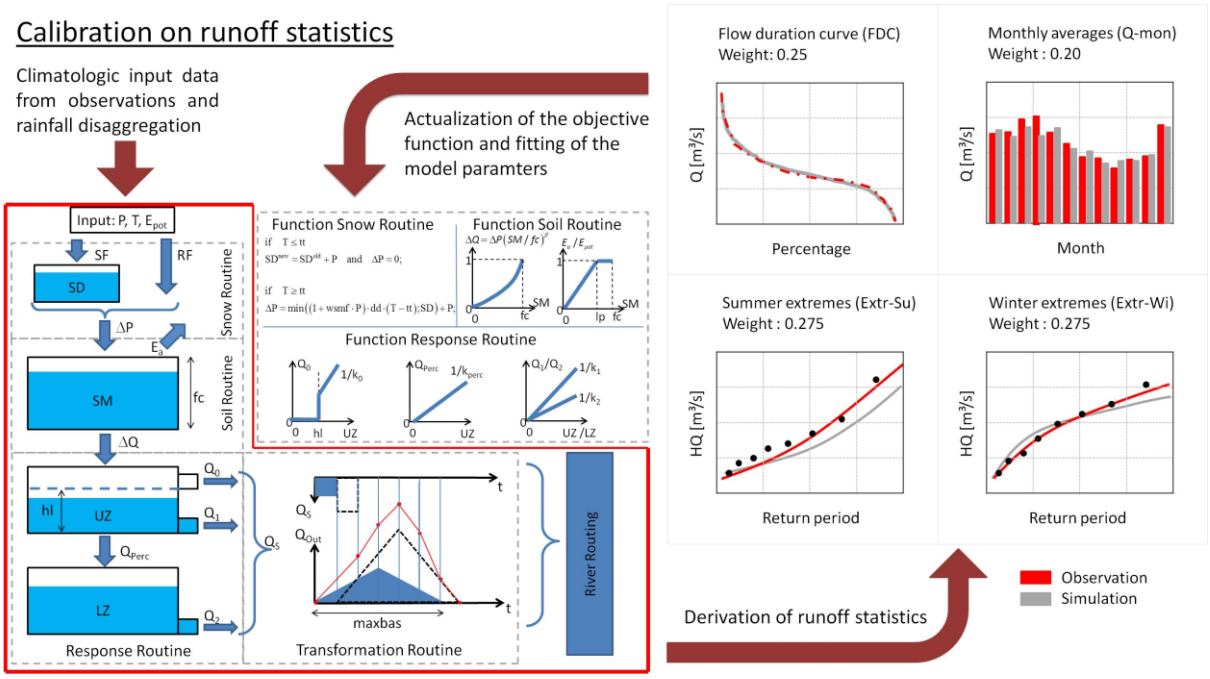
Rainfall disaggregation for hydrological modeling: Is there a need for spatial consistence?

Hannes Müller, Markus Wallner, Kristian Förster

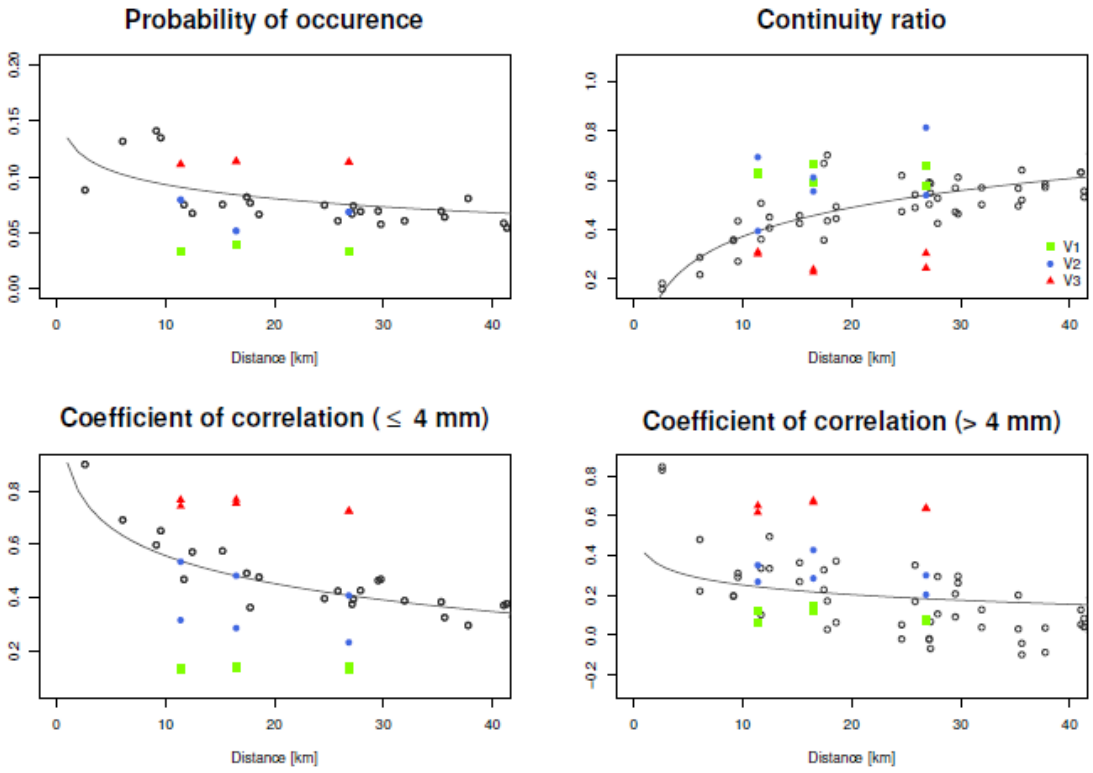
- Supplementary material -



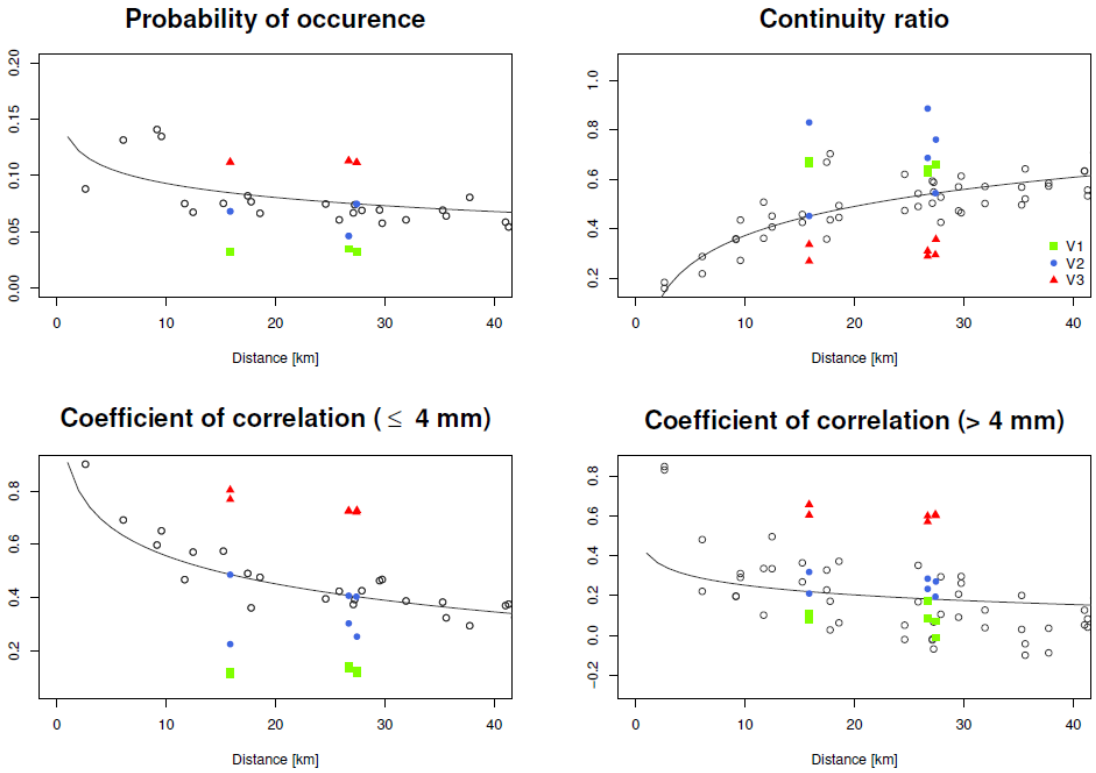
S1. Flow chart and applied calibration procedure for HBV (Wallner and Haberlandt, 2015)

S2. HBV model parameters modified during calibration with limiting ranges

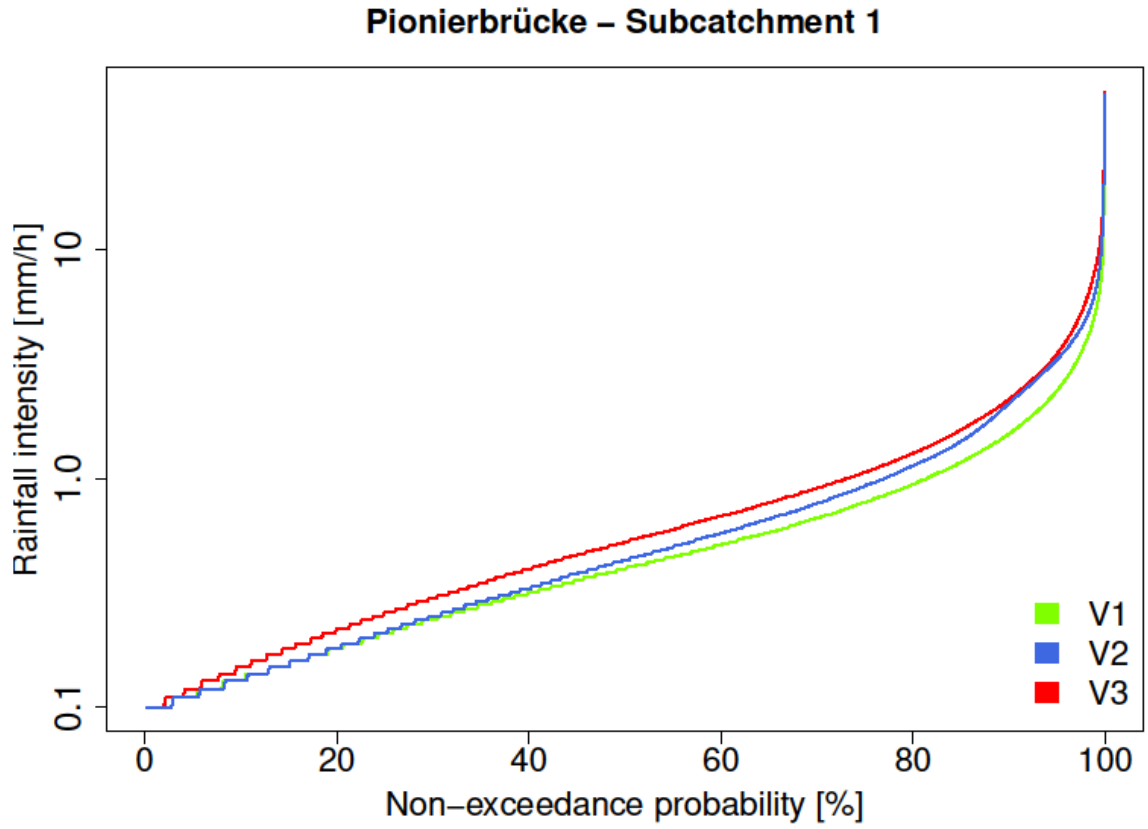
Parameter	Unit	Explanation	Minimum	Maximum
wsmf	[mm^{-1}]	Wet snow melt factor	1	4
tt	[°C]	Threshold temperature	-1.5	1.5
dd	[$mm°C^{-1}d^{-1}$]	Degree day factor	0.5	5
fc	[mm]	Field capacity	50	300
lp	[-]	Limit for potential evapotranspiration	0.1	0.95
ß	[-]	Empirical factor for runoff calculation from the soil layer	0.5	4
hl	[mm]	Threshold value for surface runoff	1	30
k0	[d]	Storage coefficient surface runoff	0.25	5
k1	[d]	Storage coefficient interflow	3	40
k2	[d]	Storage coefficient baseflow	50	500
kperc	[d]	Storage coefficient perculation	3	40
maxbas	[h]	Length of the triangular unit hydrograph impulse	3	10
mx	[-]	Weighting factor of Muskingum method	0.1	0.4
mk	[h]	Retention constant of Muskingum method	0.25	10



S3. Bivariate spatial rainfall characteristics of V1, V2 and V3 in comparison to observations for the catchment Reckershausen (for one realization, black circles represent observations - for details the reader is referred to Müller and Haberlandt (2015)).



S4. Bivariate spatial rainfall characteristics of V1, V2 and V3 in comparison to observations for the catchment Tetendorf (for one realization, black circles represent observations - for details the reader is referred to Müller and Haberlandt (2015)).



S5. Non-exceedance curve of areal rainfall intensities for V1, V2 and V3 for one subcatchment of Pionierbrücke (for one realization)

S6. NSC-values for all catchments and all criteria without calibration for validation period

Catchment	Criteria	V1	V2	V3
Reckershausen	*Extr-Su*	0.20	0.26	0.14
	Extr-Wi	0.76	0.77	0.77
	FDC	0.97	0.97	0.97
	Q-mon	0.99	0.99	0.99
Pionierbrücke	*Extr-Su*	-1.68	-1.58	-1.59
	Extr-Wi	0.01	0.10	0.06
	FDC	-0.07	-0.07	-0.07
	Q-mon	0.96	0.96	0.96
Tetendorf	*Extr-Su*	0.52	0.54	0.55
	Extr-Wi	-7.78	-7.78	-8.41
	FDC	0.19	0.19	0.19
	Q-mon	-0.06	-0.05	-0.11

S7. O_{stat}-values for all catchments and all criteria without parameter calibration for validation period

Catchment	V1	V2	V3
Reckershausen	0.27	0.25	0.28
Pionierbrücke	1.14	1.10	1.11
Tetendorf	2.79	2.79	2.96