Table S1. Prescribed catchment state variables and model parameterization. [§]: only for ligneous species, *: varies spatially, [¢]: only for herbaceous species.

Quantity	Value				Source
Soil domain					
	Peat	*Gley*	*Podzol*	*Ranker*	
Initial volumetric water content, 1st layer ($m^3.m^{-3}$)	$0.8\times\eta_{peat}$	$0.8\times\eta_{gley}$	$0.8\times\eta_{podzol}$	$0.8\times\eta_{ranker}$	*Local expertise*
Initial volumetric water content, 2nd layer ($m^3.m^{-3}$)	$0.8\times\eta_{peat}$	$0.8\times\eta_{gley}$	$0.8\times\eta_{podzol}$	$0.8\times\eta_{ranker}$	*Local expertise*
Initial volumetric water content, 3rd layer ($m^3.m^{-3}$)	$0.8\times\eta_{peat}$	$0.8\times\eta_{gley}$	$0.8\times\eta_{podzol}$	$0.8\times\eta_{ranker}$	*Local expertise*
Initial soil temperature (°C)	10				(Lozano-Parra et al., 2014; Maneta and Silverman, 2013)
Initial snow water equivalent (m)	0				*Local expertise*
Depth of the 2nd hydrological layer (m)	0.2	0.2	0.2	0.2	(Maneta and Silverman, 2013)
Soil albedo (–)	0.3				(Maneta and Silverman, 2013)
Soil emissivity (–)	0.98				(Maneta and Silverman, 2013)
Heat capacity of dry soil ($J.m^3.K^{-1}$)	1.2×10^6				(Maneta and Silverman, 2013)
Thermal conductivity of dry soil ($W.m^{-1}.K^{-1}$)	1				(Maneta and Silverman, 2013)
Soil depth with negligible heat exchange (m)	2				(Maneta and Silverman, 2013)
Temperature at bottom thermal layer (°C)	10				(Maneta and Silverman, 2013)
Snowmelt coefficient ($m.s^{-1}.\ °C^{-1}$)	4.1×10^{-8}				(Maneta and Silverman, 2013)
Snow to rain temperature threshold (°C)	2				(Maneta and Silverman, 2013)
Random roughness at the surface	0.05				(Maneta and Silverman, 2013)
Channel width (m)	1				*Local expertise*
Groundwater to channel seepage parameter (–)	0.02				(Maneta and Silverman, 2013)
Vegetation domain					
	Pine	*Heather*	*Peat moss*	*Grass*	
Initial LAI ($m^2.m^{-2}$)	2.9	1.6	3.5	2	(Albrektson, 1984; Bond-Lamberty and Gower, 2007; Calder et al., 1984; Moors et al., 1998)
Vegetation height (m)	10	0.4	0.1	0.5	*Local expertise*
Vegetation age (years) [§]	25 – 60*	7	–	–	*Local expertise*
Stem density (m^{-2}) [§]	0.1	200	–	–	*Local expertise*
Basal area (m^2) [§]	0.008-0.031*	1.3×10^{-5}	–	–	(Albrektson, 1984; Wallén, 1980)
Root mass ($g.m^{-2}$)	800	250	300	1000	(Aerts et al., 1989; Berendse et al., 2001; Oleksyn et al., 1999)
NPP to GPP ratio (–)	0.47	0.47	0.43	0.35	(Lozano-Parra et al., 2014, 2014; Street et al., 2011)
Canopy-scale water use efficiency ($gC.m^{-1}$)	680	3335	3850	800	(Gordon et al., 1999; Hobbie and Colpaert, 2004; Williams and Flanagan, 1996)
Canopy quantum efficiency ($gC.J^{-1}$)	3×10^{-6}	1.8×10^{-6}	1.8×10^{-6}	1.8×10^{-6}	(Landsberg et al., 2005)
Minimum photosynthesis temperature (°C)	-2	-4	-3	-3	(Lozano-Parra et al., 2014; Maneta and Silverman, 2013)
Maximum photosynthesis temperature (°C)	25	30	30	30	(Lozano-Parra et al., 2014; Maneta and Silverman, 2013)
Maximum forest age (years)	500	40	–	–	(Landsberg et al., 2005)
Leaf carbon allocation coefficient a (–)	2.235	2.235	–	–	(Lozano-Parra et al., 2014)

Leaf carbon allocation coefficient b (–)	6×10^{-3}	6×10^{-3}	–	–	(Lozano-Parra et al., 2014)
Stem carbon allocation coefficient a (–)	3.3	3.3	–	–	(Lozano-Parra et al., 2014)
Stem carbon allocation coefficient b (–)	3×10^{-7}	3×10^{-7}	–	–	(Lozano-Parra et al., 2014)
Stomatal sensitivity to solar radiation ($W.m^{-2}$)	300	300	300	300	(Maneta and Silverman, 2013)
Stomatal sensitivity to vapour pressure deficit (Pa^{-1})	1.9×10^{-3}	1.9×10^{-3}	1.9×10^{-3}	1.9×10^{-3}	(Maneta and Silverman, 2013)
Wilting point ($m^3.m^{-3}$)	0.12	0.06	0.05	0.05	(Maneta and Silverman, 2013)
Specific leaf area ($m^2.g^{-1}$)	8×10^{-3}	9.5×10^{-3}	3×10^{-2}	2.3×10^{-2}	(Bond-Lamberty and Gower, 2007; Landsberg et al., 2005; Poorter and De Jong, 1999)
Specific root area ($m^2.kg^{-1}$)	6.5×10^{-2}	2.2×10^{-2}	2.2×10^{-2}	1.1×10^{-2}	
Crown to stem ratio diameter ratio (–)	0.25	0.25	–	–	(Landsberg and Waring, 1997)
Tree shape coefficient (–)	0.4	0.4	–	–	(Landsberg and Waring, 1997)
Wood density ($gC.m^{-2}$)	2.2×10^{5}	2.2×10^{5}	–	–	(Landsberg and Waring, 1997)
Maximum tree height to stem diameter ratio (–)	15	150	–	–	(Landsberg et al., 2005; Wallén, 1980)
Maximum tree height to stem diameter ratio (–)	5	5	–	–	(Landsberg and Waring, 1997)
Leaf turnover rate (s^{-1})	1.2×10^{-8}	1.0×10^{-8}	3.17×10^{-8}	3.17×10^{-8}	(Lozano-Parra et al., 2014; Maneta and Silverman, 2013)
Maximum leaf turnover rate under water stress (s^{-1})	1.8×10^{-8}	1.8×10^{-8}	–	–	(Landsberg and Waring, 1997)
Sensitivity of leaf turnover rate to water stress (–)	0.2	0.2	–	–	(Landsberg and Waring, 1997)
Maximum leaf turnover rate under temperature stress (s^{-1}) ǂ	1.8×10^{-8}	1.8×10^{-8}	–	–	(Landsberg and Waring, 1997)
Sensitivity of leaf turnover rate to temperature stress (–) ǂ	1.8×10^{-8}	1.8×10^{-8}	–	–	(Landsberg and Waring, 1997)
Cold temperature stress threshold (°C) ǂ	1	1	–	–	(Landsberg and Waring, 1997)
Root turnover rate (s^{-1})	2.7×10^{-8}	1.0×10^{-8}	3.17×10^{-8}	3.17×10^{-8}	(Landsberg and Waring, 1997)
Emissivity of the canopy	0.95	0.97	0.97	0.97	(Landsberg and Waring, 1997)
Albedo of the canopy (–)	0.1	0.13	0.18	0.15	(Landsberg and Waring, 1997)
Empirical tree water use coefficient c_θ (–) ǂ	0.7	0.7	–	–	(Landsberg and Waring, 1997)
Empirical tree water use exponent n_θ (–) ǂ	9	9	–	–	(Landsberg and Waring, 1997)
Dry grass decomposition rate (s^{-1}) ¢	–	–	8.5×10^{-7}	8.5×10^{-7}	(Lozano-Parra et al., 2014)
Temperature threshold triggering dry grass decay (°C) ¢	–	–	18	18	(Lozano-Parra et al., 2014)

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