

**SUPPLEMENTARY INFORMATION**

**Table S1.** Results (*t* and *P*), sample size (*n*) and parameter estimates according to the linear mixed models (including the null models without any predictor variables) to assess the effects of temperature, soil volumetric water content (VWC), potential evapotranspiration (PET), wood density and parenchyma fraction on the slope of the soil water line (SWL slope), line-conditioned excess (LC-excess) and soil water excess (SW-excess). All parameter estimates have been standardized.

<b>Response Variable</b>	<b>Predictor variable</b>	<b>n</b>	<b>Estimate</b>	<b>Std. error</b>	<b>t-value</b>	<b>P-value</b>
SWL slope	Null model	656	5.52	0.17	31.687	<0.001
	Monthly air temperature	609	-0.32	0.07	-4.58	<0.001
	Mean anual air temperature	639	0.034	0.164	0.209	0.835
	Monthly precipitation	609	0.45	0.10	4.44	<0.001
	Annual precipitation	639	0.40	0.15	2.51	0.013
	Monthly VWC (0-7 cm)	609	0.90	0.10	8.99	<0.001
	Monthly VWC (7-28 cm)	609	0.80	0.09	8.45	<0.001
	Monthly VWC (28-100 cm)	609	0.60	0.10	5.54	<0.001
	Monthly VWC (100-289 cm)	609	0.23	0.13	1.76	0.078
	Monthly soil water content (0-100 cm)	609	0.72	0.10	6.77	<0.001
	Monthly soil water content (0-289 cm)	609	0.52	0.13	3.99	<0.001
	Annual VWC (0-7 cm)	639	0.34	0.13	2.48	0.014
	Annual VWC (7-28 cm)	639	0.32	0.13	2.41	0.016
	Annual VWC (28-100 cm)	639	0.27	0.13	2.19	0.034
	Annual VWC (100-289 cm)	639	0.25	0.13	1.90	0.058
	Annual soil water content (0-100 cm)	639	0.30	0.13	2.27	0.024
	Annual soil water content (0-289 cm)	639	0.28	0.13	2.12	0.034
	Monthly PET	572	-0.33	0.077	-6.75	<0.001
	Annual PET	639	-0.52	0.014	-2.32	0.021
	LC-excess	Null model	642	-12.230	1.32	-9.02
Monthly air temperature		602	-0.12	0.45	-0.33	0.742
Mean anual air temperature		632	-1.04	1.36	-0.76	0.448

	Monthly precipitation	602	0.36	0.63	0.57	0.565
	Annual precipitation	632	1.49	1.18	1.26	0.206
	Monthly VWC (0-7 cm)	602	0.53	0.65	0.85	0.411
	Monthly VWC (7-28 cm)	602	0.67	0.61	1.09	0.272
	Monthly VWC (28-100 cm)	602	0.70	0.72	0.98	0.328
	Monthly VWC (100-289 cm)	602	0.89	0.86	1.03	0.304
	Monthly soil water content (0-100 cm)	602	0.74	0.71	1.05	0.249
	Monthly soil water content (0-289 cm)	602	1.00	0.87	1.16	0.247
	Annual VWC (0-7 cm)	632	1.60	1.06	1.15	0.133
	Annual VWC (7-28 cm)	632	1.56	0.96	1.62	0.106
	Annual VWC (28-100 cm)	632	0.63	0.91	0.62	0.489
	Annual VWC (100-289 cm)	632	0.88	0.86	1.03	0.304
	Annual soil water content (0-100 cm)	632	0.89	0.93	0.95	0.341
	Annual soil water content (0-289 cm)	632	0.92	0.89	1.03	0.303
	Monthly PET	602	-0.12	0.45	-0.33	0.742
	Annual PET	632	-2.52	1.00	-2.50	0.013
	Wood density	251	-2.02	1.33	-1.15	0.138
	Parenchyma fraction	148	-0.16	1.88	-0.08	0.933
	Null model	656	-3.02	0.65	-4.59	<0.001
SW-excess	Monthly air temperature	609	1.00	0.32	3.06	0.002
	Mean anual air temperature	639	0.03	0.16	0.21	0.835
	Monthly precipitation	609	-0.74	0.45	-1.62	0.103
	Annual precipitation	639	-0.21	0.78	-0.25	0.784
	Monthly VWC (0-7 cm)	609	-1.94	0.44	-4.32	<0.001
	Monthly VWC (7-28 cm)	609	-1.61	0.42	-3.80	<0.001
	Monthly VWC (28-100 cm)	609	-1.51	0.48	-3.14	0.002
	Monthly VWC (100-289 cm)	609	-0.72	0.54	-1.33	0.185
	Monthly soil water content (0-100 cm)	609	-1.69	0.47	-3.55	<0.001
	Monthly soil water content (0-289 cm)	609	-1.25	0.54	-2.29	0.022
	Annual VWC (0-7 cm)	639	-1.22	0.69	-1.75	0.081
	Annual VWC (7-28 cm)	639	-0.94	0.64	-1.48	0.141
	Annual VWC (28-100 cm)	639	-1.07	0.61	-1.76	0.079
	Annual VWC (100-289 cm)	639	-0.75	0.58	-1.28	0.198

Annual soil water content (0-100 cm)	639	-1.07	0.62	-1.73	0.086
Annual soil water content (0-289 cm)	639	-0.87	0.60	-1.45	0.148
Monthly PET	609	1.00	0.33	3.02	0.002
Annual PET	639	-0.12	0.65	-0.18	0.850
Wood density	258	0.82	0.91	0.90	0.268
Parenchyma fraction	150	-0.11	1.43	-0.07	0.938

**Table S2** Sample size (*n*) and results (*F* and *P*) for the linear mixed models assessing differences in the slope of the soil water line (SWL slope), line conditioned excess (LC-excess) and soil water excess (SW-excess) among quantitative variables: soil classes (coarse, medium, medium fine, fine, ,very fine, organic or tropical organic), type of methodology used for measuring soil or stem water (mass or laser spectrometer), taxonomic group (angiosperms or gymnosperms), leaf habit (evergreen, deciduous or semi-deciduous), leaf shape (narrow or broad), growth form (tree, shrub or non-woody) and known type of mycorrhizal habit (non-mycorrhizal, arbuscular, ectomycorrhizal or arbuscular and ectomycorrhizal). Differences within group indicated were assessed with post-hoc tests for those variables with significant ( $P < 0.05$ ) effects.

<b>Response Variable</b>	<b>Predictor variable</b>	<b>n</b>	<b>F-value</b>	<b>P-value</b>	<b>Within group differences</b>
SWL slope	Soil class	636	0.66	0.618	
	Methodology (soil)	656	0.97	0.327	
LC-excess	Soil class	629	2.80	<b>0.028</b>	Organic soils > Medium textured soils ( $P = 0.0218$ )
	Soil isotopic measurement	642	0.67	0.414	
	Xylem isotopic measurement	642	0.35	0.421	
	Taxonomic group	570	0.87	0.354	
	Leaf habit	552	0.01	0.363	
	Leaf shape	473	0.04	0.831	
	Growth form	622	3.00	0.052	
	Mycorrhizal habit	406	3.29	<b>0.014</b>	Non-mycorrhizal > Ectomycorrhizal ( $P = 0.016$ ) Non-mycorrhizal > Arbuscular ( $P = 0.018$ )
SW-excess	Soil class	636	1.93	0.109	
	Methodology (soil)	656	6.17	<b>0.015</b>	Mass methods > Laser methods ( $P = 0.015$ )
	Methodology (stem)	656	3.80	0.054	Mass methods > Laser methods ( $P = 0.048$ )
	Taxonomic group	570	0.11	0.733	
	Leaf habit	552	0.45	0.633	
	Leaf shape	473	0.43	0.514	
	Growth form	622	2.86	0.057	

Mycorrhizal habit	408	0.63	0.635
-------------------	-----	------	-------

**Table S3.** Output of the models for the soil water excess (SW-excess) residuals and environmental variables. The response variable (SW-excess residuals) is obtained after running the correlation between SW-excess and the slope of the soil water line (SWL) and the intercept of the SWL. For each model, the estimates, 95% confidence interval (CI) and *P*-value are shown. Numbers in bold highlight significant effects ( $P < 0.05$ ).

Predictor	Intercept residuals			Slope residuals		
	Estimate	CI	<i>P</i> -value	Estimate	CI	<i>P</i> -value
Monthly soil water (0-100 cm)	< 0.01	-0.01-0.00	0.344	< 0.01	<0.01-<0.01	0.683
Monthly air temperature	0.09	0.03-0.15	<b>0.002</b>	0.06	0.01-0.12	<b>0.023</b>