S1 Fitted models

Figure S1. Parameter α of the Beta distribution for f_{W^+}. (a) Estimates α at each temporal scale and intensity class (solid circles) against the intensity and fitted scaling model B, Eq. (13) (solid black line). (b) and (c) the two scaling sub-models for α in model A. (b) Model $h(\tau)$ (equation 11) and (b) model $g(I)$ (equation 12). See Fig. 1 for caption details. Data from the Zurich station, all seasons.
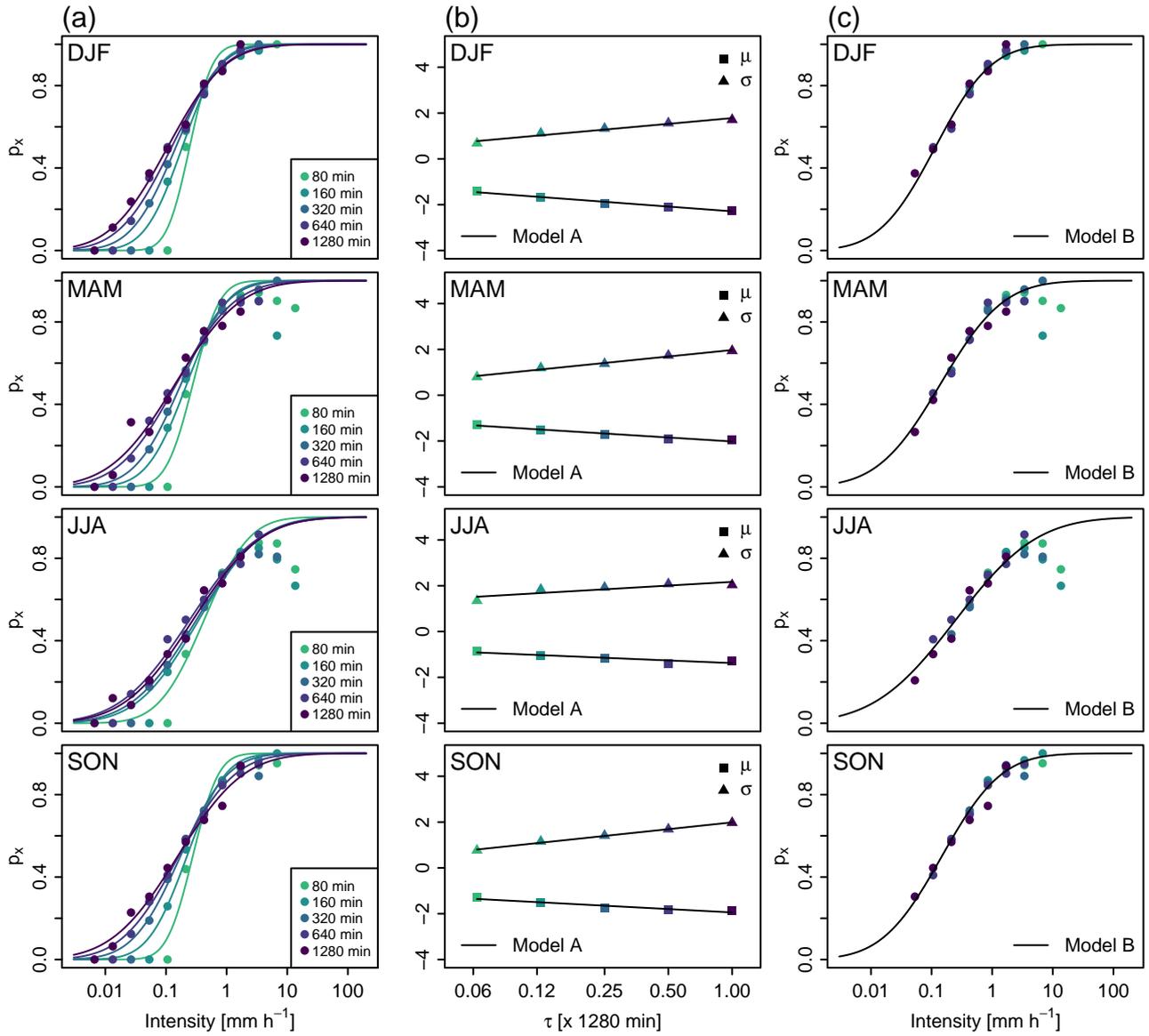
Figure S2. Non-zero subdivisions probability p_x. (a) p_x estimates for different classes of intensity and temporal scale and scaling model $p_x(I,\tau)$ in model A, Eq. (6) . b) Scaling models for the parameters $\mu(\tau)$ and $\sigma(\tau)$ in model A (equations 7 and 8, respectively). (c) Scaling model of $p_x(I)$, Eq. (9), in model B (precipitation data below 0.8 mm threshold are disregarded). See Fig. 1 for details.

S2   Performance evaluation
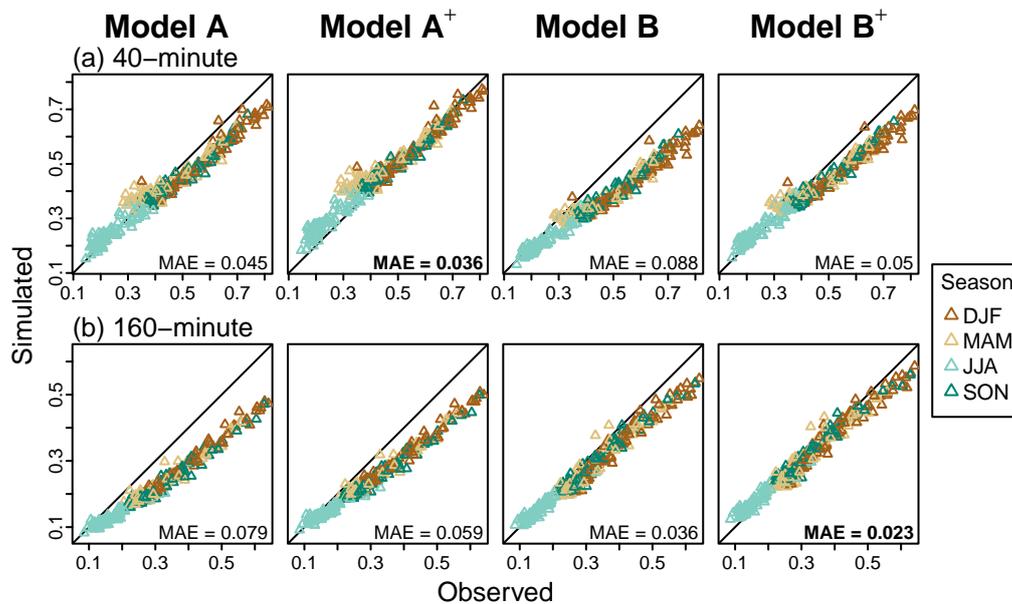
Figure S3. Observed versus simulated lag-2 autocorrelation at (a) 40-minute in resolution (b) and 160-minute resolution. Same notation as in Fig. 5.
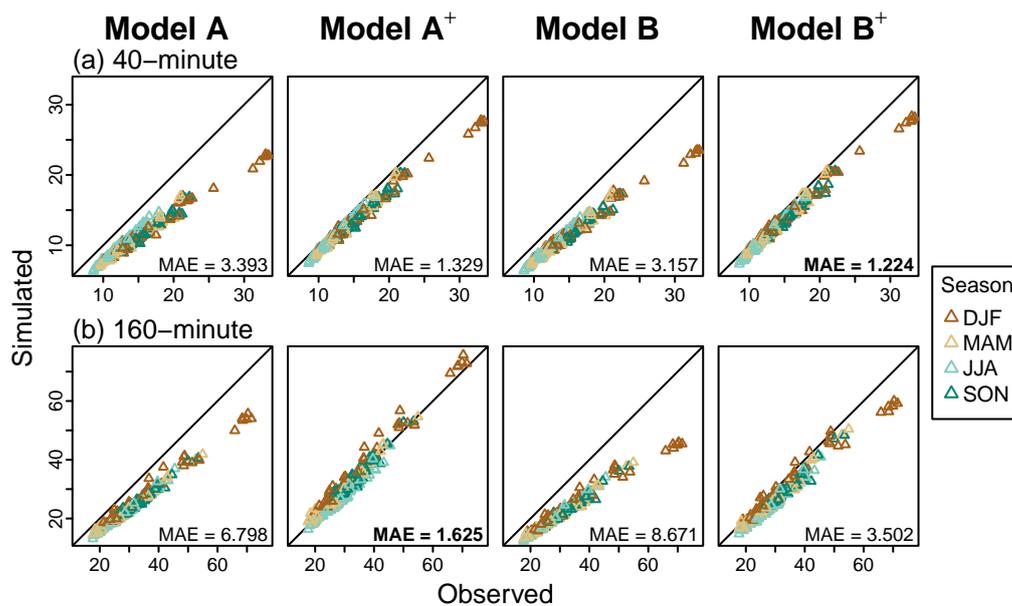
Figure S4. Observed versus simulated mean length of dry spells. Same notation as in Fig. 5.
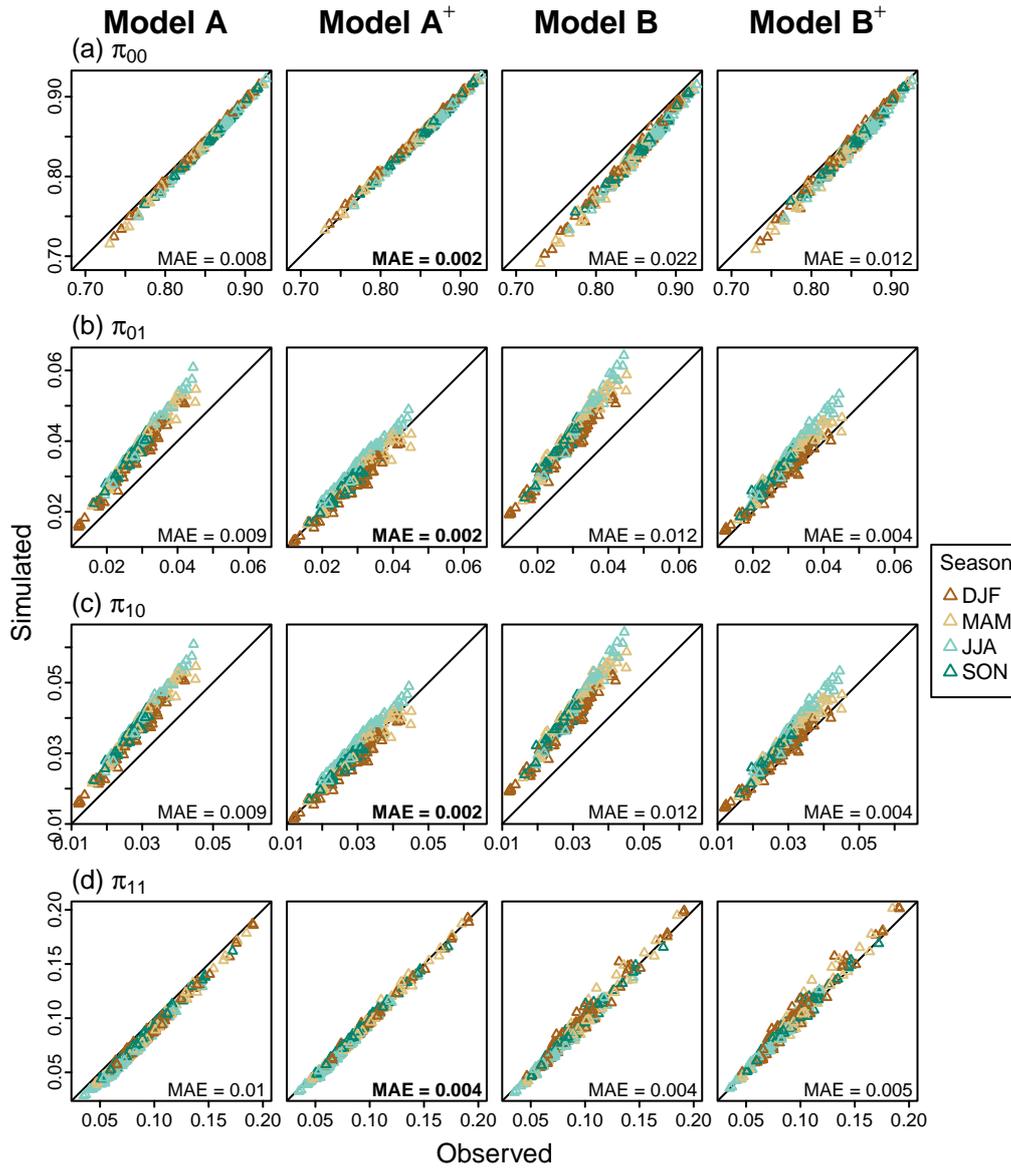
Figure S5. Observed versus simulated transition probabilities at 40-minute resolution at each site for each model. (a) $\pi_{00} = P(R_t = 0, R_{t-1} = 0)$, (b) $\pi_{01} = P(R_{t-1} = 0, R_t = 1)$, (c) $\pi_{10} = P(R_{t-1} = 1, R_t = 0)$ and (d) $\pi_{11} = P(R_{t-1} = 1, R_t = 1)$, where 0 and 1 refer to dry/wet steps respectively. Same notation as in Fig. 5.
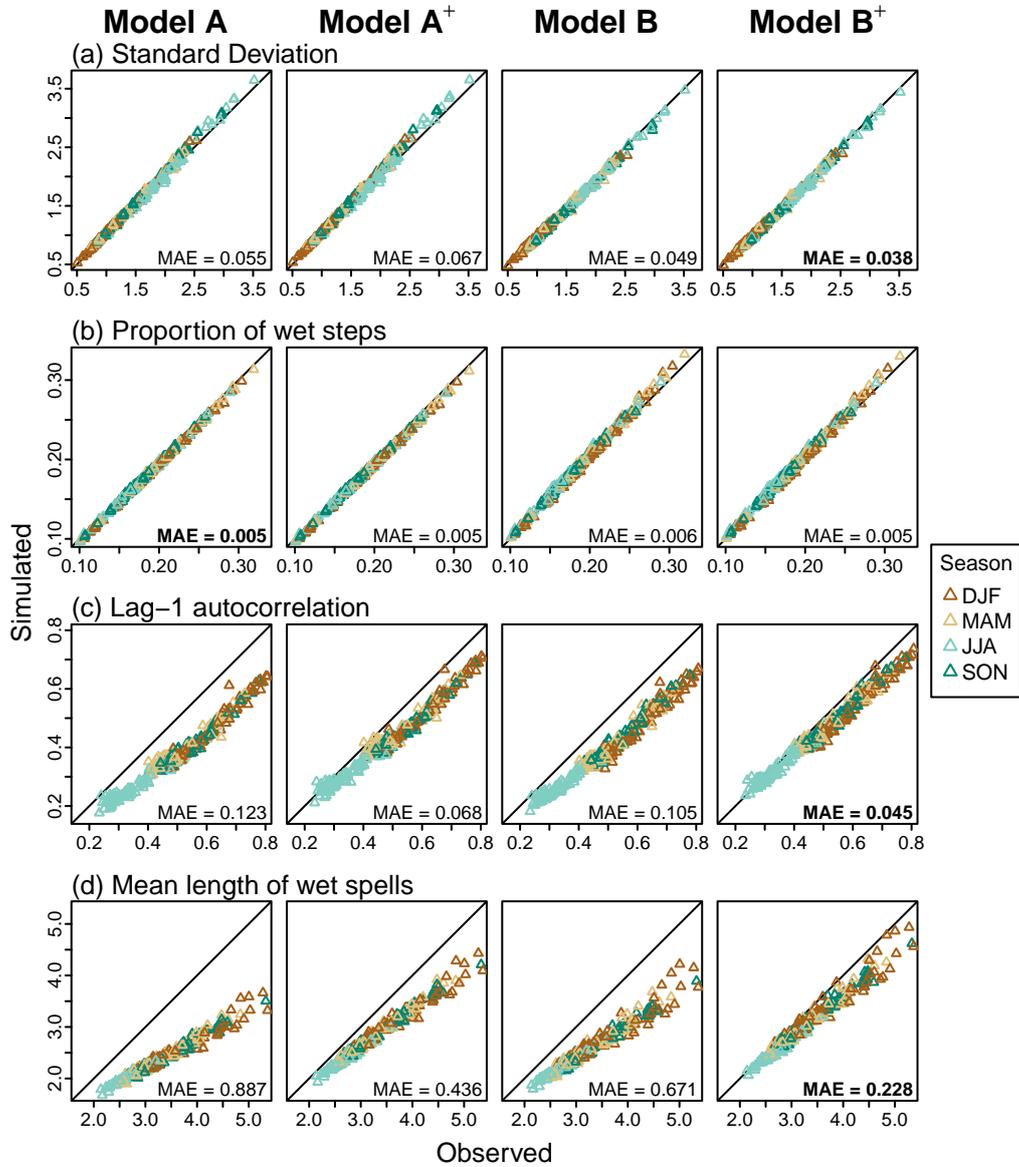
Figure S6. Observed versus simulated statistics for different metrics at 160-minute aggregation level. Same notation as in Fig. 5.
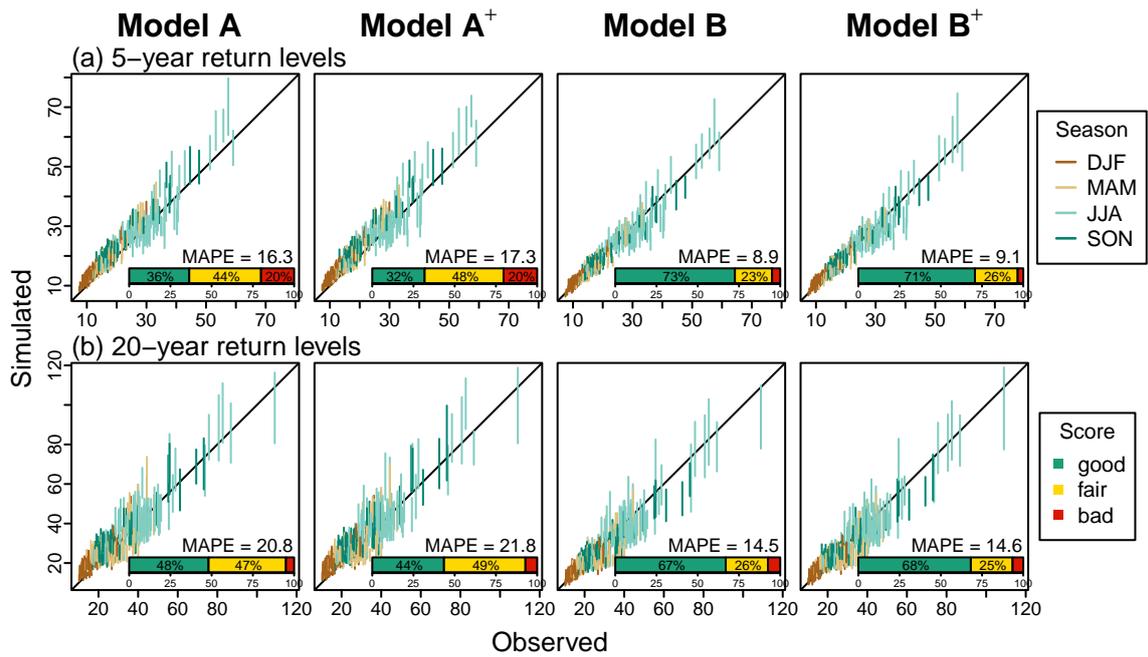
Figure S7. Observed versus simulated return levels at 160-minute temporal resolution for 5- and 20-year return periods, (a) and (b) respectively. See Fig. 6 for details.