

Supplements Gillefalk et al. – Figures and tables

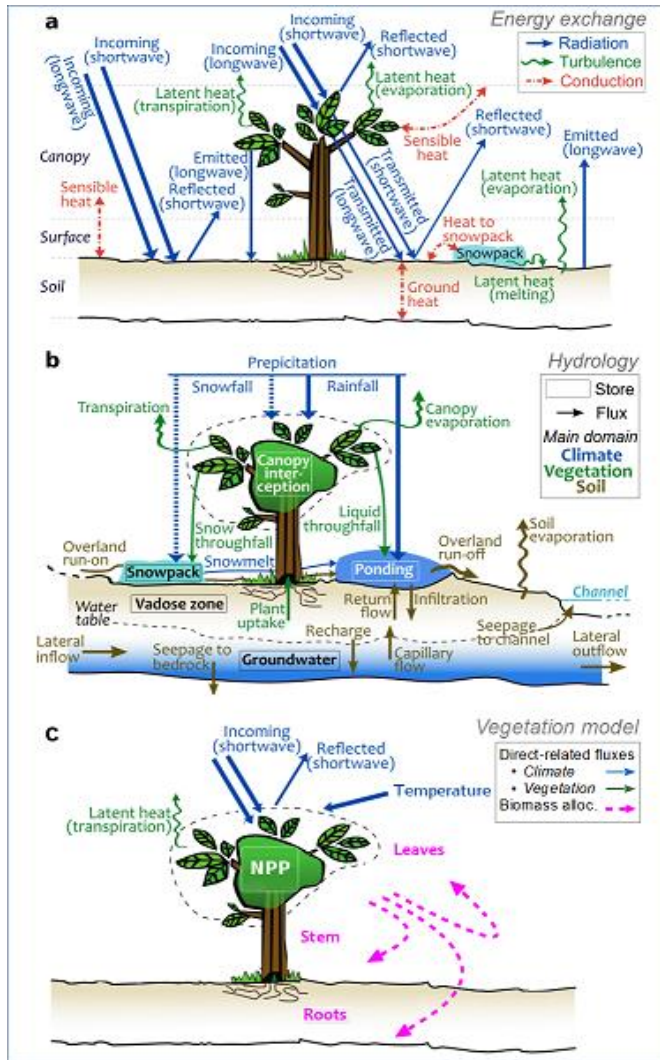
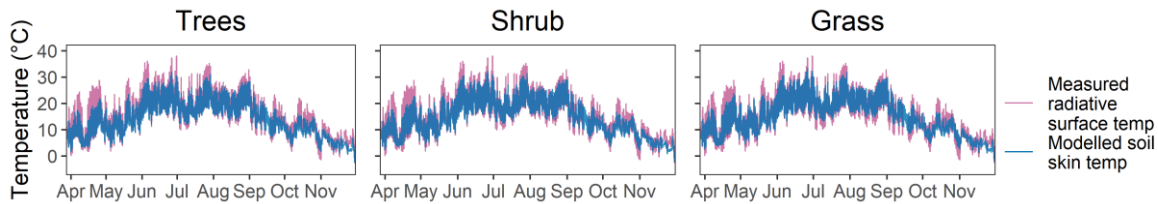


Figure S1: EcH₂O-iso schematic description of processes in a) energy balance b) water balance and c) vegetation calculations. Adapted from Douinot et al. (2019).



5 Figure S2: Modelled soil skin temperature (average of 20 best runs) for all vegetation types (trees, shrub and grass) and calculated radiative temperature from upward longwave radiation.

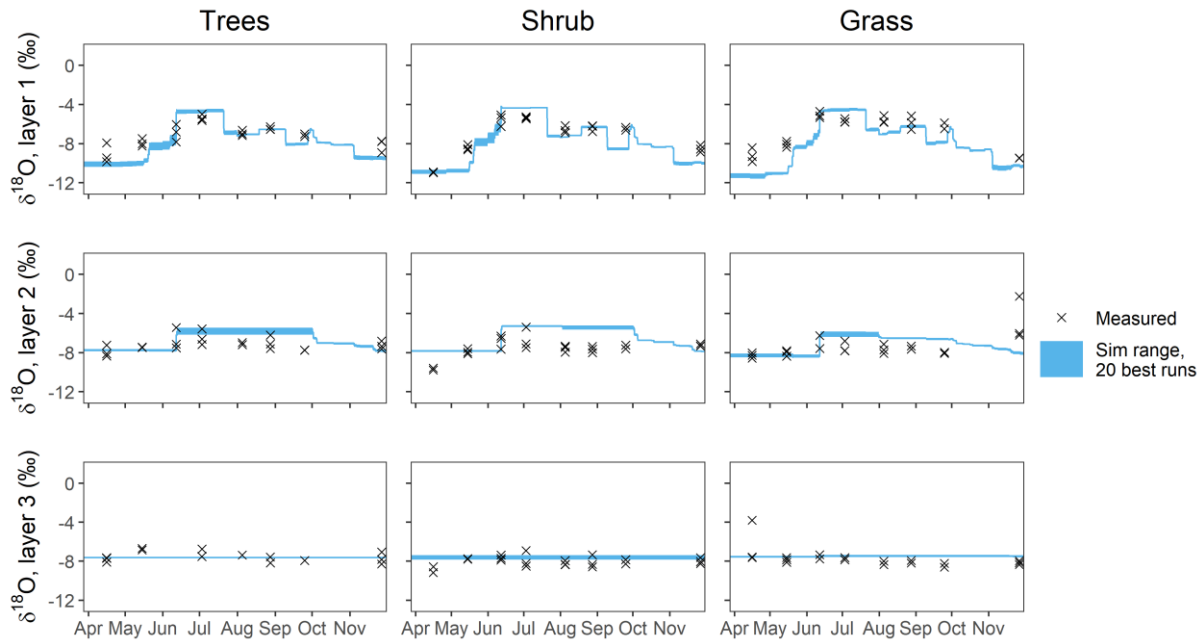


Figure S3: Measured and modelled stable water isotope $\delta^{18}\text{O}$ in bulk soil water.

10 Table S1: Final ranges for calibrated vegetation and soil parameters.

Parameter	Abbreviation	Final parameter range/value		
		Trees	Grass	Shrub
Vegetation parameters				
Vegetation albedo [-]	α_{veg}	0.12–0.20	0.13–0.20	0.13–0.20
Leaf area index (LAI) [-]	LAI	4.0–5.0	2.1–2.9	3.0–3.5
Maximum stomatal conductance [ms^{-1}]	g_{Smax}	0.008–0.011	0.031–0.049	0.010–0.020
Stomatal sensitivity to vapor pressure deficit	g_{Svpd}	$1.5\text{e-}4$ – $3.9\text{e-}4$	$3.2\text{e-}4$ – $9.0\text{e-}4$	$4.2\text{e-}4$ – $1.00\text{e-}3$
Stomatal sensitivity to soil moisture content	LWPC	$1.8\text{e-}4$ – $9.2\text{e-}3$	$2.0\text{e-}4$ – $6.6\text{e-}4$	$1.1\text{e-}4$ – $1.9\text{e-}2$
Light extinction coefficient for the canopy [-]	K_{beer}	0.20–0.78	0.52–0.78	0.41–0.79
Optimal growth temperature ($^{\circ}\text{C}$)	T_{opt}	14.2–24.6	16.0–24.0	11.2–19.6
Soil parameters				
Total soil depth [m]	D_{soil}	4.65	2.35	1.2
Thickness of 1 st hydrological layer [m]	D_{L1}	0.25	0.15	0.25
Thickness of 2 nd hydrological layer [m]	D_{L2}	0.4	0.4	0.6
Porosity [-]	H	0.41–0.50	0.40–0.48	0.40–0.50
Air-entry pressure head [m]	ψ_{AE}	0.26–0.52	0.16–0.53	0.15–0.29
Saturated horizontal hydraulic conductivity [ms^{-1}]	K_{EFF}	0.011–0.020	0.002–0.030	0.007–0.028
Exponential root profile [-]	k_{root}	1.1–9.7	7.3–17.5	2.6–9.6
Brooks-Corey exponent [-]	λ_{BC}	2.0–2.2	2.4–3.7	2.0–2.6

Table S2. Parameters not part of calibration process.

Parameter	Abbreviation	Fixed value		
Vegetation parameters		Trees	Grass	Shrub
Maximum interception storage [mmLAI ⁻¹]	CWS _{max}	0.0006	0.0004	0.0006
Stomatal sensitivity to light	g _{Slight}	150	150	150
Emissivity of vegetation [-]	EmisS _{veg}	0.99	0.99	0.99
Soil moisture suction potential at which stomatal function is reduced by 50%.	LWP _D	10	10	10
Maximum temperature for the comfort of the species (° C)	T _{max}	35	35	35
Minimum temperature for the comfort of the species (° C)	T _{min}	-2	-2	-2
Wilting point [-]	Wilt	0.001	0.001	0.001
Cold stress [° C]	T _{cold}	-2	-2	-2
Vegetation height [m]	hgt	20	0.2	5
Soil parameters				
Soil albedo [-]	α _{soil}	0.18	0.18	0.18
Soil heat capacity [Jm ⁻³ K ⁻¹]	S _{HP}	2.5e6	2.5e6	2.5e6
Soil thermal conductivity [Wm ⁻¹ K ⁻¹]	K _{Sthermal}	0.15	0.15	0.15
Ratio of vertical t horizontal K _{EFF} [-]	KvKh	0.4	0.4	0.4
Leakance to groundwater [-]	L _G	0.01	0.01	0.01
Dampening depth [m]	D _{damp}	2	2	2
Temperature at dampening depth [° C]	T _{damp}	10	10	10