Supplementary Material

Global sensitivity analysis of the dynamics of a distributed hydrological model at the catchment scale

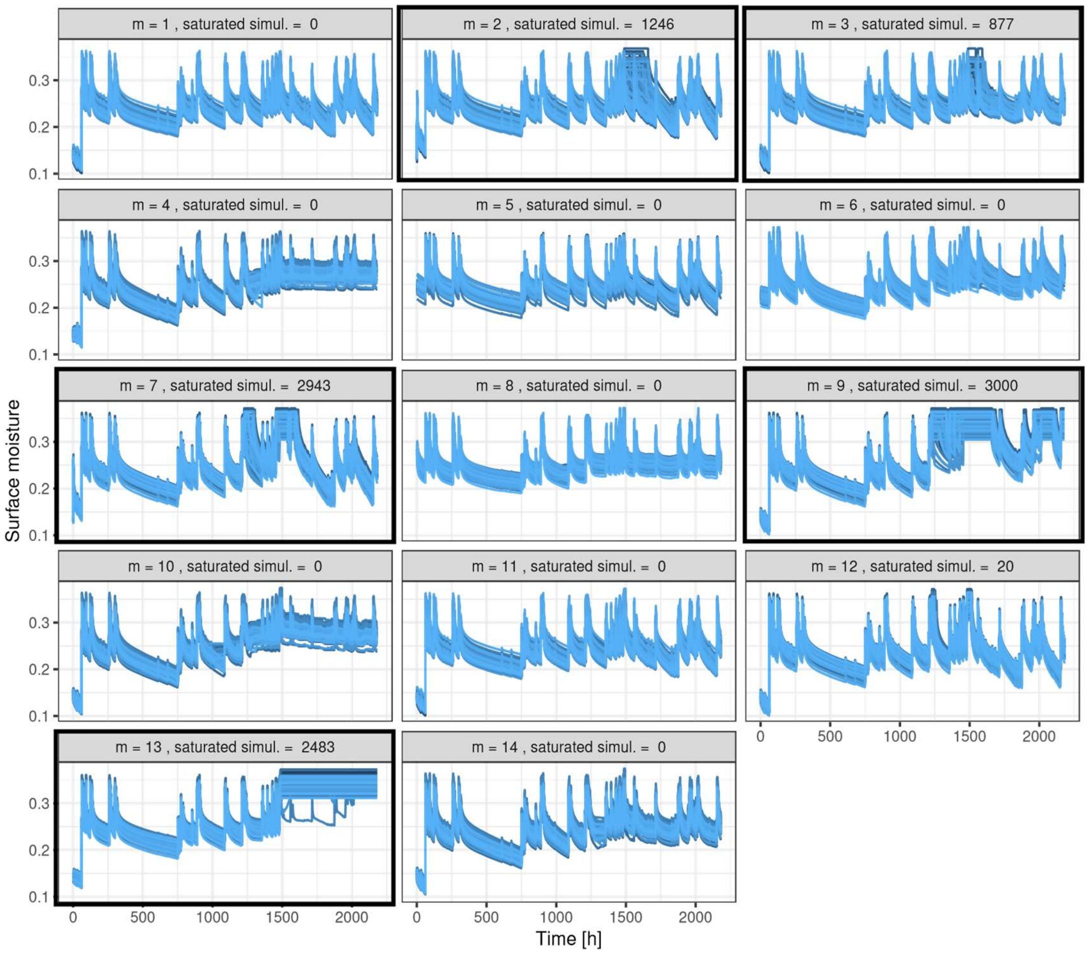

Figure S1: The first 100 output time series for all plots $m = 1..14$ (out of 3000 simulations). The number of simulations presenting a saturated soil surface for longer than 100 hours are denoted next to the plot number (previously seen in Table 1). The plots considered belonging to the group $\mathcal{G}_{\text{sat}}$ have a bold black frame.

Table S1: PESHMELBA parameters selected for the sensitivity analysis. The suffixes surf, interm and deep specify the soil horizon; soil1, soil2 and soil3 specify the soil type (SU1, SU2, SU3) and (VFZ) denotes vegetative buffer strips. Gaussian, lognormal and uniform distributions are $\mathcal{N}(\mu,\sigma)$, $\mathcal{LN}(\mu,\sigma)$ and $U(a,b)$, thetar is bounded to $[0,1]$ and the PCE basis accounts for the truncated gaussian, following Marelli & Sudret (2014).

Name	Definition	Unit	Distribution
thetas_surf_soil1	water content at saturation	$[L^3L^{-3}]$	$\mathcal{N}(0.3375,0.0338)$
thetas_interm_soil1		$[L^3L^{-3}]$	$\mathcal{N}(0.3362,0.0336)$
thetas_deep_soil1		$[L^3L^{-3}]$	$\mathcal{N}(0.2844,0.0284)$
thetas_surf_soil2		$[L^3L^{-3}]$	$\mathcal{N}(0.3375,0.0338)$
thetas_interm_soil2		$[L^3L^{-3}]$	$\mathcal{N}(0.3537,0.0354)$
thetas_deep_soil2		$[L^3L^{-3}]$	$\mathcal{N}(0.4162,0.0416)$
thetas_surf_soil3		$[L^3L^{-3}]$	$\mathcal{N}(0.3375,0.0338)$
thetas_interm_soil3		$[L^3L^{-3}]$	$\mathcal{N}(0.3322,0.0332)$
thetas_deep_soil3		$[L^3L^{-3}]$	$\mathcal{N}(0.316,0.0316)$
thetas_surf_soil1(VFZ)		$[L^3L^{-3}]$	$\mathcal{N}(0.3375,0.0338)$
thetas_surf_soil2(VFZ)		$[L^3L^{-3}]$	$\mathcal{N}(0.3375,0.0338)$
thetas_surf_soil3(VFZ)		$[L^3L^{-3}]$	$\mathcal{N}(0.3375,0.0338)$
thetar_surf_soil1	residual water content	$[L^3L^{-3}]$	$\mathcal{N}(0.0372,0.0093)$
thetar_deep_soil1		$[L^3L^{-3}]$	$\mathcal{N}(0.0661,0.0165)$
thetar_surf_soil2		$[L^3L^{-3}]$	$\mathcal{N}(0.0372,0.0093)$
thetar_interm_soil2		$[L^3L^{-3}]$	$\mathcal{N}(0,0.0093)$
thetar_deep_soil2		$[L^3L^{-3}]$	$\mathcal{N}(0,0.0093)$
thetar_surf_soil3		$[L^3L^{-3}]$	$\mathcal{N}(0.0372,0.0093)$
thetar_deep_soil3		$[L^3L^{-3}]$	$\mathcal{N}(0.0612,0.0153)$
thetar_surf_soil1(VFZ)		$[L^3L^{-3}]$	$\mathcal{N}(0.0372,0.0093)$
thetar_surf_soil2(VFZ)		$[L^3L^{-3}]$	$\mathcal{N}(0.0372,0.0093)$
hg_surf_soil1	Van Genuchten water retention curve parameter	$[-]$	$\mathcal{N}(-9.69,0.969)$
hg_surf_soil2		$[-]$	$\mathcal{N}(-9.69,0.969)$
hg_deep_soil2		$[-]$	$\mathcal{N}(-30.18,3.018)$
hg_surf_soil3		$[-]$	$\mathcal{N}(-9.69,0.969)$
hg_surf_soil1(VFZ)		$[-]$	$\mathcal{N}(-9.69,0.969)$
hg_surf_soil2(VFZ)		$[-]$	$\mathcal{N}(-9.69,0.969)$
hg_surf_soil3(VFZ)		$[-]$	$\mathcal{N}(-9.69,0.969)$
mn_surf_soil1	Van Genuchten water retention curve parameter	$[-]$	$\mathcal{N}(0.2685,0.0268)$
mn_deep_soil1		$[-]$	$\mathcal{N}(0.2274,0.0227)$
mn_surf_soil2		$[-]$	$\mathcal{N}(0.2685,0.0268)$
mn_interm_soil2		$[-]$	$\mathcal{N}(0.1289,0.0129)$
mn_deep_soil2		$[-]$	$\mathcal{N}(0.1,0.01)$
mn_surf_soil3		$[-]$	$\mathcal{N}(0.2685,0.0268)$
mn_deep_soil3		$[-]$	$\mathcal{N}(0.1791,0.0179)$
mn_surf_soil1(VFZ)		$[-]$	$\mathcal{N}(0.2685,0.0268)$
mn_surf_soil2(VFZ)		$[-]$	$\mathcal{N}(0.2685,0.0268)$
mn_surf_soil3(VFZ)		$[-]$	$\mathcal{N}(0.2685,0.0268)$
Ks_surf_soil2	hydraulic conductivity at total saturation	$[cm/h]$	$\mathcal{LN}(2.6291,0.198)$
Ks_interm_soil2		$[cm/h]$	$\mathcal{LN}(2.0292,0.198)$
Ks_interm_soil2		$[cm/h]$	$\mathcal{LN}(1.2206,0.198)$
Ks_deep_soil2		$[cm/h]$	$\mathcal{LN}(0.3391,0.198)$
Ks_interm_soil3		$[cm/h]$	$\mathcal{LN}(2.3762,0.198)$
Ks_surf_soil1(VFZ)		$[cm/h]$	$\mathcal{LN}(2.6884,0.198)$
Ks_surf_soil2(VFZ)		$[cm/h]$	$\mathcal{LN}(2.6884,0.198)$
Ks_surf_soil3(VFZ)		$[cm/h]$	$\mathcal{LN}(2.6884,0.198)$
Kx_surf_soil2	hydraulic conductivity at soil matrix saturation	$[cm/h]$	$\mathcal{LN}(-2.2926,0.198)$
Kx_interm_soil2		$[cm/h]$	$\mathcal{LN}(-2.833,0.198)$
veget_LAImax_1	maximal Leaf Area Index	$[-]$	$U(2,3)$
plot_hpond	maximal ponding height of the plots	$[cm]$	$U(0.8,1.2)$
river_di	distance between the riverbed and the aquifer	$[cm]$	$U(120,180)$
river_ks	hydraulic conductivity of the riverbed at saturation	$[cm/h]$	$\mathcal{LN}(2.1268,0.198)$