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Supplement of

Intra-catchment variability of surface saturation – insights from physically based simulations in comparison with biweekly thermal infrared image observations

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Supplemental material

5 **Table S1: Evapotranspiration parameter used in the model setup of this study, table adapted from Glaser et al. 2016. Root depth and interception storage parameters for the coniferous forest were changed compared to the calibrated parameter values of Glaser et al. 2016. The leaf area index was set to zero for all vegetation types, since this showed to reduce the calculation time during dry conditions substantially without a pronounced effect on the simulated discharge and surface saturation (while the partitioning between transpiration and evaporation changed).**

	Deciduous tree land	Coniferous tree land	Riparian zone + streambed
Root depth (m)	2	1.5	0.5
Root distribution function	Cubic	Cubic	Cubic
Evaporation depth (m)	0.2	0.2	0.2
Evaporation distribution function	Cubic	Cubic	Cubic
Transpiration fitting parameter C1	0.3	0.3	0.3
Transpiration fitting parameter C2	0.2	0.2	0.2
Transpiration fitting parameter C3	0.7	0.7	0.1
Canopy storage parameter (m)	5.00E-04	7.50E-04	1.00E-04
Initial interception storage (m)	5.00E-05	7.50E-05	1.00E-05
Wilting point saturation	0.165	0.165	0.165
Field capacity saturation	0.51	0.51	0.51
Oxic limit saturation	0.7	0.7	0.8
Anoxic limit saturation	0.9	0.9	0.98
Evaporation limiting saturation (min.)	0.1	0.1	0.1
Evaporation limiting saturation (max.)	0.5	0.5	0.5

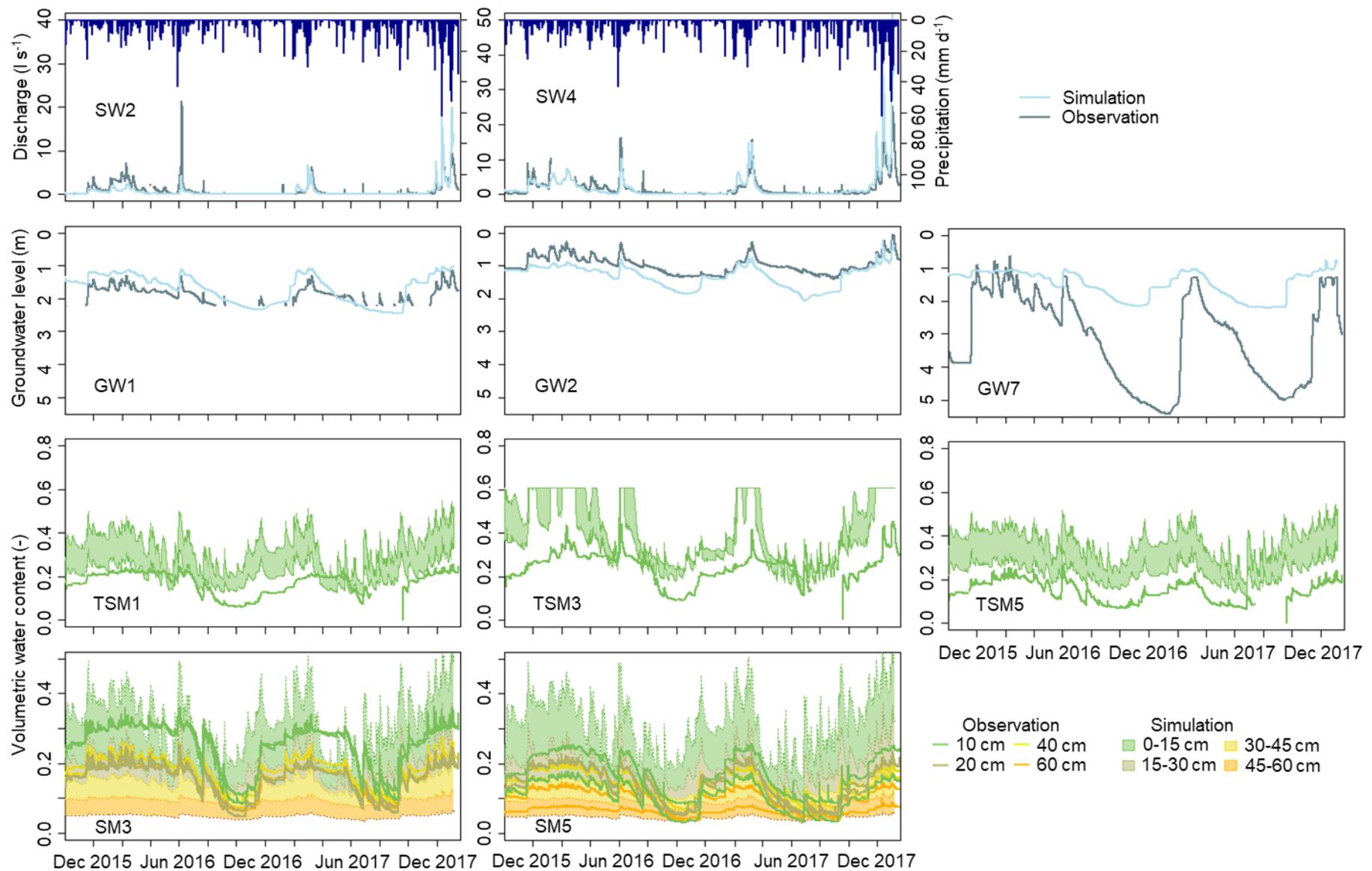


Figure S1: Simulated and observed time series of discharge, groundwater level below the surface, and volumetric water content. Colour bands indicate the possible span of simulated volumetric water contents in the depths between two model nodes. The time series of the observation locations (cf. Figure 1) that are not shown here, are shown in Figure 3.

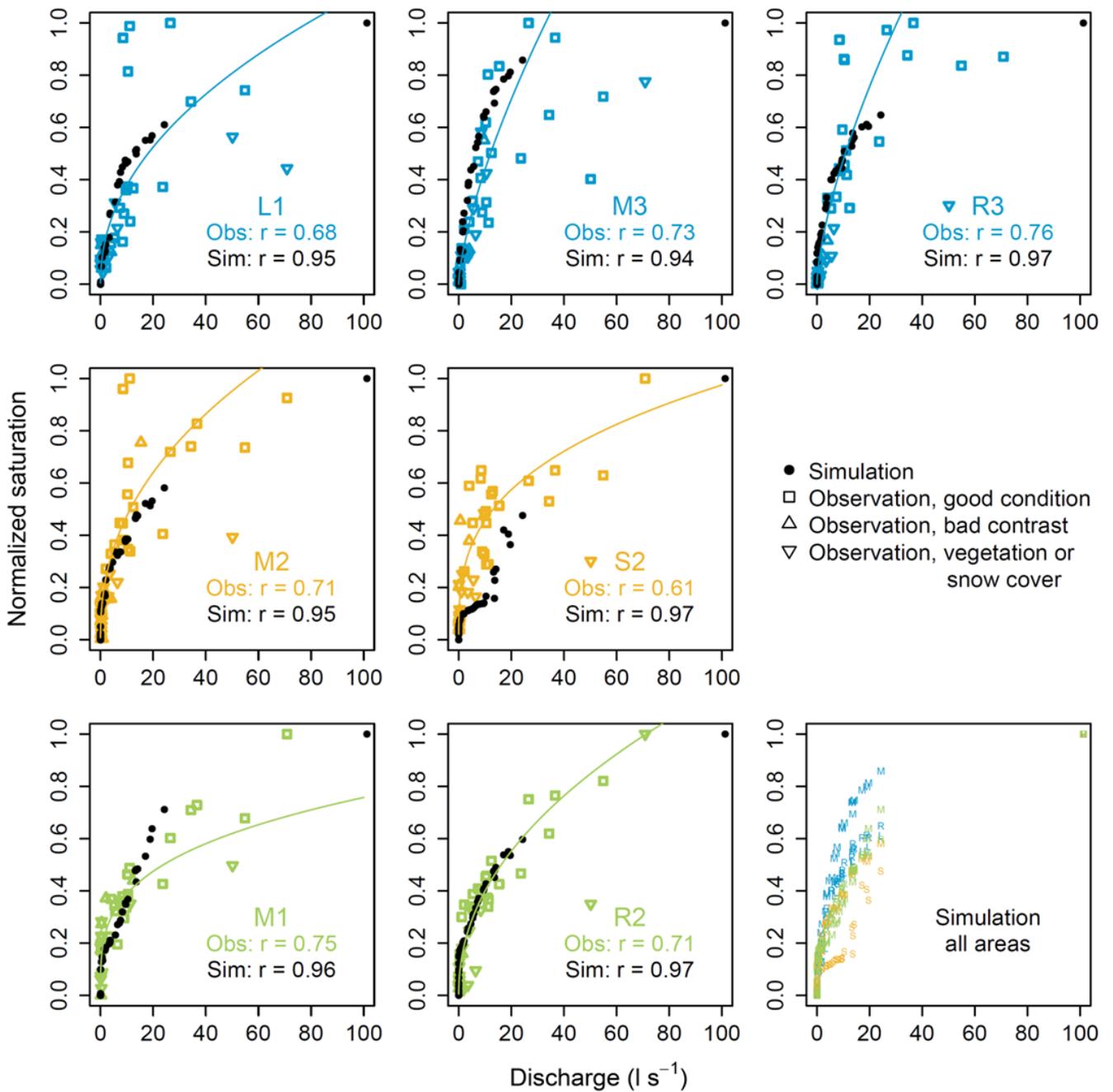


Figure S2: Observed and simulated relationships and Kendall correlations between normalised surface saturation and discharge at the catchment outlet SW1 for the seven investigated riparian areas plotted with non-logarithmic abscissa and ordinate (cf. Fig. 6). Labels and colours correspond to the labels and colours of the icons in Fig. 1 and represent the different categories of riparian areas. Observations that were derived from TIR images with a poor temperature contrast or with influences of vegetation and snow cover are deemed less reliable and are indicated with triangles. Solid lines are power law curves fitted to the observation data (exponents ranging between 0.29 and 0.69), excluding data taken during rainfall or rising discharge. To facilitate the comparison between the seven areas, the simulated data points from all seven areas are shown with the different colours and letters of the respective areas in the panel on the bottom right.

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Mesh used in this study

Alternative mesh

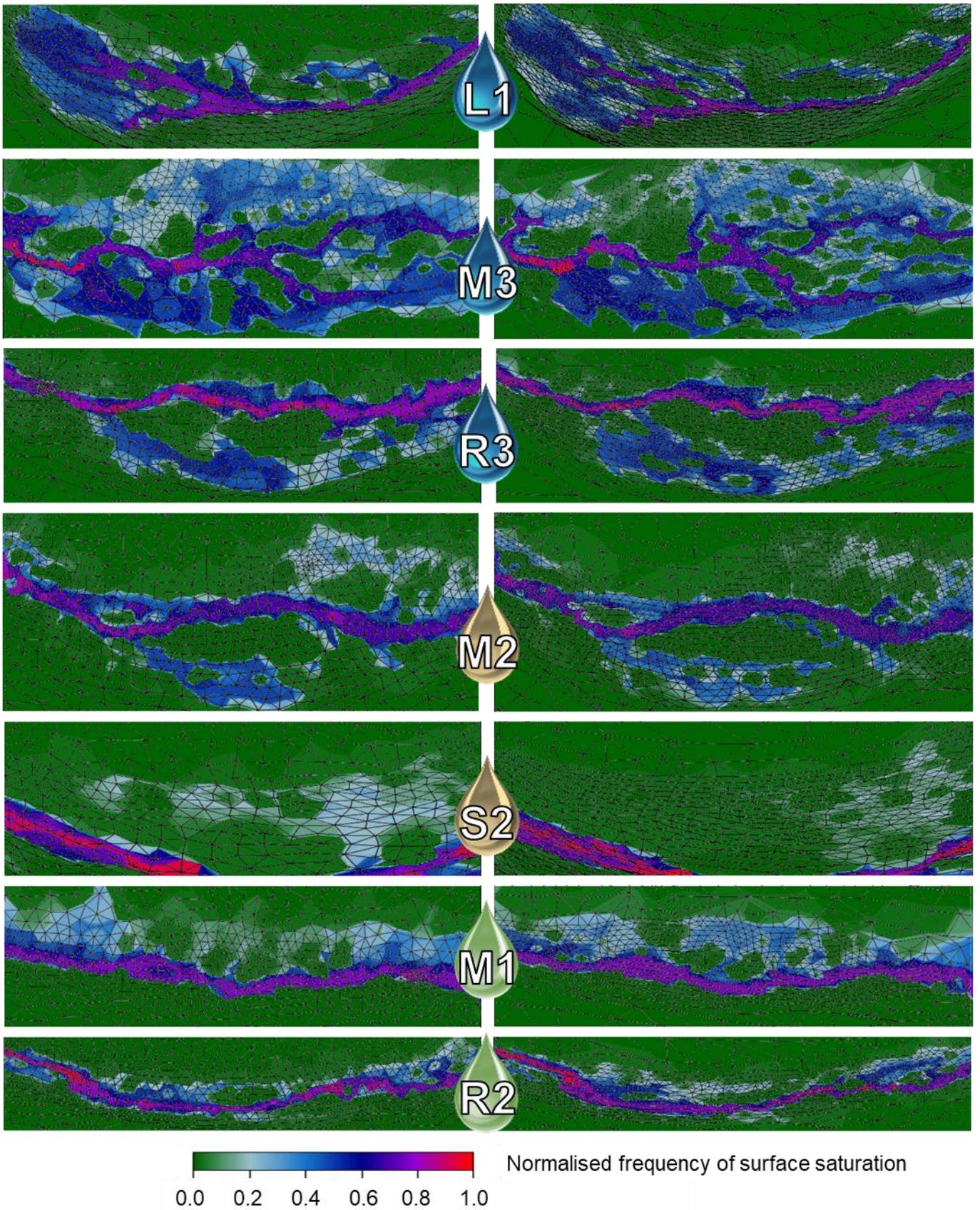


Figure S3: Comparison of simulated frequencies of surface saturation in the seven investigated riparian areas for two different model meshes. Left: mesh as used in this study; Right: alternative mesh with finer resolution in the riparian areas.