376	279	0.047	0.263	-	a	PTF01
PTF15	PSD+DEPTH+CACO3+CEC	791	0.041	0.366	279	0.049	0.214	-	a	PTF01
PTF16	PSD+DEPTH+PH_H2O+CEC	739	0.042	0.321	279	0.048	0.237	-	a	PTF01
PTF17	PSD+DEPTH+OC+BD+CACO3	1334	0.039	0.399	279	0.048	0.262	-	a	PTF03
PTF18	PSD+DEPTH+OC+BD+PH_H2O	1072	0.040	0.393	279	0.047	0.293	-	a	PTF03
PTF19	PSD+DEPTH+OC+BD+CEC	995	0.038	0.432	279	0.049	0.223	-	a	PTF03
PTF20	PSD+DEPTH+OC+CACO3+PH_H2O	1059	0.042	0.362	279	0.047	0.289	-	a	PTF01
PTF21	PSD+DEPTH+OC+CACO3+CEC	707	0.041	0.358	279	0.049	0.229	-	a	PTF01
PTF22	PSD+DEPTH+OC+PH_H2O+CEC	660	0.041	0.339	279	0.048	0.253	-	a	PTF01
PTF23	PSD+DEPTH+BD+CACO3+PH_H2O	1221	0.039	0.442	279	0.047	0.267	-	a	PTF01
PTF24	PSD+DEPTH+BD+CACO3+CEC	788	0.039	0.405	279	0.047	0.269	-	a	PTF01
PTF25	PSD+DEPTH+BD+PH_H2O+CEC	736	0.039	0.402	279	0.046	0.307	-	a	PTF01
PTF26	PSD+DEPTH+CACO3+PH_H2O+CEC	732	0.040	0.405	279	0.048	0.254	-	a	PTF01
PTF27	PSD+DEPTH+OC+BD+CACO3+PH_H2O	1057	0.040	0.415	279	0.046	0.312	-	a	PTF03
PTF28	PSD+DEPTH+OC+BD+CACO3+CEC	705	0.040	0.383	279	0.047	0.277	-	a	PTF03
PTF29	PSD+DEPTH+OC+BD+PH_H2O+CEC	658	0.040	0.385	279	0.046	0.315	-	a	PTF03
PTF30	PSD+DEPTH+OC+CACO3+PH_H2O+CEC	653	0.040	0.395	279	0.047	0.274	-	a	PTF01
PTF31	PSD+DEPTH+BD+CACO3+PH_H2O+CEC	729	0.039	0.431	279	0.047	0.290	-	a	PTF01
PTF32	PSD+DEPTH+OC+BD+CACO3+PH_H2O+CEC	651	0.039	0.403	279	0.046	0.307	-	a	PTF03

[1]PSD: particle size distribution (sand, 50–2000 μm; silt, 2–50 μm; clay, <2 μm (mass %)); DEPTH: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

[2]Different letters indicate significant differences at the 0.05 level between the accuracy of the methods based on the squared error;for example performance indicated with the letter c is significantly better than the one noted with letters b and a.

Table S3. Normalized root mean square error (NRMSE) of the point predictions by soil hydraulic properties computed on the test datasets in cm^3 cm^{-3} for water retention and log_{10} (cm day^{-1}) for saturated hydraulic conductivity. In case of PTF01, 02, 03 and 07 TEST_BASIC set was used for the analysis, for the rest of the PTFs TEST_CHEM+ set was considered.

Name of PTF in euptfv2	Predictor variables[1]	NRMSE in test sets[2]						
		THS	FC_2	FC	WP	AWC_2	AWC	KS
PTF01	PSD+DEPTH_M	0.104	0.090	0.082	0.105	0.126	0.140	0.17
PTF02	PSD+DEPTH_M+OC	0.086	0.083	0.076	0.102	0.112	0.132	0.14
PTF03	PSD+DEPTH_M+BD	0.048	0.079	0.074	0.100	0.111	0.132	0.17
PTF04	PSD+DEPTH_M+CACO3	0.191	0.107	0.113	0.122	0.164	0.145	0.19
PTF05	PSD+DEPTH_M+PH_H2O	0.176	0.112	0.114	0.126	0.164	0.142	0.19
PTF06	PSD+DEPTH_M+CEC	0.191	0.107	0.107	0.118	0.181	0.156	0.19
PTF07	PSD+DEPTH_M+OC+BD	0.047	0.075	0.073	0.097	0.107	0.127	0.14
PTF08	PSD+DEPTH_M+OC+CACO3	0.184	0.097	0.109	0.117	0.160	0.143	0.19
PTF09	PSD+DEPTH_M+OC+PH_H2O	0.167	0.095	0.107	0.119	0.158	0.141	0.18
PTF10	PSD+DEPTH_M+OC+CEC	0.172	0.098	0.108	0.116	0.158	0.150	0.18
PTF11	PSD+DEPTH_M+BD+CACO3	0.072	0.091	0.105	0.115	0.144	0.140	0.19
PTF12	PSD+DEPTH_M+BD+PH_H2O	0.069	0.086	0.103	0.117	0.143	0.137	0.19
PTF13	PSD+DEPTH_M+BD+CEC	0.070	0.091	0.100	0.115	0.144	0.142	0.19
PTF14	PSD+DEPTH_M+CACO3+PH_H2O	0.168	0.101	0.109	0.121	0.157	0.139	0.18
PTF15	PSD+DEPTH_M+CACO3+CEC	0.179	0.102	0.106	0.113	0.155	0.144	0.19
PTF16	PSD+DEPTH_M+PH_H2O+CEC	0.183	0.098	0.104	0.115	0.152	0.142	0.19
PTF17	PSD+DEPTH_M+OC+BD+CACO3	0.070	0.089	0.102	0.111	0.145	0.139	0.18
PTF18	PSD+DEPTH_M+OC+BD+PH_H2O	0.070	0.083	0.103	0.116	0.143	0.136	0.18
PTF19	PSD+DEPTH_M+OC+BD+CEC	0.070	0.087	0.099	0.113	0.139	0.143	0.18
PTF20	PSD+DEPTH_M+OC+CACO3+PH_H2O	0.166	0.105	0.107	0.114	0.154	0.137	0.18
PTF21	PSD+DEPTH_M+OC+CACO3+CEC	0.171	0.090	0.104	0.108	0.149	0.142	0.18
PTF22	PSD+DEPTH_M+OC+PH_H2O+CEC	0.166	0.089	0.102	0.111	0.148	0.140	0.18
PTF23	PSD+DEPTH_M+BD+CACO3+PH_H2O	0.071	0.089	0.104	0.116	0.147	0.139	0.18
PTF24	PSD+DEPTH_M+BD+CACO3+CEC	0.071	0.085	0.099	0.110	0.138	0.139	0.19
PTF25	PSD+DEPTH_M+BD+PH_H2O+CEC	0.067	0.084	0.100	0.112	0.137	0.135	0.19
PTF26	PSD+DEPTH_M+CACO3+PH_H2O+CEC	0.163	0.094	0.103	0.111	0.145	0.140	0.18
PTF27	PSD+DEPTH_M+OC+BD+CACO3+PH_H2O	0.072	0.086	0.101	0.111	0.148	0.135	0.18
PTF28	PSD+DEPTH_M+OC+BD+CACO3+CEC	0.070	0.082	0.098	0.106	0.136	0.138	0.18
PTF29	PSD+DEPTH_M+OC+BD+PH_H2O+CEC	0.068	0.083	0.095	0.109	0.135	0.134	0.18
PTF30	PSD+DEPTH_M+OC+CACO3+PH_H2O+CEC	0.162	0.100	0.101	0.108	0.145	0.138	0.17
PTF31	PSD+DEPTH_M+BD+CACO3+PH_H2O+CEC	0.070	0.081	0.097	0.108	0.134	0.137	0.18
PTF32	PSD+DEPTH_M+OC+BD+CACO3+PH_H2O+CEC	0.069	0.079	0.097	0.107	0.135	0.135	0.18

[1]PSD: particle size distribution (sand, 50–2000 μm; silt, 2–50 μm; clay, <2 μm (mass %)); DEPTH: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm_{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

[2]THS: saturated water content (pF 0); FC_2: water content at -100 cm matric potential head (pF 2.0); FC: water content at -330 cm matric potential head (pF 2.5); AWC_2: plant available water content based on FC_2; AWC: plant available water content based on FC; WP: water content at wilting point (pF 4.2); KS: saturated hydraulic conductivity;

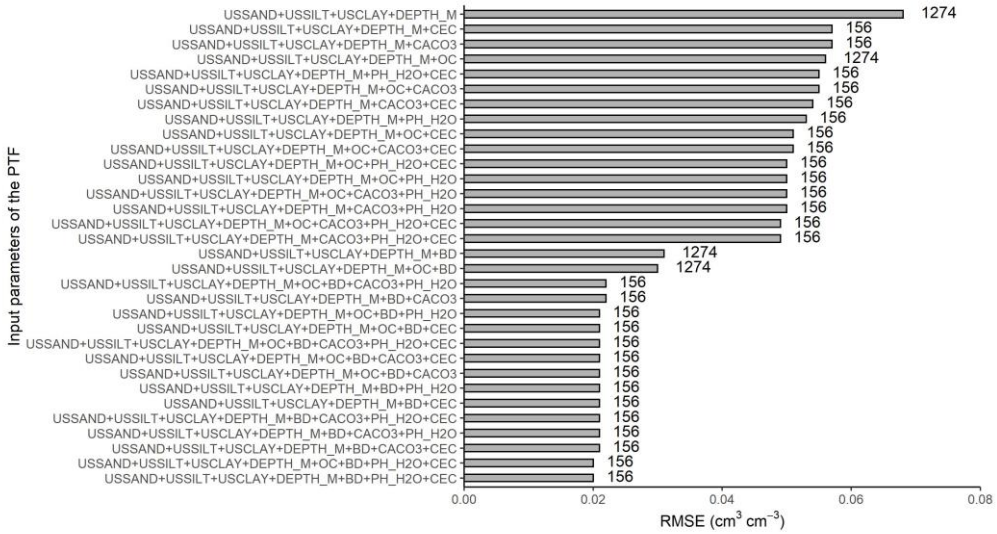

Figure S2. Root mean square error (RMSE) of the pedotransfer functions derived to predict water content at saturation (THS) computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

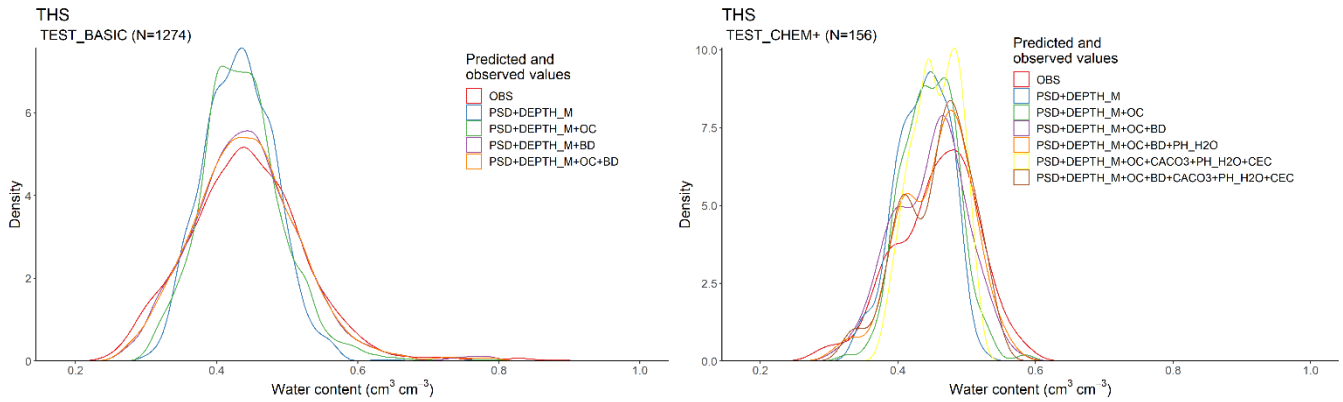

Figure S3. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) water content at saturation (THS) for selected pedotransfer functions, computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

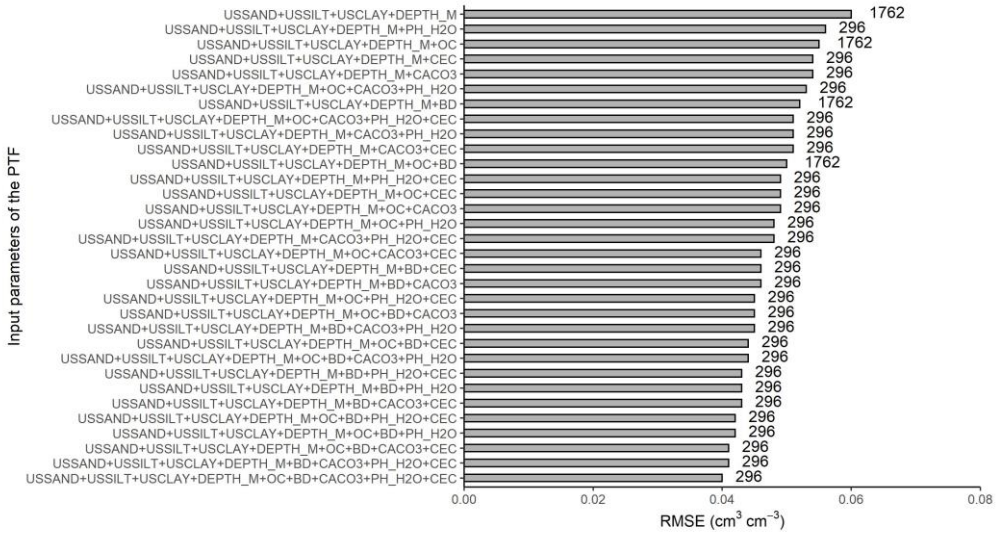

Figure S4. Root mean square error (RMSE) of the pedotransfer functions derived to predict water content at -100 cm matric potential head (FC_2) computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

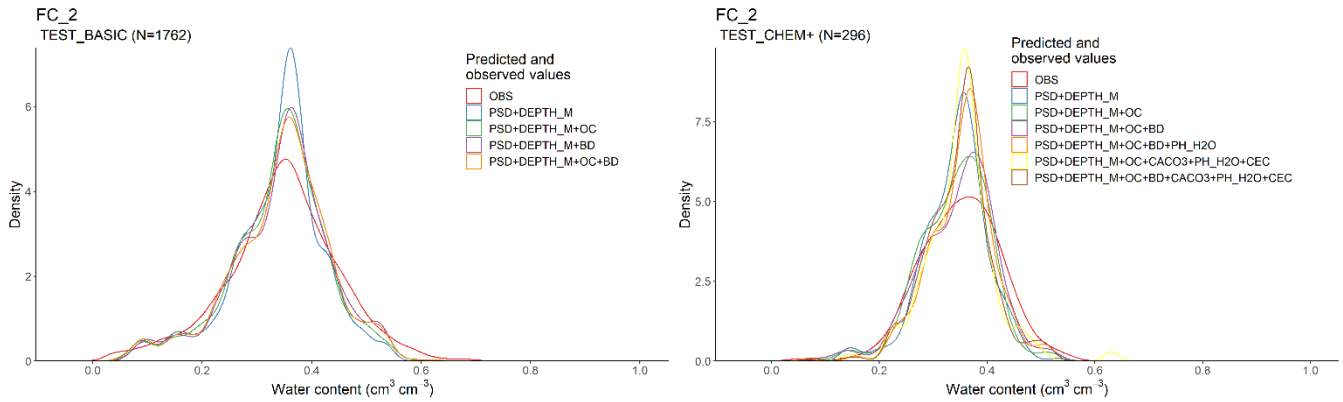

Figure S5. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) water content at -100 cm matric potential head (FC_2) for selected pedotransfer functions, computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

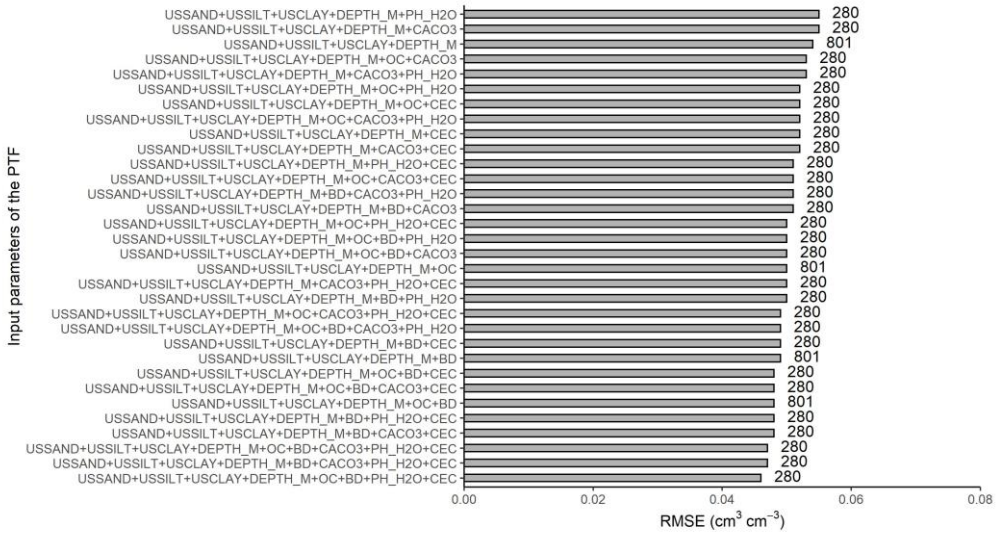

Figure S6. Root mean square error (RMSE) of the pedotransfer functions derived to predict water content at -330 cm matric potential head (FC) computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

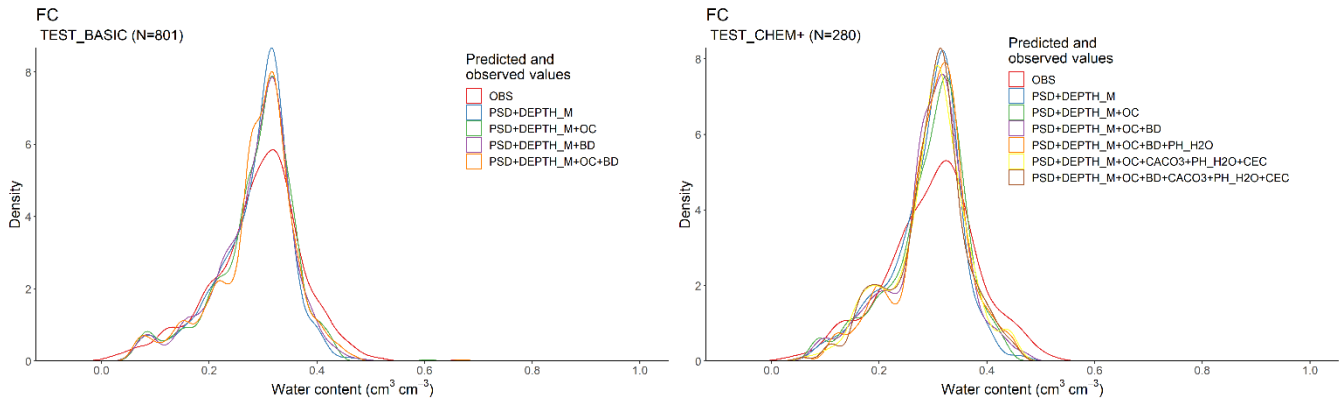

Figure S7. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) water content at -330 cm matric potential head (FC) for selected pedotransfer functions, computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

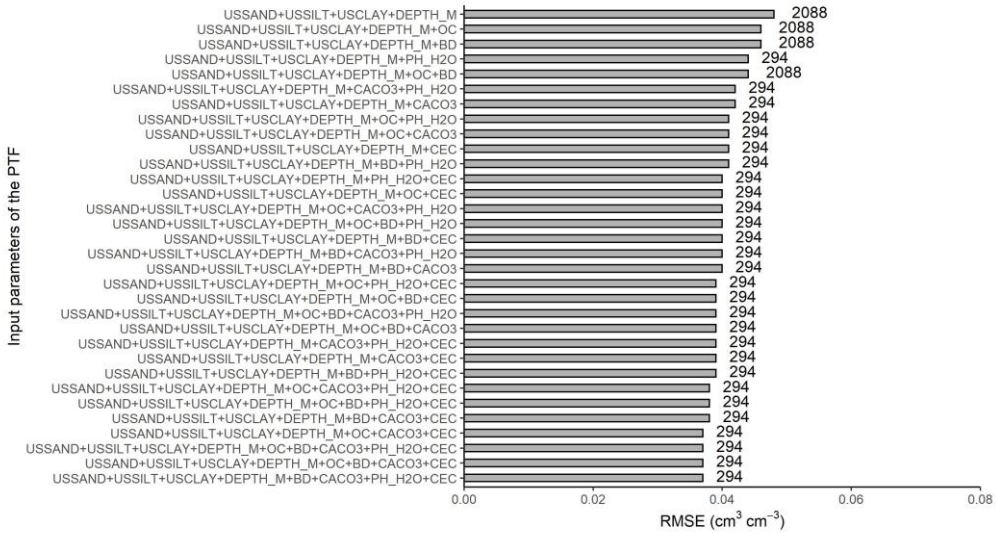

Figure S8. Root mean square error (RMSE) of the pedotransfer functions derived to predict water content at wilting point (WP) computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

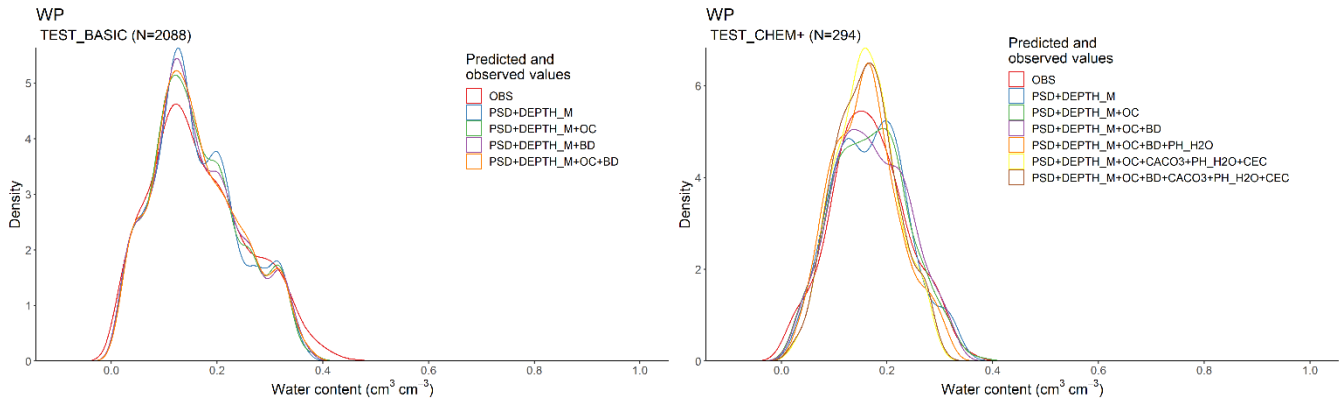

Figure S9. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) water content at wilting point (WP) for selected pedotransfer functions, computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

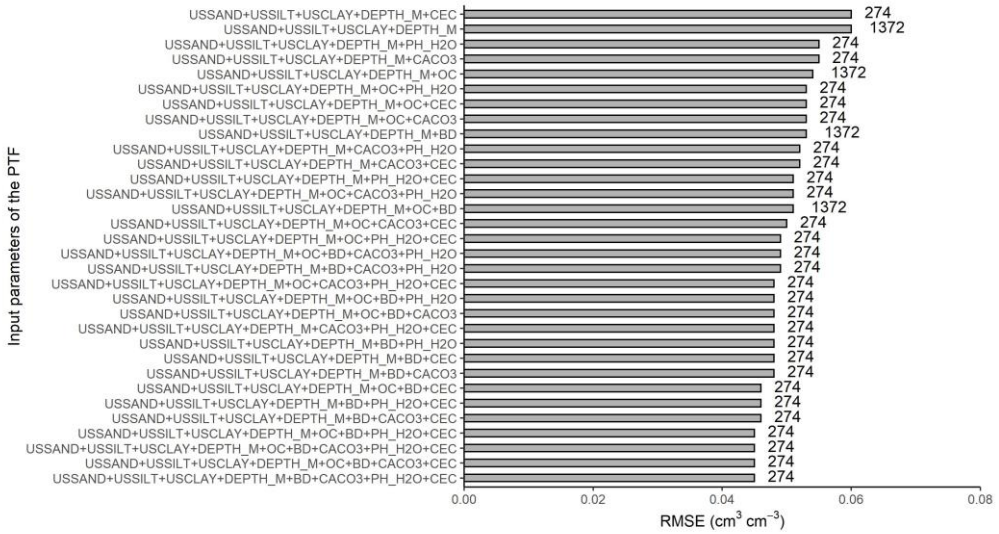

Figure S10. Root mean square error (RMSE) of the pedotransfer functions derived to predict plant available water content (AWC_2) considering field capacity at -100 matric potential head (FC_2), computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

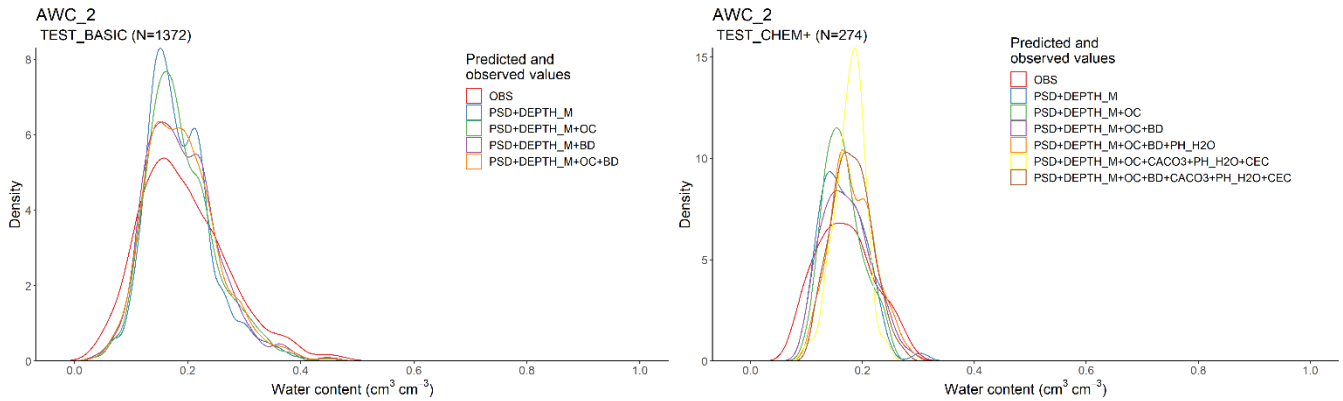

Figure S11. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) plant available water content (AWC_2) considering field capacity at -100 matric potential head (FC_2) for selected pedotransfer functions, computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

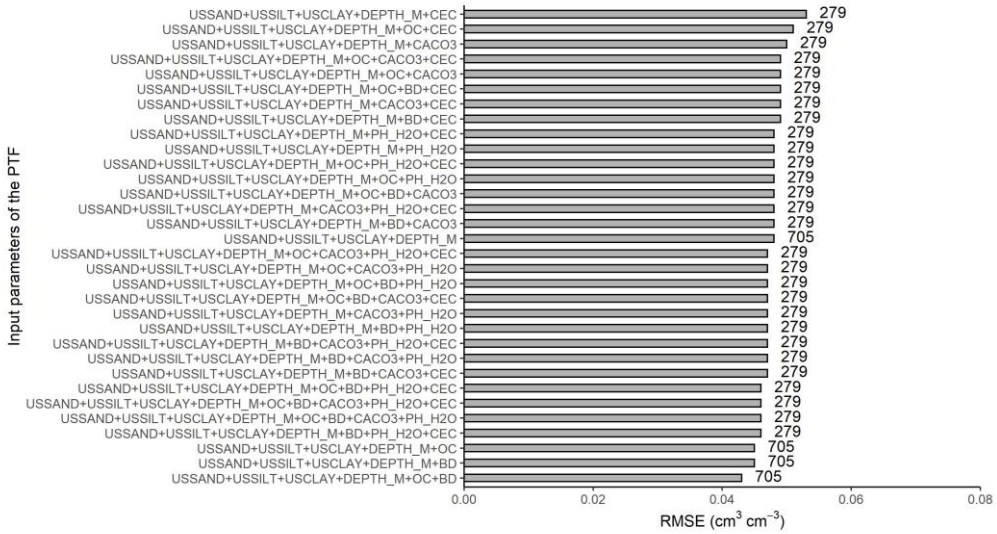

Figure S12. Root mean square error (RMSE) of the pedotransfer functions derived to predict plant available water content (AWC) considering field capacity at -330 matric potential head (FC), computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

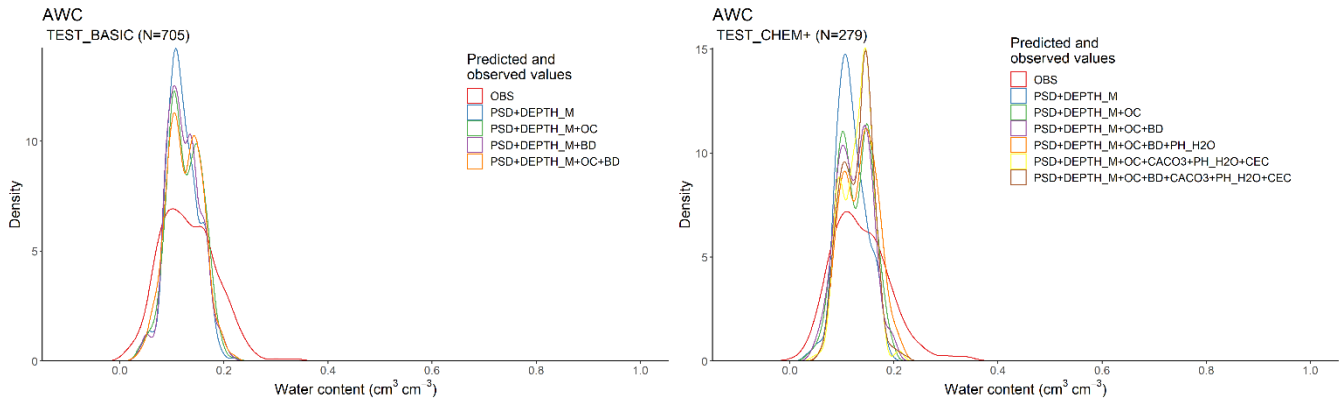

Figure S13. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) plant available water content (AWC) considering field capacity at -330 matric potential head (FC) for selected pedotransfer functions, computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

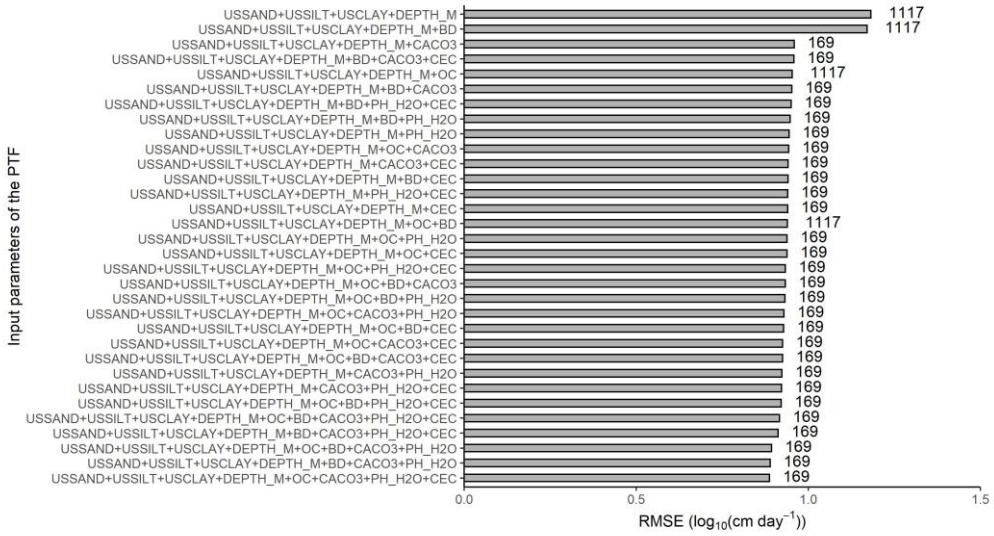

Figure S14. Root mean square error (RMSE) of the pedotransfer functions derived to predict saturated hydraulic conductivity (KS), computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

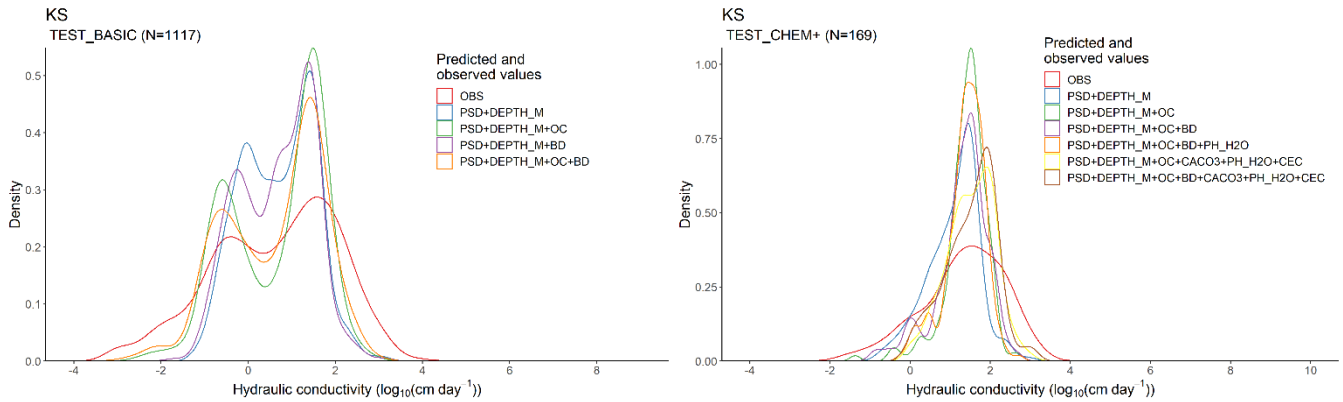

Figure S15. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) saturated hydraulic conductivity (KS) for selected pedotransfer functions, computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

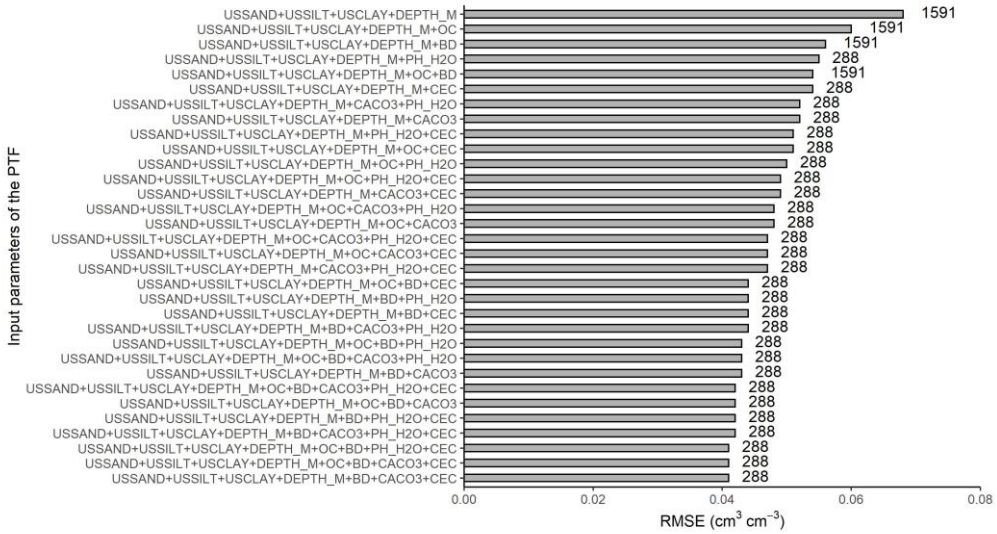

Figure S16. Root mean square error (RMSE) of the pedotransfer functions derived to predict parameters of the van Genuchten model for the description of the moisture retention curve (MRC), computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

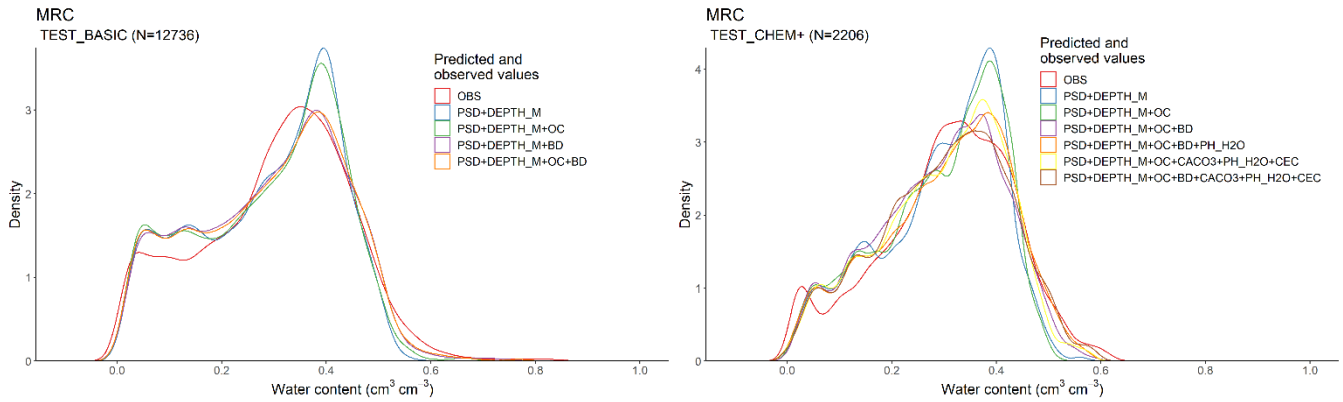

Figure S17. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) water retention values (MRC) computed based on the parameters of the van Genuchten model, computed on TEST_BASIC and TEST_CHEM+ set. Predicted values of those PTFs are shown which use the most often available predictor variables. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

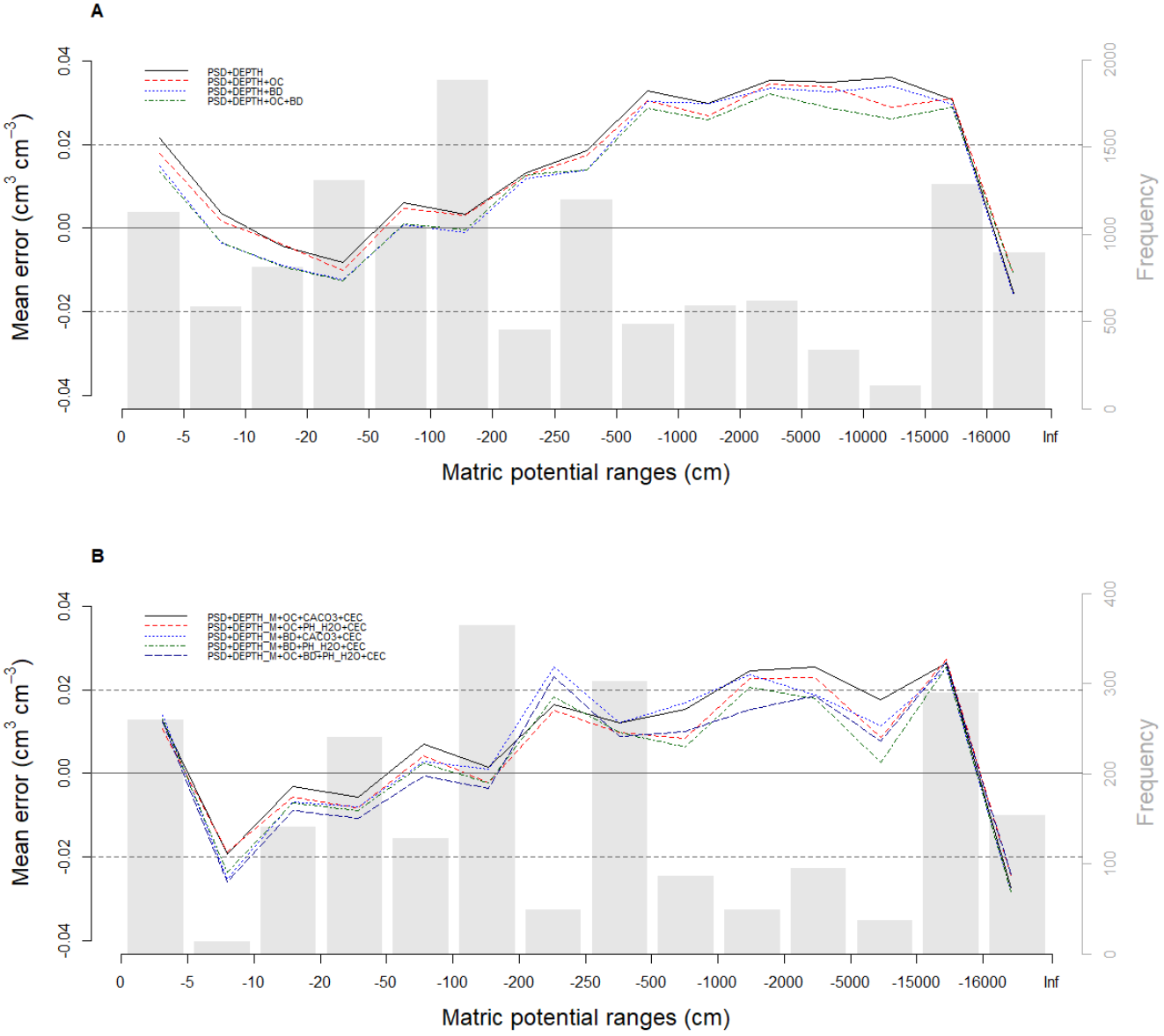

Figure S18. Mean error of the pedotransfer functions derived to predict parameters of the van Genuchten model for the description of the moisture retention curve, computed on TEST_BASIC (N = 1591) (A) and TEST_CHEM+ (N = 288) (B) sets by matric potential head values.

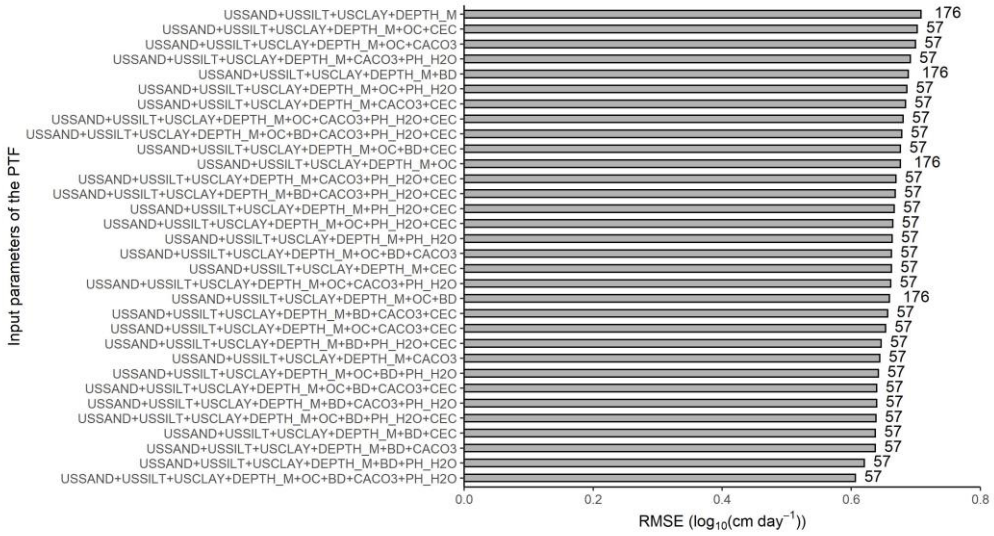

Figure S19. Root mean square error (RMSE) of the pedotransfer functions derived to predict parameters of the Mualem-van Genuchten model for the description of the hydraulic conductivity curve (HCC), computed on TEST_BASIC and TEST_CHEM+ set. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

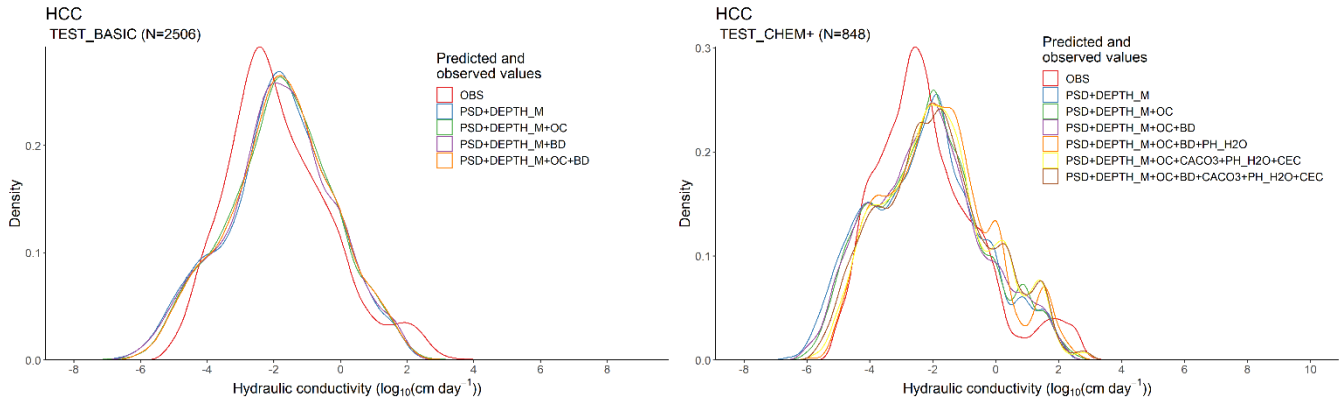

Figure S20. Density plot of observed (OBS) and predicted median (PSD+DEPTH_M+*) hydraulic conductivity values (HCC) computed based on the parameters of the Mualem-van Genuchten model, computed on TEST_BASIC and TEST_CHEM+ set. Predicted values of those PTFs are shown which use the most often available predictor variables. USSAND: sand (50–2000 µm) content (mass %); USSILT: silt (2–50 µm) content (mass %), USCLAY: clay (<2 µm) content (mass %); DEPTH_M: mean soil depth (cm); OC: organic carbon content (mass %); BD: bulk density (g cm^{-3}); CACO3: calcium carbonate content (mass %); PH_H2O: pH in water (-); CEC: cation exchange capacity (cmol (+) kg^{-1}).

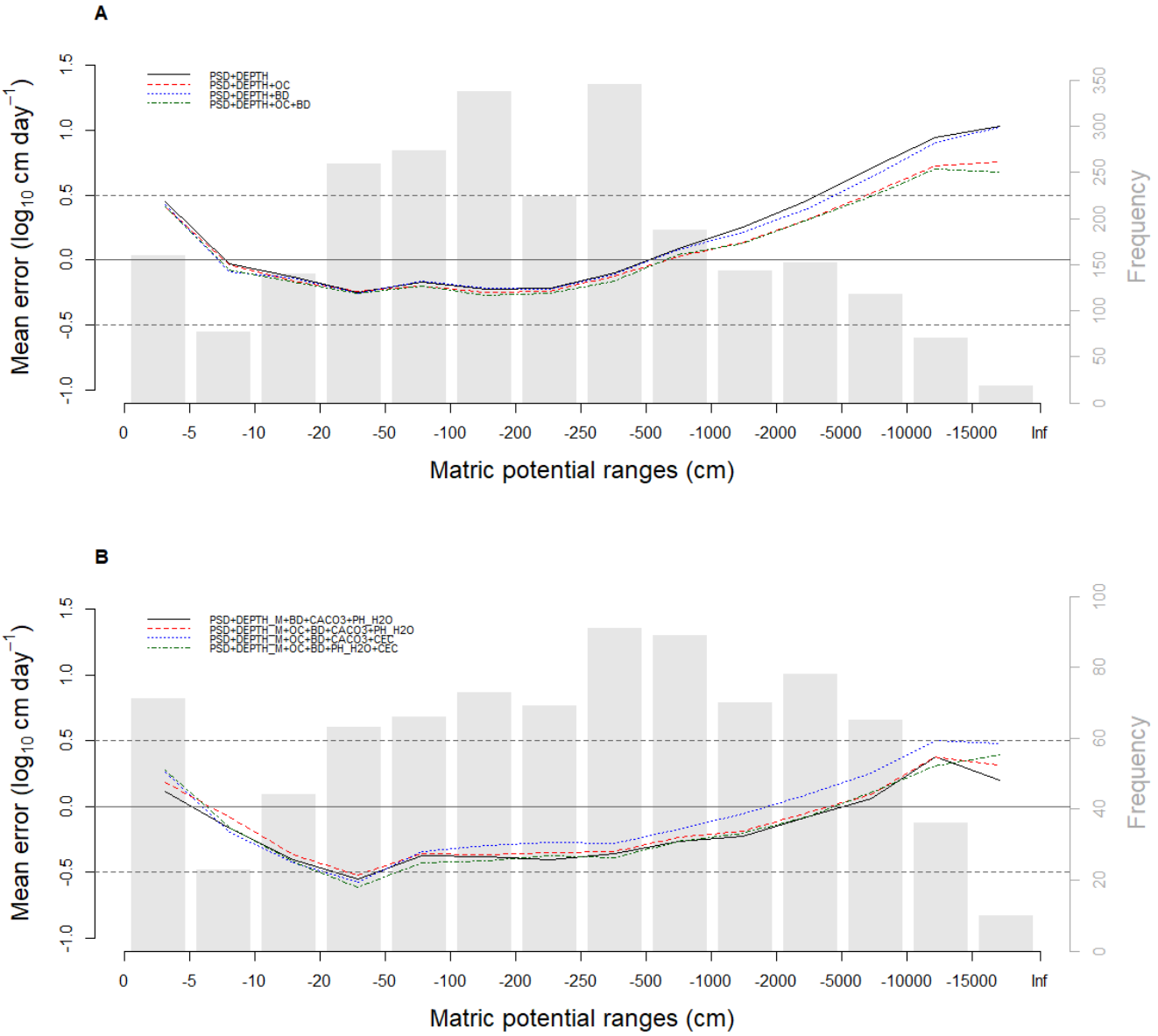

Figure S21. Mean error of the pedotransfer functions derived to predict parameters of the Mualem-van Genuchten model for the description of the hydraulic conductivity curve, computed on TEST_BASIC (N = 176) (A) and TEST_CHEM+ (N = 57) (B) sets by matric potential head values.