SUPLEMENTARY INFORMATION

Modelling net CO_2 assimilation of two *Sphagnum* species from temperature and water content response

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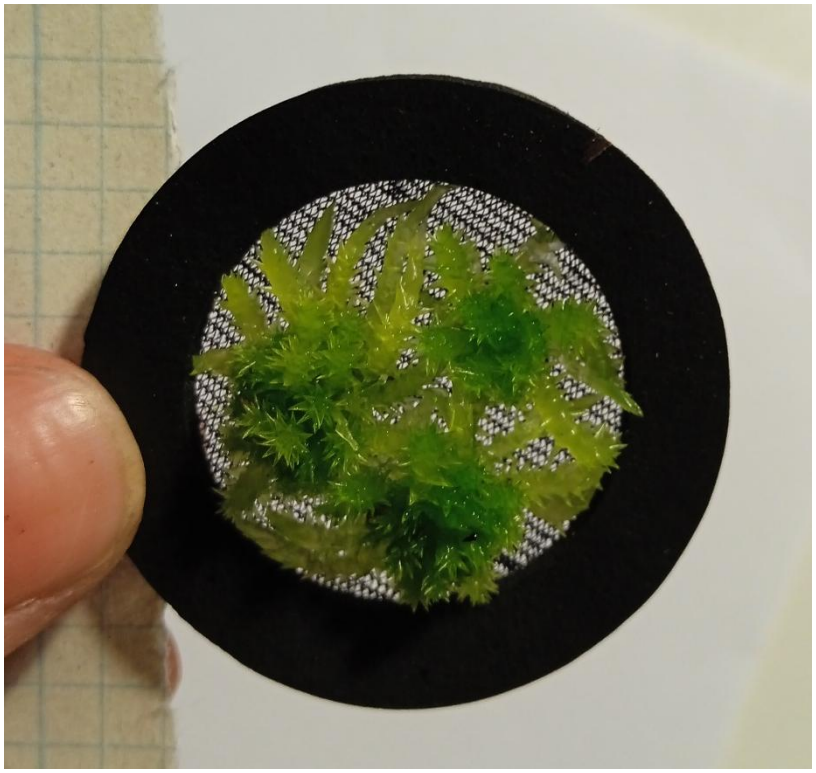

Figure S1. Custom-made moss cuvette consisting of a LI-6800 6 cm^2 gasket affixed to a piece of thin polyester stocking fabric. Normally 3 apical green capitula (top, living part of the moss) of *Sphagnum angustifolium* and *S. squarrosum* were placed on the fabric with shoot overlap minimized. The moss cuvette (with sample over it) were placed inside Li-6800 chamber between the two gaskets of its articulated aperture, creating a kind of "sandwich" of gaskets when the chamber was closed. Both net CO_2 assimilation and dark respiration were based to the projected area of the capitula.

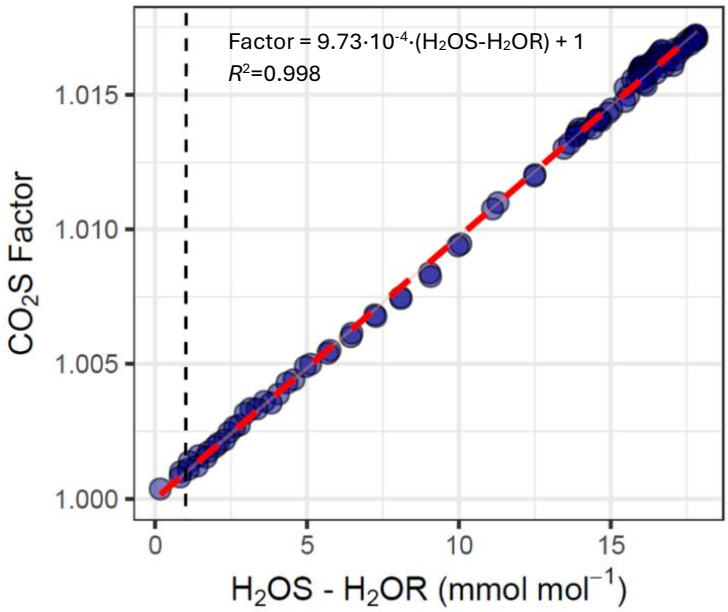

Figure S2. Linear regression between the CO_2 sample (CO_2S) factor and the water vapour difference between sample and reference IRGAs (H_2OS and H_2OS, respectively). The CO_2S factor was calculated as the ratio of CO_2 reference and sample (CO_2R/CO_2S). Data were collected during the dehydration of a wet piece of paper inside the empty moss cuvette.

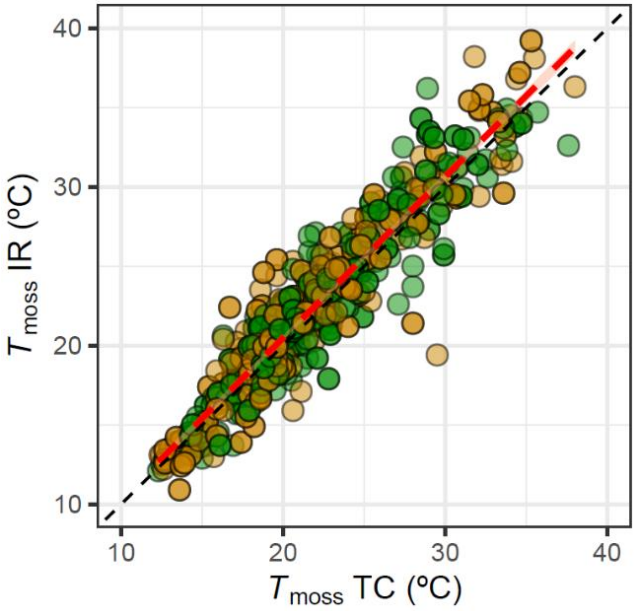

Figure S3. Relationship between moss canopy temperature (T_{moss}) of the two used sensors: infra-red sensor (IR) and thermocouple (TC) for *S. angustifolium* (brown) and *S. squarrosum* (green). Both temperature values were averaged for the final analysis.

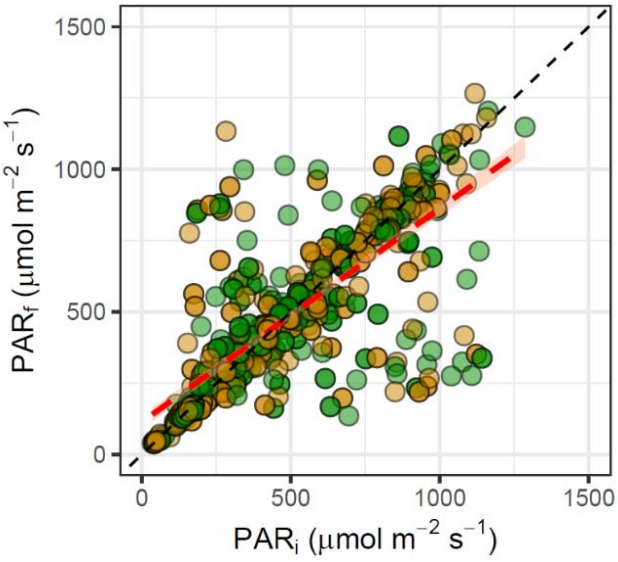

Figure S4. Relationship between PAR measured at the beginning of the cycle of moss temperature measurements (PAR_i) and at the end of each cycle (PAR_f). Some differences were found for those data that were collected in a sunny-cloud transition. Both PAR values were averaged for the final analysis.

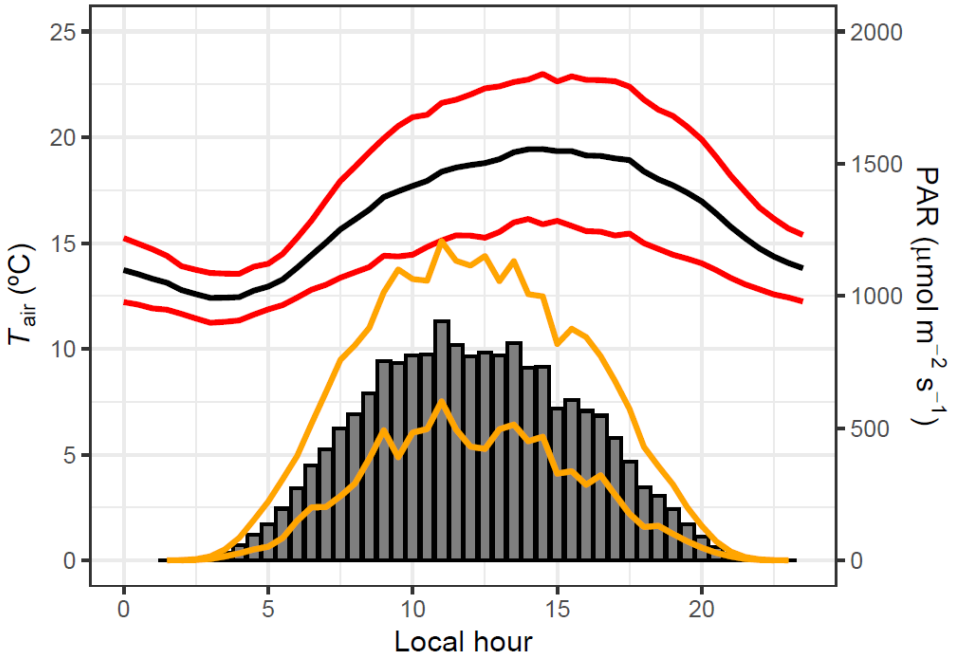

Figure S5. Averaged daily variation of air temperature (T_{air}) and photosynthetic active radiation (PAR) from 3rd to 17th September 2023 of SMEAR II Hyytiälä forest meteorological station. Red line indicates standard deviation of T_{air}. Bars indicate daily average PAR ± standard deviation (orange lines) measured with a Li-Cor Li-190SZ quantum sensor.

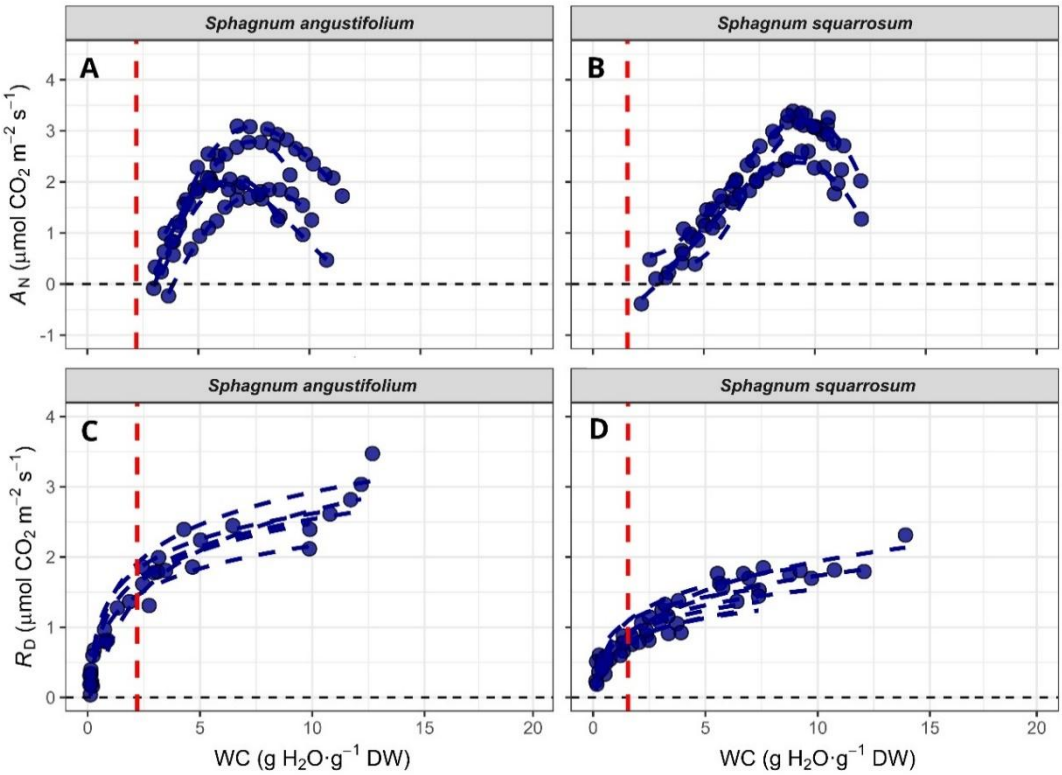

Figure S6. Net CO_2 assimilation (A_N, A, B) under saturated light conditions and dark respiration rates (R_D, C, D) in response to water content (WC) of *S. angustifolium* (A, C) and *S. squarrosum* (B, D) during dehydration curves at 25ºC. Red dashed line indicates the water content at which F_v/F_m was not able to recover to 50% of its original value after rehydration (WC_{FvFm50} = 1.5 and 2.7 g H_2O g^{-1} DW for *S. squarrosum* and *S. angustifolium*, respectively) (Supplementary Fig. S7). Blue dashed lines indicate polynomial and logarithmic fitting for A_N and R_D curves, respectively (n = 5).

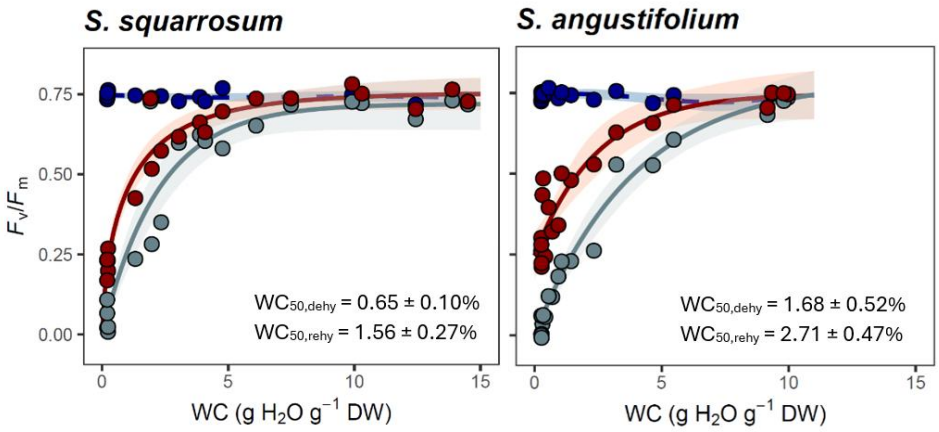

Figure S7. Response of maximum yield of PSII (F_v/F_m) to water content of samples during air-dehydration (red dots) for *S. squarrosum* and *S. angustifolium*. Values of F_v/F_m of the same sample under well-water conditions previous to dehydration (blue dots) and after dehydration + recovery by covering the sample for 24 h with a wet tissue (grey dots) are also represented in the graphs. The water content at which F_v/F_m is reduced by 50 % during dehydration and rehydration ($WC_{50,dehy}$ and $WC_{50,rehy}$, respectively) is shown for both species.

Table S1. Fitted parameters of the A_N Model (eqn 3, 4 and 5) for estimating net CO_2 assimilation rates of *S. angustifolium* and *S. squarrosum*.

Parameter	*Sphagnum angustifolium*		*Sphagnum squarrosum*	
	MEAN	**SD**	**MEAN**	**SD**
a	-0.0081	0.0013***	-0.0040	0.0008***
b	0.4490	0.0676***	0.2366	0.0407***
c	-9.4755	0.8508***	-7.0975	0.4904***
d	0.0886	0.0056***	0.0800	0.0057***
e	-1.4964	0.0803***	-1.4275	0.0135***
f	-2.1442	0.0618***	-2.5836	0.0576***
g	-0.0478	0.0128***	-0.0744	0.0097***
h	-0.0602	0.0915	-0.1108	0.0599*
i	0.0222	0.0012***	0.0114	0.0009***

***P<0.001; **P<0.01; *P<0.05

Table S2. Fitted parameters of the Model 2 for estimating moss canopy temperature of both *S. angustifolium* and *S. squarrosum* (merged dataset) from PAR, water content and air temperature of the meteorological station SMEAR II Hyytiälä forest, Finland.

Parameter	MEAN	SD
j	$-8.268 \cdot 10^{-6}$	$1.358 \cdot 10^{-6}$***
k	0.0178	0.0014***
l	-0.7343	0.3585*
m	-1.624	0.0687***

***P<0.001; **P<0.01; *P<0.05