Supplementary materials

Topoclimate buffers floristic diversity from macroclimate in temperate mountain forests.

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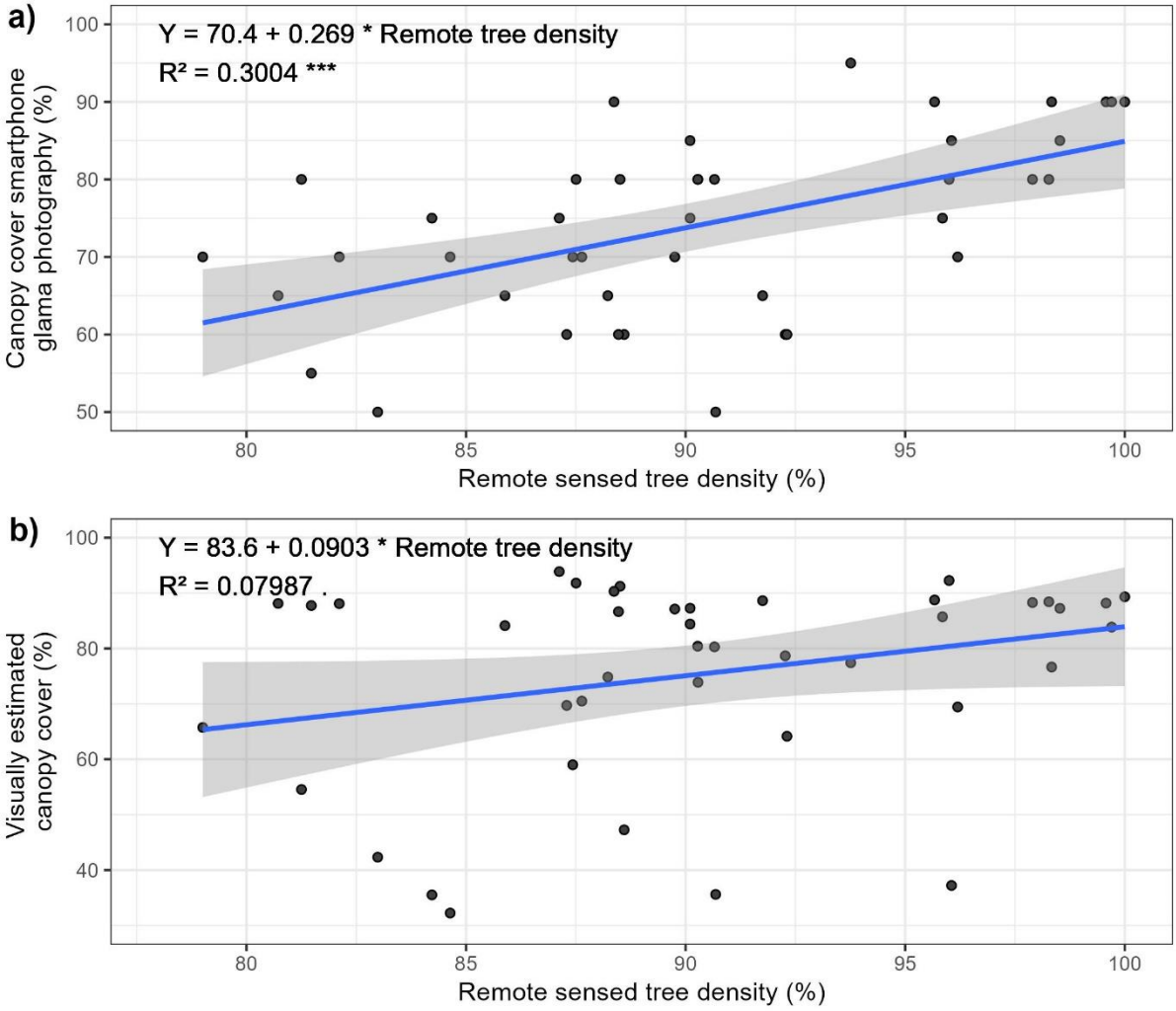

Figure S1: Relationship between Copernicus remote sensed tree density and canopy closure estimated in a 25-meter radius circle (a) and canopy cover estimated by a smartphone photography and segmented by the 'Glama' application (b). The blue line corresponds to a fitted linear model which equation, Person R², and its statistical significance are displayed (***): P<0.001, (.) P<0.1. The ribbons are the confidence interval of the model.

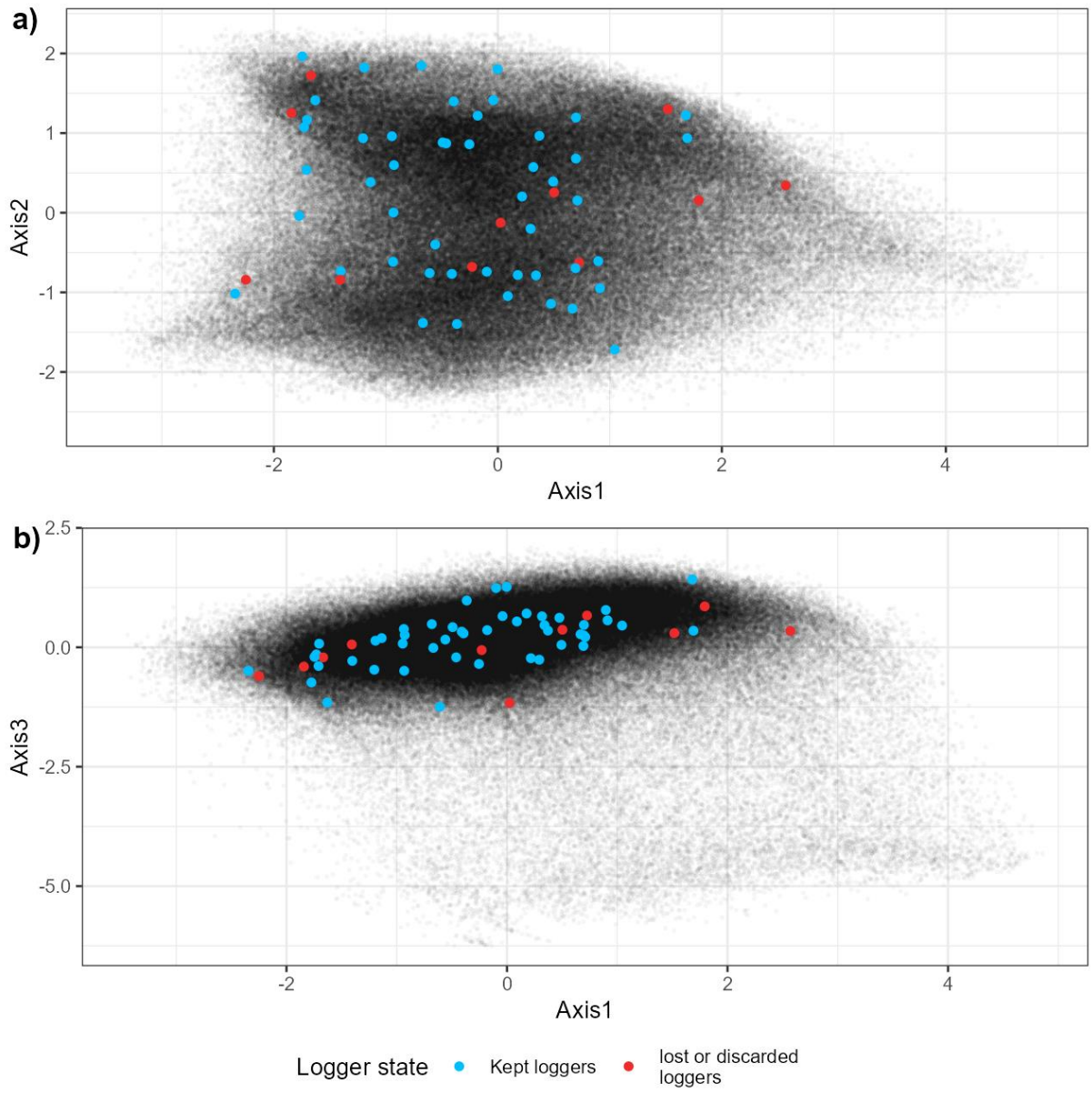

Figure S2; Principal component analysis of the spatial factor ought to influence microclimate. Axis 1 is explained by elevation and topographic position, Axis 2 represents mostly head load index, Axis 3 represents mostly canopy cover. The position in the PCA projection of the initial sampling and the final selection of loggers is shown (Lembrechts et al.*, 2021).*

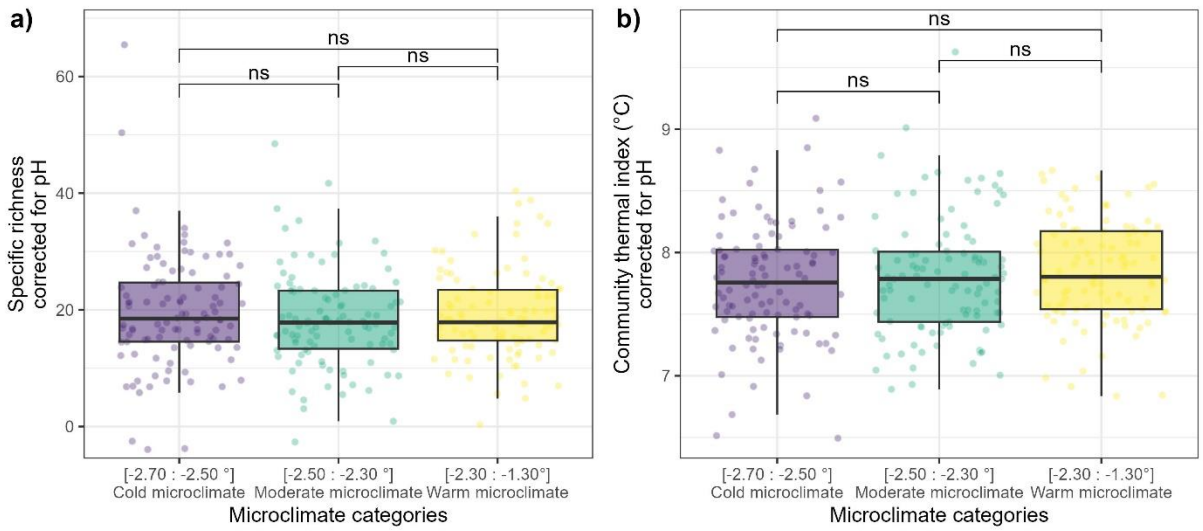

Figure S3: Species richness (a) and community thermal index (b), corrected for bioindicated pH, of 306 floristic surveys evenly spread into three microclimatic cooling classes. The correction consists of extracting the residuals of a linear model with pH as a sole predictor, this process could thus lead to negative specific richness. The p-value significance of a Wilcoxon test between two classes is displayed as follows: (ns): p>0.05.

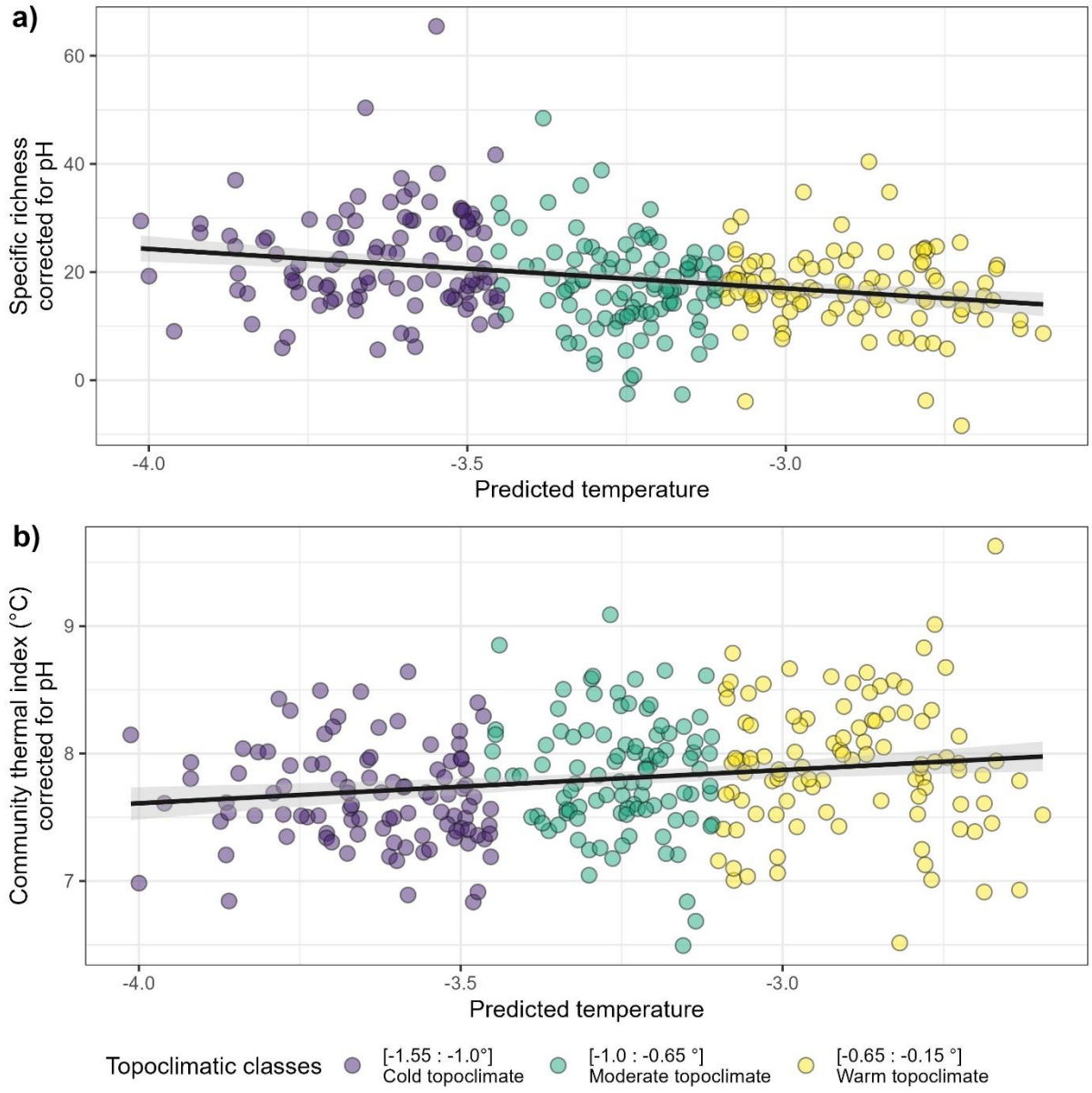

Figure S4 Species richness (a) and community thermal index (b), corrected for bioindicated pH, of 306 floristic surveys evenly spread into three topoclimatic buffering classes, as function of predicted topoclimatic cooling.

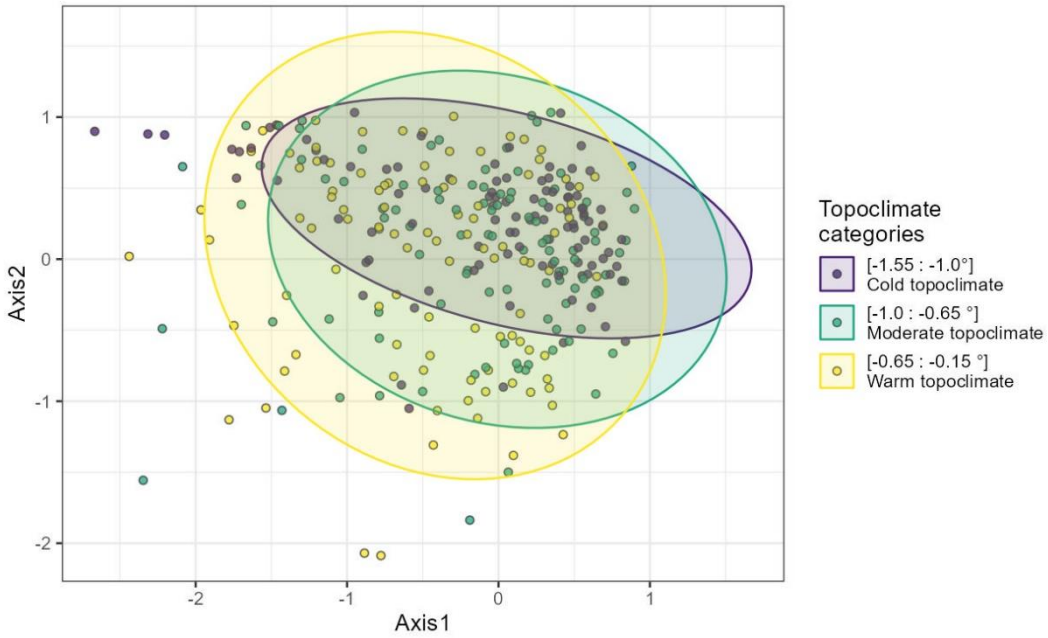

Figure S55: The first two axes of a correspondence analysis of the 306 floristic surveys spread among the three topoclimatic cooling class.

*Table S1: Estimated parameters, their standard error and p-values of the predictors included in models of the daily maximum growing season temperature. The range of the predictors in the calibration dataset and their effect size on the temperature (range * estimate) are displayed. The percentage of explained variation per type of predictor is included. P-values were obtained with a Wald test on parameters. Heat load and topographic indices have no units, refer to the methods for their calculation.*

Predictor	Type of predictor	Estimate	Standard error	Range	Effect size (°C)	Explained variation (%)	P-value
Intercept (°C)		30,6	2,45				<10-4
Elevation (m a.s.l)	Elevation	-0,00803	0,000685	475.69 : 1203.17	-5,84	56,5	<10-4
Heat load index (n.u)	Topography	5,35	0,732	0.335 : 0.951	3,29	21,5	<10-4
Topographic index (n.u)	Topography	0,333	0,607	0.147 : 1	0,284	21,5	0.587
Tree density (%)	Canopy	-0,0947	0,0253	79.004 : 100	-1,99	3,17	<10-4

*Table S2: Estimated parameters, their standard error and p-values of the predictors included in models of the field canopy cover daily mean growing season temperature. The range of the predictors in the calibration dataset and their effect size on the temperature (range * estimate) are displayed. The percentage of explained variation per type of predictor is included. P-values were obtained with a Wald test on parameters. The canopy cover was estimated visually in a 25-meter radius circle around the loggers.*

Predictor	Type of predictor	Estimate	Standard error	Range	Effect size (°C)	P-value
Intercept (°C)		19,2	0,605			<10-4
Elevation (m a.s.l)	Elevation	-0,00656	0,000333	475 : 1203	-4,78	<10-4
Heat load index (n.u)	Topography	1,52	0,359	0,335 : 0,951	0,934	<10-4
Topographic index (n.u)	Topography	0,42	0,295	0,201 : 1	0,335	0,163
Canopy cover 25 radius (%)	Canopy	-0,00767	0,00599	50 : 95	-0,345	0,208

*Table S3: Estimated parameters, their standard error and p-values of the predictors included in models of the immediate canopy cover daily mean growing season temperature. The range of the predictors in the calibration dataset and their effect size on the temperature (range * estimate) are displayed. The percentage of explained variation per type of predictor is included. P-values were obtained with a Wald test on parameters. The canopy cover was estimated visually in a 25-meter radius circle around the loggers. Immediate canopy cover was measured used a hemispherical photography above the logger and a sky segmentation application.*

Predictor	Type of predictor	Estimate	Standard error	Range	Effect size (°C)	P-value
Intercept (°C)		16,2	0,812			<10-4
Elevation (m a.s.l)	Elevation	-0,00672	0,000299	475 : 1203	-4,89	<10-4
Heat load index (n.u)	Topography	5,47	1,22	0,335 : 0,951		<10-4
Topographic index (n.u)	Topography	0,481	0,256	0,147 : 1	0,41	0.0682
Immediate canopy cover (%)	Canopy	0,0346	0,0109	32,23 : 93,88		0.00311
Topography index X Immediate canopy cover	Interaction	-0,0547	0,0162			0.00171