



Supplement of

High-resolution fully coupled atmospheric–hydrological modeling: a cross-compartment regional water and energy cycle evaluation

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Supplementary material

Additional tables and figures that were omitted in the manuscript for brevity.

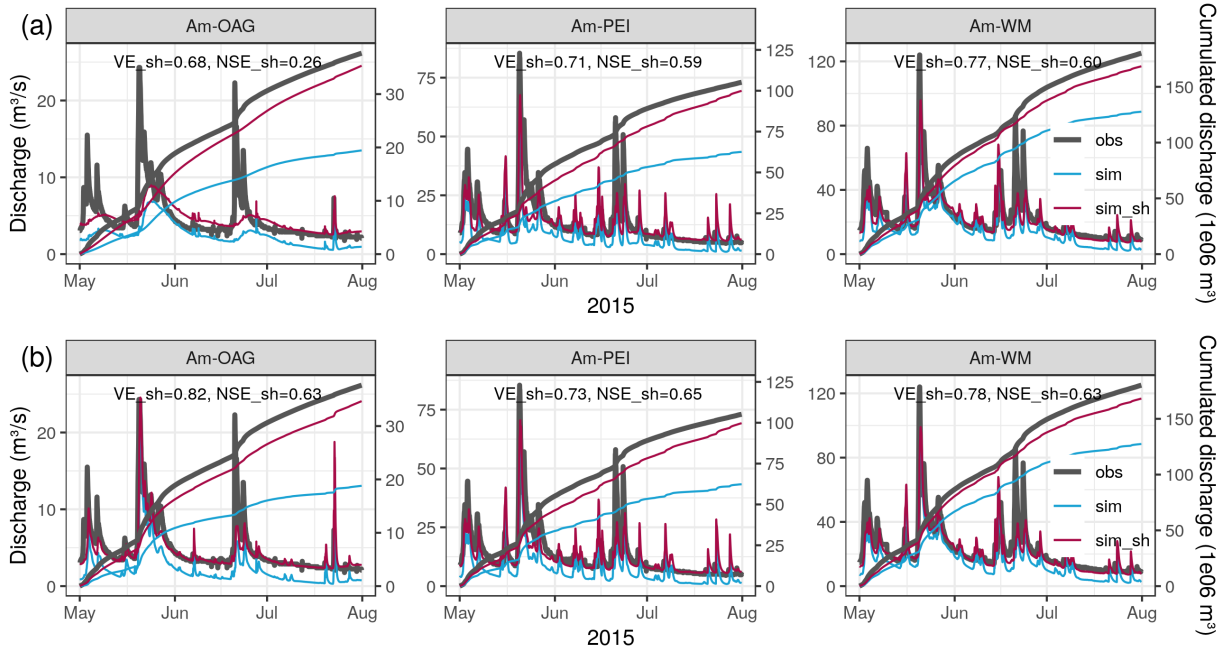


Figure S1: Simulated and observed discharge for the calibration period (01 May–31 July). (a) Uniform soil layers throughout domain, (b) reduced soil layer thicknesses for slopes $> 50\%$.

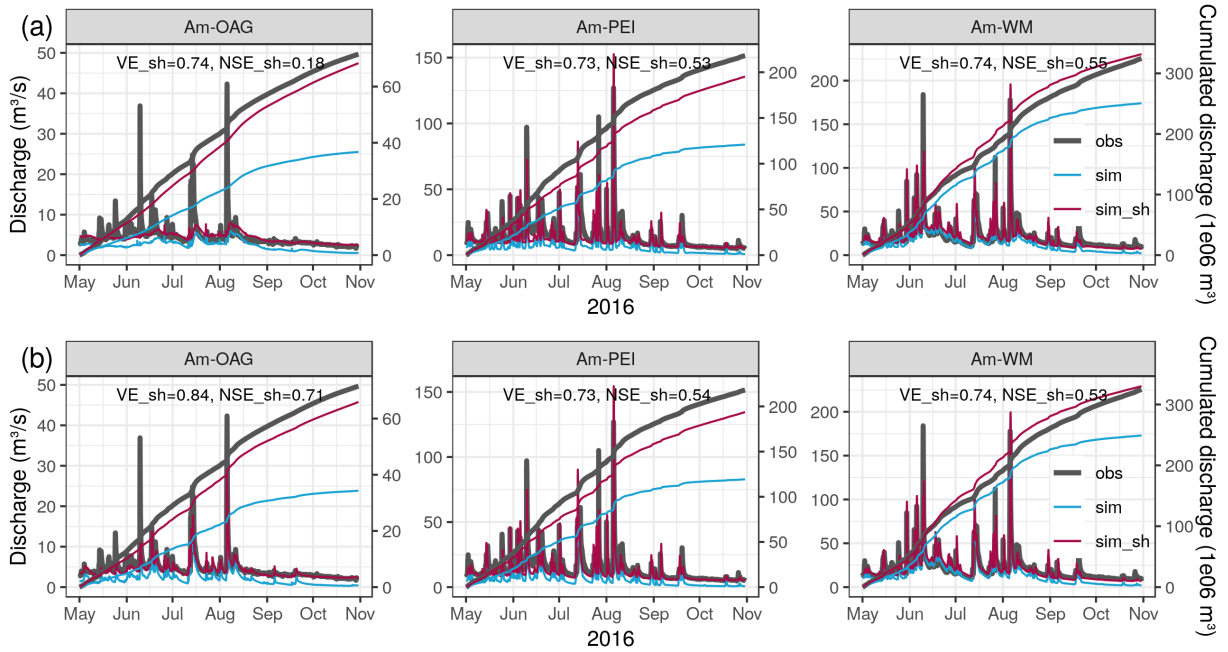


Figure S2: Simulated and observed discharge for the validation period (1 May–31 October 2016). (a) Uniform soil layers throughout domain, (b) reduced soil layer thicknesses for slopes $> 50\%$.

Table S1: Performance measures for total absorbed shortwave radiation (W m^{-2}), simulations vs. observations for June to October 2016.

Station	Model	r^2	ME	MAE
DE-Fen	WRF_SA	0.76	48.37	68.61
	WRF-H_FC	0.77	49.51	68.27
DE-RbW	WRF_SA	0.73	47.65	71.44
	WRF-H_FC	0.72	46.14	70.89
DE-Gwg	WRF_SA	0.66	68.16	88.95
	WRF-H_FC	0.65	68.64	89.76

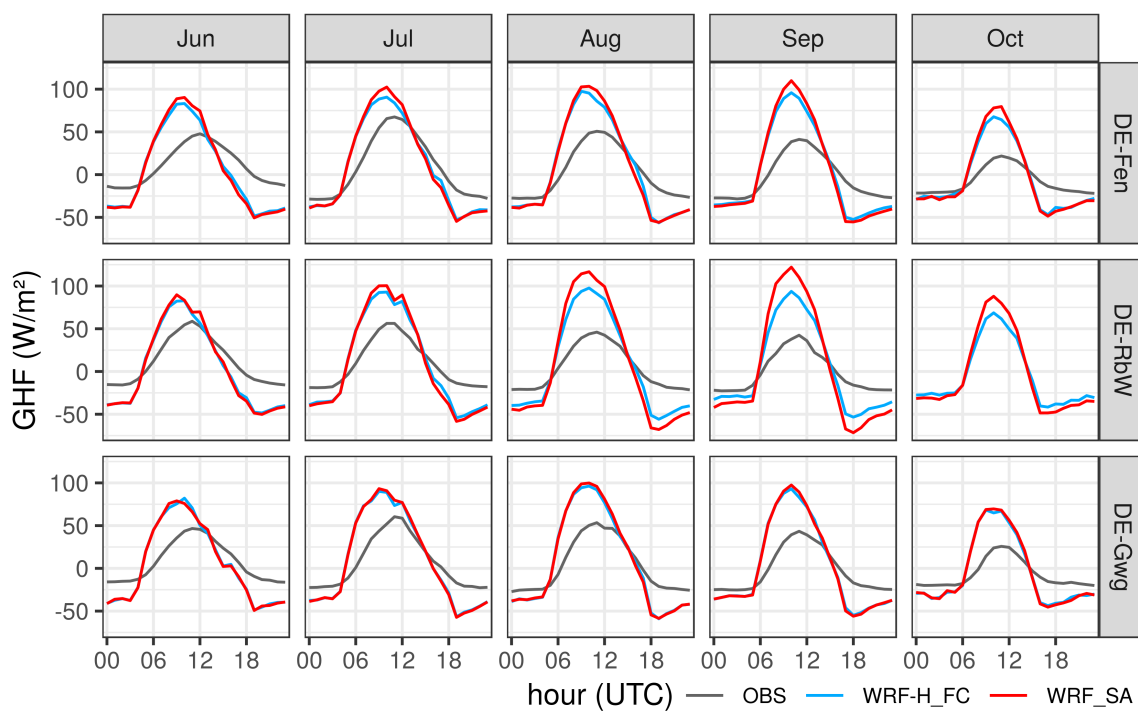


Figure S3: Mean diurnal cycles of simulated and observed ground-heat flux for the months June to October 2016 at different TERENO Pre-Alpine Observatory sites.

Table S2: Performance measures for ground-heat flux (W m^{-2}), simulations vs. observations for June to October 2016.

Station	Model	r^2	ME	MAE
DE-Fen	WRF_SA	0.60	2.57	30.40
	WRF-H_FC	0.62	1.99	27.32
DE-RbW	WRF_SA	0.61	0.19	36.49
	WRF-H_FC	0.64	-0.08	29.49
DE-Gwg	WRF_SA	0.57	2.32	29.89
	WRF-H_FC	0.56	2.05	29.20

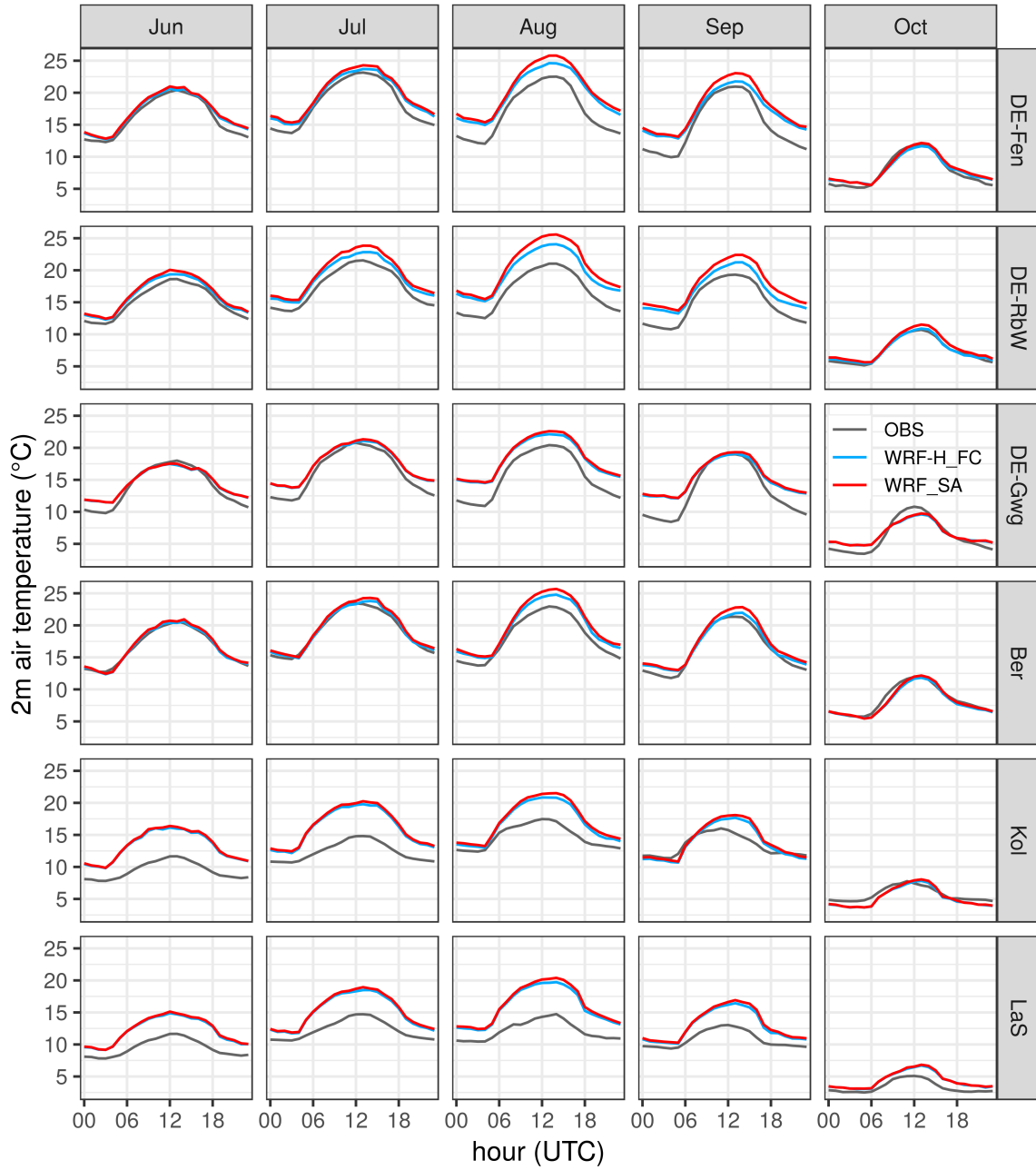


Figure S4: Mean diurnal cycles of simulated and observed 2m air temperature for the months June to October 2016 at different TERENO Pre-Alpine Observatory sites.

Table S3: Performance measures for 2 m air temperature (K), simulations vs. observations for June to October 2016.

Station	Model	r^2	ME	MAE
DE-Fen	WRF_SA	0.81	1.76	2.64
	WRF-H.FC	0.81	1.32	2.37
DE-RbW	WRF_SA	0.84	2.06	2.73
	WRF-H.FC	0.84	1.41	2.24
DE-Gwg	WRF_SA	0.79	1.40	2.51
	WRF-H.FC	0.79	1.27	2.45
Ber	WRF_SA	0.85	0.72	1.94
	WRF-H.FC	0.86	0.38	1.82
Kol	WRF_SA	0.77	2.19	2.93
	WRF-H.FC	0.77	1.94	2.77
LaS	WRF_SA	0.81	2.66	3.07
	WRF-H.FC	0.81	2.45	2.91

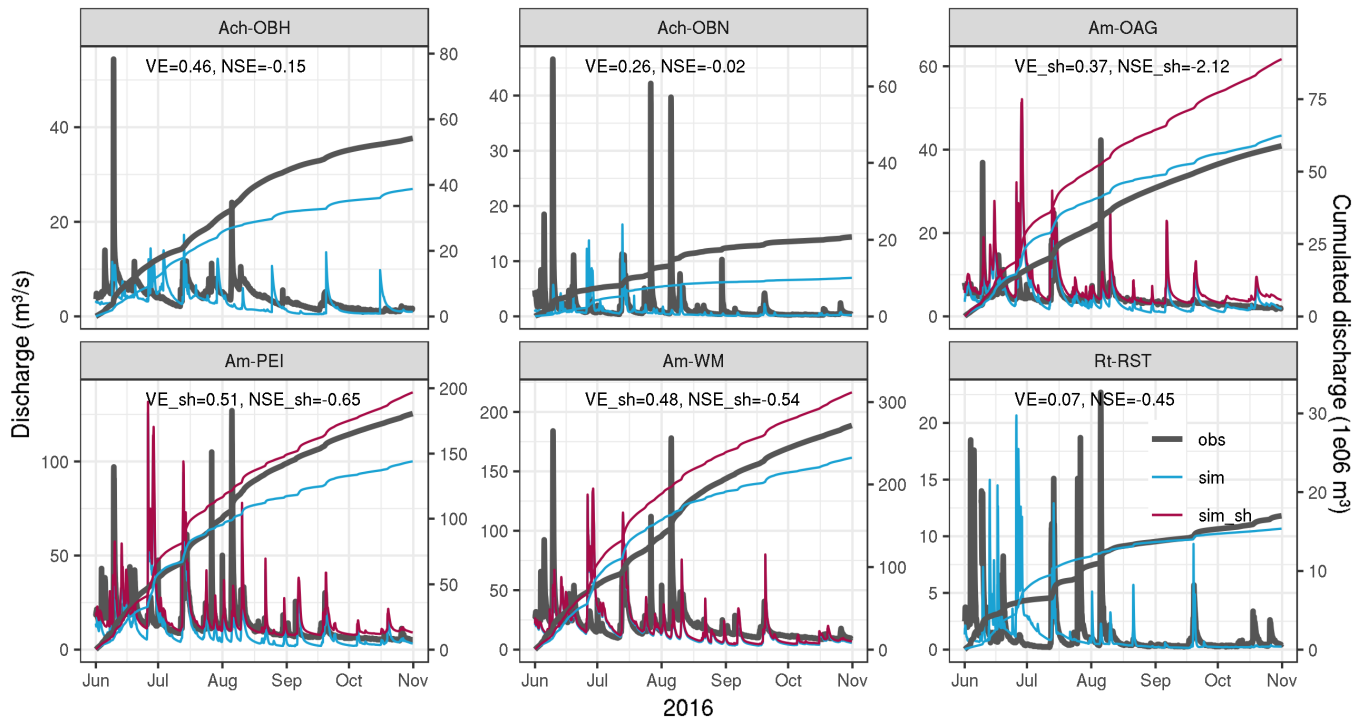


Figure S5: Subcatchment hydrographs for validation period (1 May–31 October 2016). Standard WRF-H.FC model output is printed in blue. Shifted (sh) hydrographs are shown in red. Shift amounts are listed in Tab. 3 of the main article.