

Tab. S1

Values for selected parameters used in the BROOK90 simulation

		Managed														Old-growth													
		Forest							Gap							Forest							Gap						
Soil layer		2001-2013	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2001-2013	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		
Input parameters																													
MAXLAI ^a		7.00	1.00	1.25	1.75	2.00	2.25	2.50	2.75	3.00	3.00	3.00	3.00	3.00	3.00	7.00	2.00	2.50	3.00	3.50	4.00	4.50	4.90	5.15	5.50	5.75	6.00		
MAXH ^b		20.00	0.10	0.10	0.30	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	27.00	0.25	0.50	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60		
GLMAX ^c		0.53	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.53	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80		
CVPD ^d		2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00		
PSICR ^e		-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90	-1.90		
STONEF ^f																													
	L1 [†]	0.10	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.10	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15		
	L2 ^{**}	0.20	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.20	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
	L3 ^{***}	0.30	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.30	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45		
THETAF ^g																													
	L1	0.377	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.343	0.417	0.343	0.417	0.417	0.417	0.417	0.343	0.417	0.343	0.417	0.343		
	L2	0.243	0.283	0.283	0.283	0.293	0.283	0.283	0.283	0.283	0.283	0.283	0.283	0.283	0.283	0.216	0.283	0.329	0.283	0.283	0.283	0.329	0.283	0.329	0.283	0.329	0.329		
	L3	0.251	0.291	0.291	0.291	0.311	0.291	0.291	0.291	0.291	0.291	0.291	0.291	0.291	0.291	0.225	0.291	0.333	0.291	0.291	0.291	0.333	0.291	0.333	0.291	0.333	0.333		
THSAT ^h																													
	L1	0.714	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.419	0.738	0.419	0.358	0.419	0.419	0.419	0.419	0.358	0.419	0.358	0.419	0.358		
	L2	0.599	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.399	0.618	0.399	0.339	0.399	0.399	0.399	0.399	0.339	0.399	0.339	0.399	0.339		
	L3	0.565	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.365	0.571	0.365	0.344	0.365	0.365	0.365	0.344	0.365	0.344	0.365	0.344	0.344		
BEXP ⁱ																													
	L1	6.75	6.75	6.75	6.75	7.75	7.75	6.75	6.75	7.75	6.75	7.75	6.75	7.75	7.75	7.10	9.10	11.50	9.10	9.10	9.10	11.50	9.10	11.50	9.10	11.50	11.50		
	L2	6.75	6.75	6.75	6.75	7.75	7.75	6.75	6.75	7.75	6.75	7.75	6.75	7.75	7.75	7.10	9.10	11.50	9.10	9.10	9.10	11.50	9.10	11.50	9.10	11.50	11.50		
	L3	7.75	7.75	7.75	7.75	8.75	8.75	7.75	7.75	8.75	7.75	8.75	7.75	8.75	8.75	8.10	10.10	11.50	10.10	10.10	10.10	11.50	10.10	11.50	10.10	11.50	11.50		
Calibrated parameters																													
FRINTL ^j		0.065	0.001	0.001	0.001	0.010	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	
FRINTS ^k		0.060	0.001	0.001	0.001	0.010	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.060	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050		
CINTRL ^l		0.25	0.10	0.10	0.10	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.35	0.05	0.10	0.05	0.10	0.05	0.10	0.05	0.10	0.05	0.10	0.10		
CINTRS ^m		0.25	0.10	0.10	0.10	0.20	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.35	0.05	0.10	0.05	0.10	0.05	0.10	0.05	0.10	0.05	0.10	0.10		
DENSEF ⁿ		1.00	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	1.00	0.05	0.10	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
QFFC ^o		0.47	0.60	0.60	0.10	0.01	0.01	0.60	0.60	0.01	0.60	0.01	0.10	0.01	0.01	0.50	0.30	0.25	0.30	0.30	0.30	0.25	0.30	0.25	0.30	0.25	0.25		

Notes:

^aMAXLAI, Maximal leaf area index, based on litterfall collectors (Bastrup-Birk & Breda 2004);^bMAXH, Maximal height (m), based on stand inventory measurements;^cGLMAX, Maximum leaf conductance when stomata are fully open. A default value for deciduous broadleaved forests was set in forest stands and medium gaps, whereas a default value for grass was set in natural and clear-cut gaps (Federer 1995);^dCVPD, Vapour pressure deficit at which conductance is halved (kPa), default value (Federer 1995);^ePSICR, Critical water potential at which stomata close (MPa), default value (Federer 1995);^fSTONEF, Stone fraction, based on soil analysis;^gTHETAF, Volumetric soil water content at field capacity, based on soil hydrological measurements;^hTHSAT, Volumetric soil water content at saturation, based on soil hydrological measurements;ⁱBEXP, Exponent in "matric soil water potential-soil water content" power curve relationship (Clapp & Hornberger 1978), based on soil hydrological measurements;^jFRINTL, Intercepted fraction of rain per unit of projected leaf area index, based on calibration with measured data;^kFRINTS, Intercepted fraction of rain per unit of projected stem area index, based on calibration with measured data;^lCINTRL, Maximal interception storage of rain per unit of projected leaf area index, based on calibration with measured data;^mCINTRS, Maximal interception storage of rain per unit of projected stem area index, based on calibration with measured data;ⁿDENSEF, Canopy density multiplier, used to simulate thinned or spaced plants compared with the original canopy, based on calibration with measured data;^oQFFC, Fraction of quick flow at field capacity, based on calibration with measured data.[†]L1, Soil layer 1 (0-10 cm)^{**}L2, Soil layer 2 (10-30 cm)^{***}L3, Soil layer 3 (30-40 cm)

Tab. S2

Linear regression ($y = a + bx$), correlation coefficients (r), indices of agreement (D), “root mean square error» (RMSE) and number of measurements (n) between the BROOK90 simulated (y) and measured (x) values for the soil water contents (SWC, mm) of the 0 to 40 cm layer.

Study site		a	b	r	D	RMSE	n
Model fitting - soil water content 2001 - 2004							
Managed	Forest	0.69	41.10	0.685	0.725	24.84	30
	Gap	0.88	18.84	0.881	0.946	5.67	32
Old-growth	Forest	0.82	15.35	0.786	0.862	13.21	29
	Gap	1.05	-8.20	0.941	0.989	3.31	18
Model testing - soil water content 2005 - 2007							
Managed	Forest	0.57	54.72	0.754	0.580	27.54	23
	Gap	0.81	31.95	0.913	0.929	8.65	27
Old-growth	Forest	0.40	63.79	0.537	0.707	14.60	23
	Gap	0.67	58.01	0.847	0.800	13.45	27

Tab. S3

Linear regression ($y = a + bx$), correlation coefficients (r), indices of agreement (D), “root mean square error” (RMSE) and number of measurements (n) between the BROOK90 simulated (y) and the measured (x) throughfall (TF, mm).

Study plot		a	b	r	D	RMSE	n
Model fitting - throughfall 2001 - 2003							
Managed	Forest	0.67	34.82	0.728	0.849	47.83	16
Old-growth	Forest	0.87	29.99	0.692	0.797	50.95	17
Model testing - throughfall 2004 - 2007							
Managed	Forest	1.35	-4.17	0.790	0.766	74.12	16
Old-growth	Forest	1.24	20.55	0.727	0.738	82.02	16

Fig. S1

a) BROOK90 model fitting and b) BROOK90 model testing: simulated and measured values for soil water contents (SWC, mm) of the rooting depth (0 to 40 cm) for the managed forest, gap, and the old-growth forest during 2001 – 2007 and the old-growth gap during 2003 – 2007. The dashed line is the 1:1 line.

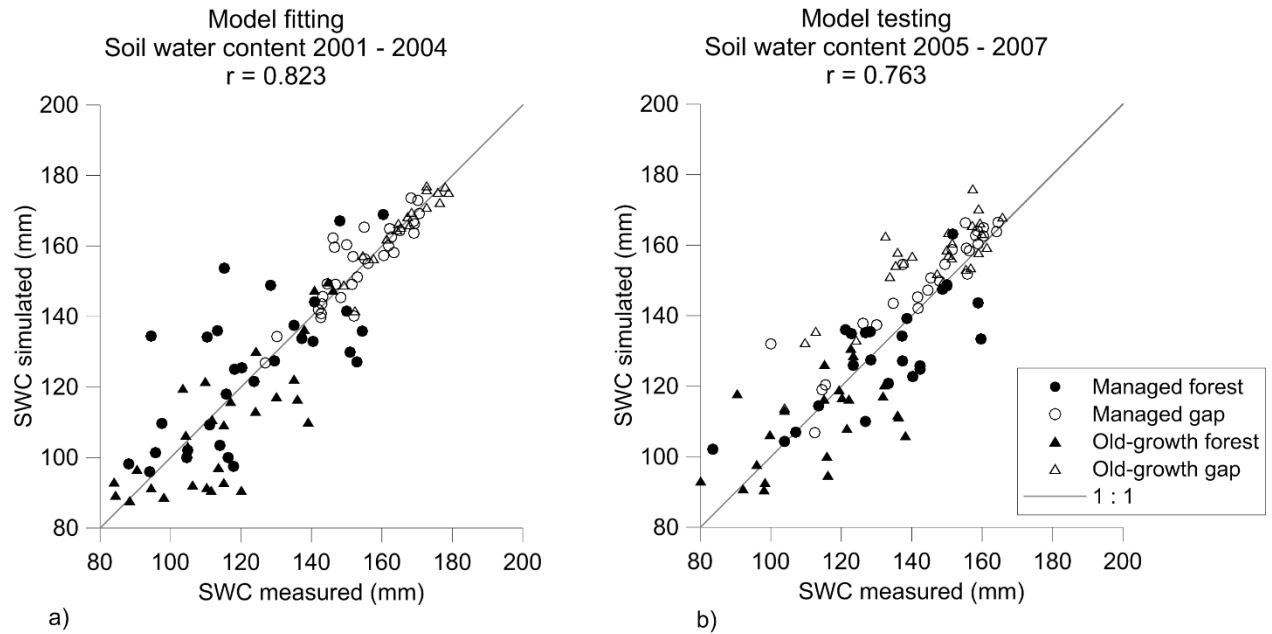


Fig. S2

Model fitting and testing: simulated and measured values for throughfall TF (mm) for the managed and the old-growth forest during 2001 - 2007. The grey line is the 1:1 line.

