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Supplement of

Stochastic modelling of spatially and temporally consistent daily precipitation time-series over complex topography

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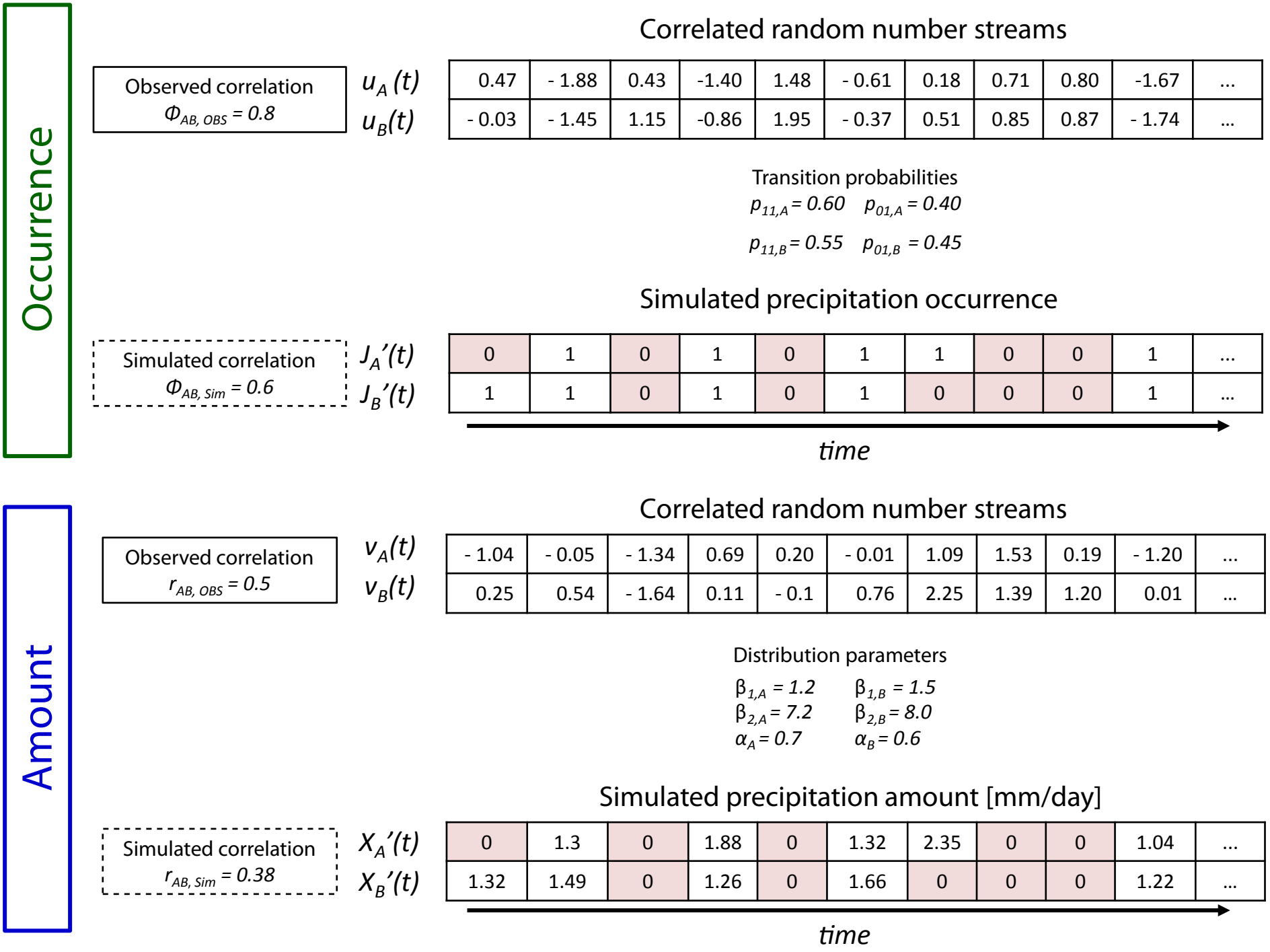
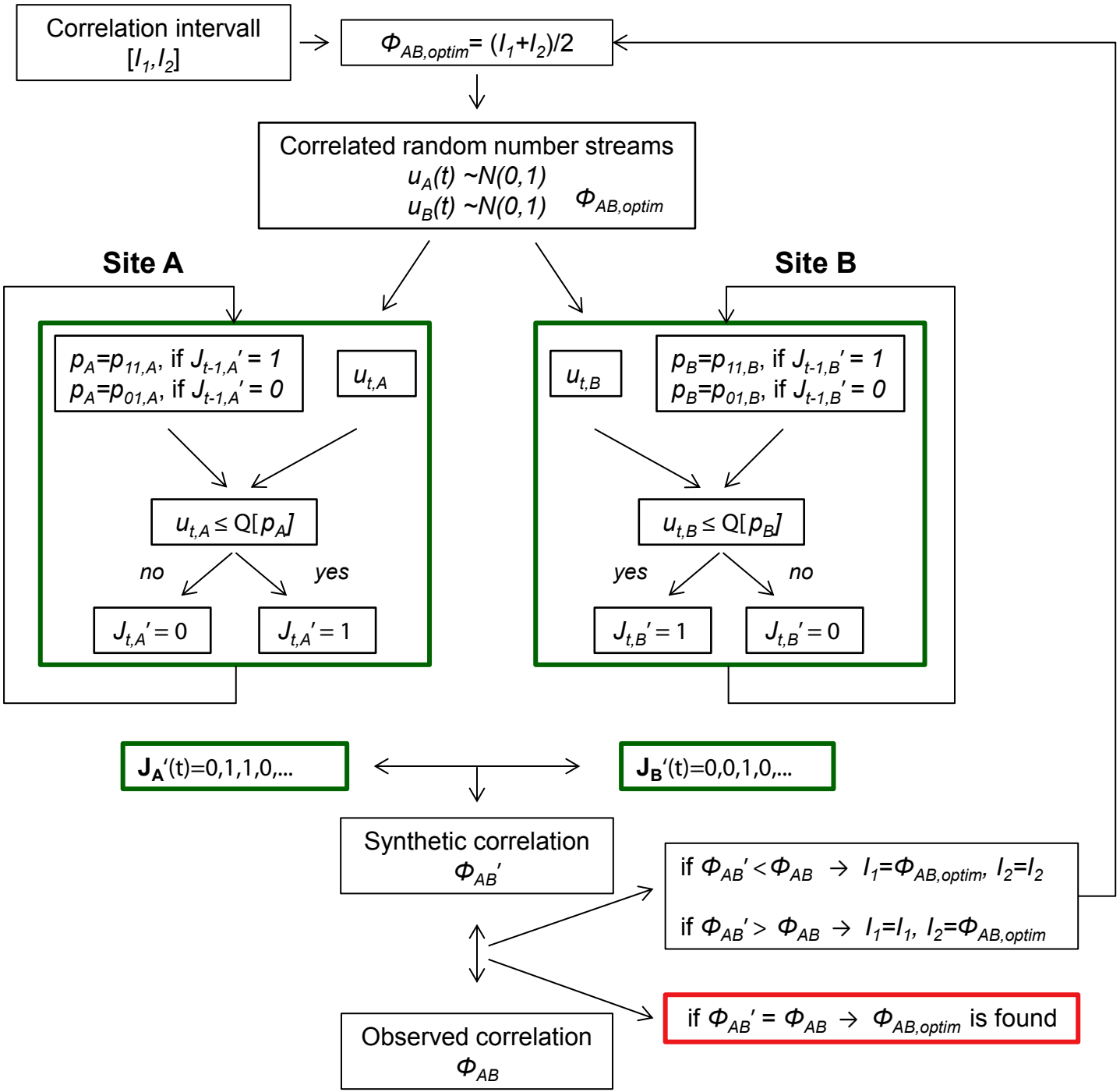
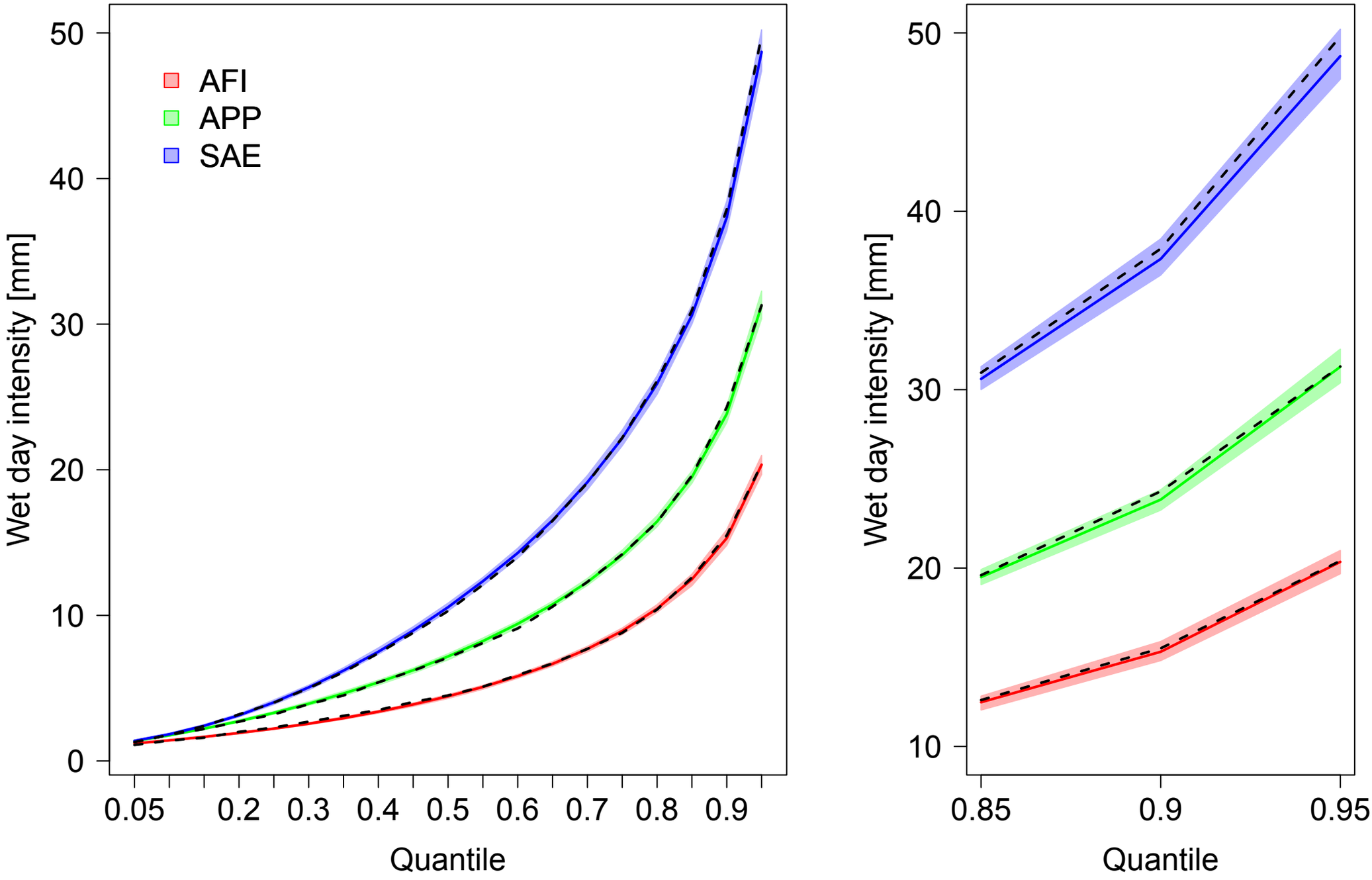


Supplementary Figure 1. The issue of simulating spatially correlated time-series in a Richardson-type WG for two stations *A* and *B*.The observed spatial correlation (solid box) as input for the occurrence (green) and amount (blue) process is partly destroyed by the stochastic step-by-step simulation of precipitation that is calibrated at single stations (transition probabilities and distribution parameters). This results in a simulated spatial correlation that is lower than observed (dashed box). On the right-hand side, a fictitious example of correlated random number streams and simulated time-series are shown. The pink boxes indicate instances of dry conditions.



Supplementary Figure 2. Iterative procedure to find an optimal spatial correlation coefficient between two stations A and B (ΦAB,optim) in case of precipitation occurrences. The synthetic correlation is derived from the binary series (JA'(t) and JB'(t)) and compared to the observed target correlation (ΦAB). A similar procedure is used for precipitation amounts.



Supplementary Figure 3. Quantiles of daily non-zero precipitation amounts, aggregated over 51 years (1961-2011) for the three stations *Andelfingen* (AFI), *Appenzell* (APP) and *Saentis* (SAE). The coloured areas (lines) show for each quantile the estimates of the 95% interval (median) across the 100 model realizations. The black dashed lines represent the observed quantiles.