

Supplementary Information to

Uncertainty and non-stationarity of empirical streamflow sensitivities

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This file contains:

- Supplementary Figures S1 to S6

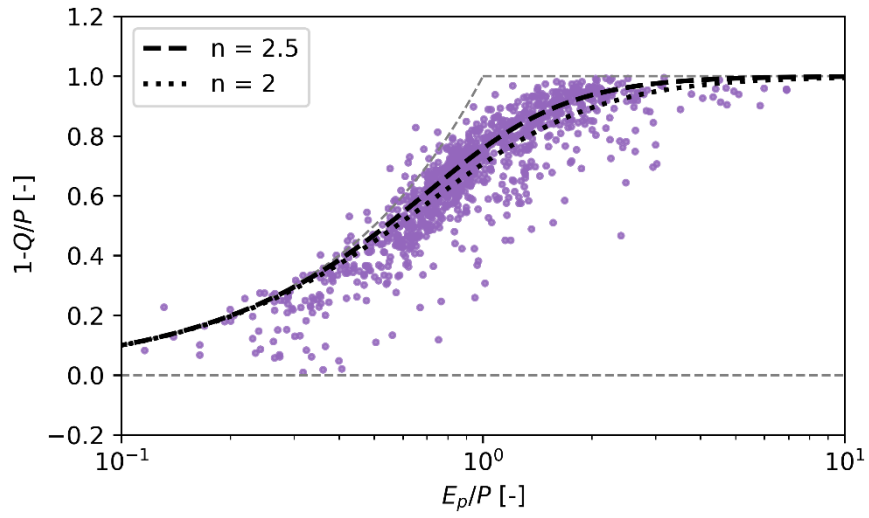
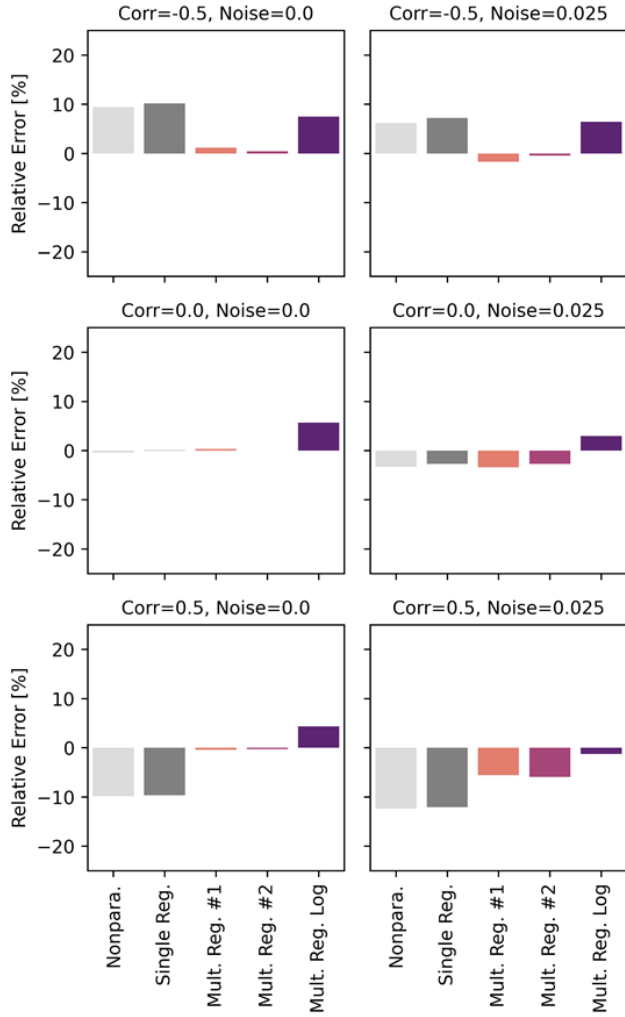


Figure S1: Budyko plot showing the Turc-Mezentsev model with two different values for the parameter n alongside the 1121 catchments analysed in the corresponding manuscript.

(a) Streamflow sensitivity to precipitation



(b) Streamflow sensitivity to potential evaporation

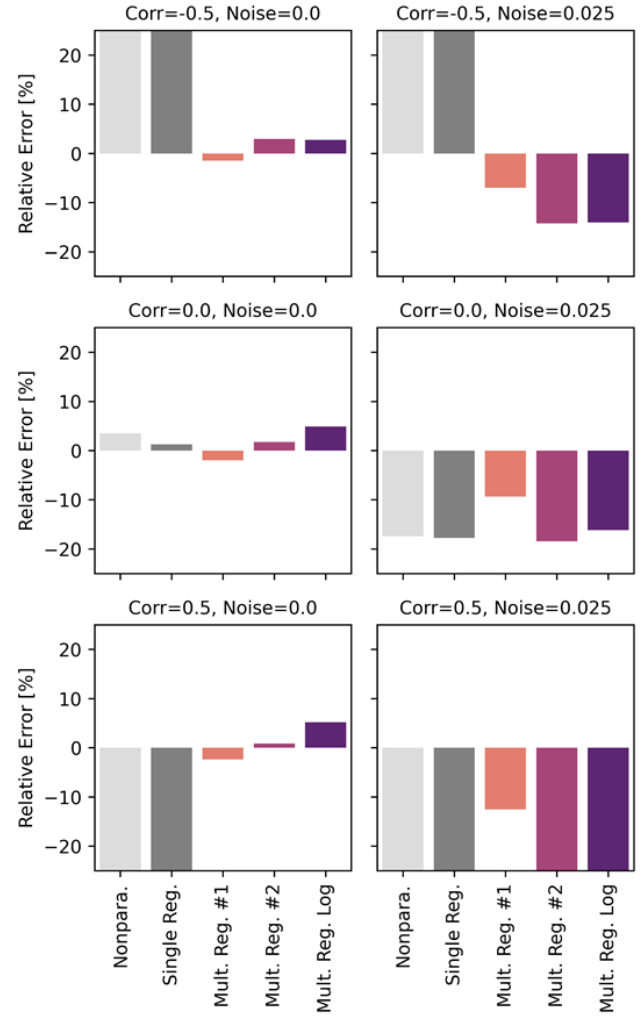


Figure S2: Average relative errors for the different estimation methods when applied to synthetic data that exhibit different degrees of correlation and noise. (a) Streamflow sensitivity to precipitation. (b) Streamflow sensitivity to potential evaporation. Note that the y-axes are capped for better visibility.

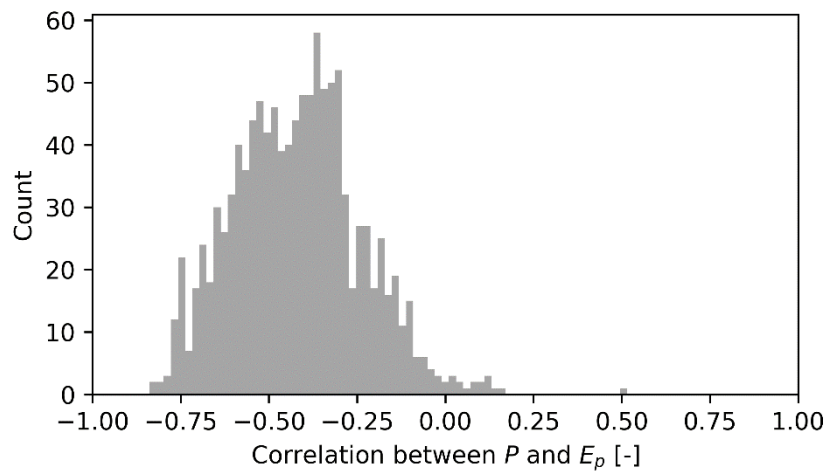


Figure S3: Pearson correlation ρ_p between precipitation and potential evaporation for the entire dataset (average = -0.42).

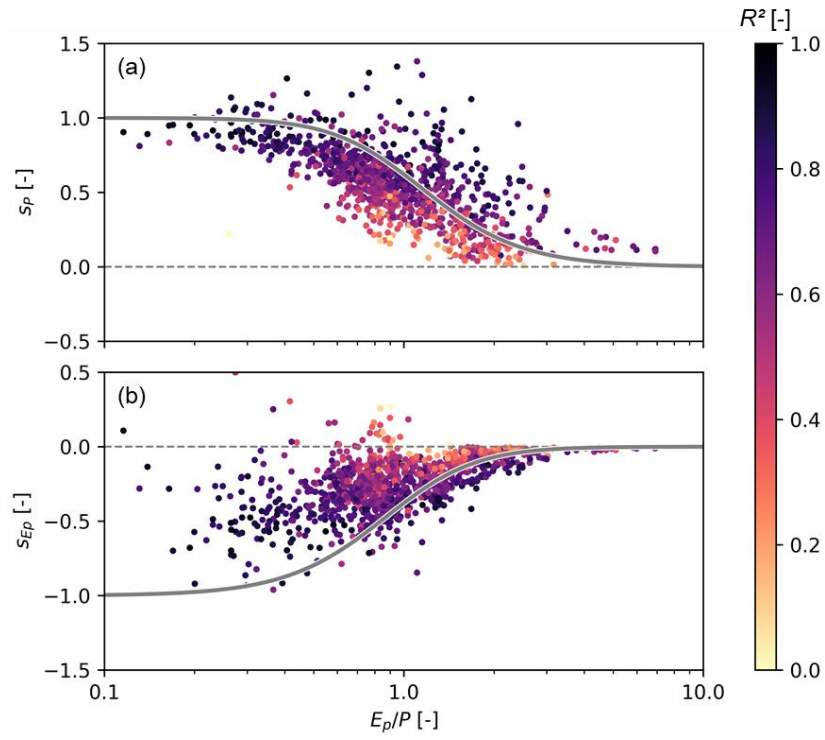


Figure S4: Streamflow sensitivity to precipitation (a) and potential evaporation (b) calculated using multiple regression method #1 with observations from 1121 catchments, coloured according to R^2 . Both panels show empirically calculated values (dots) and theoretical values based on the Turc-Mezentsev model (dashed lines). Note that the y-axes are capped for better visibility.

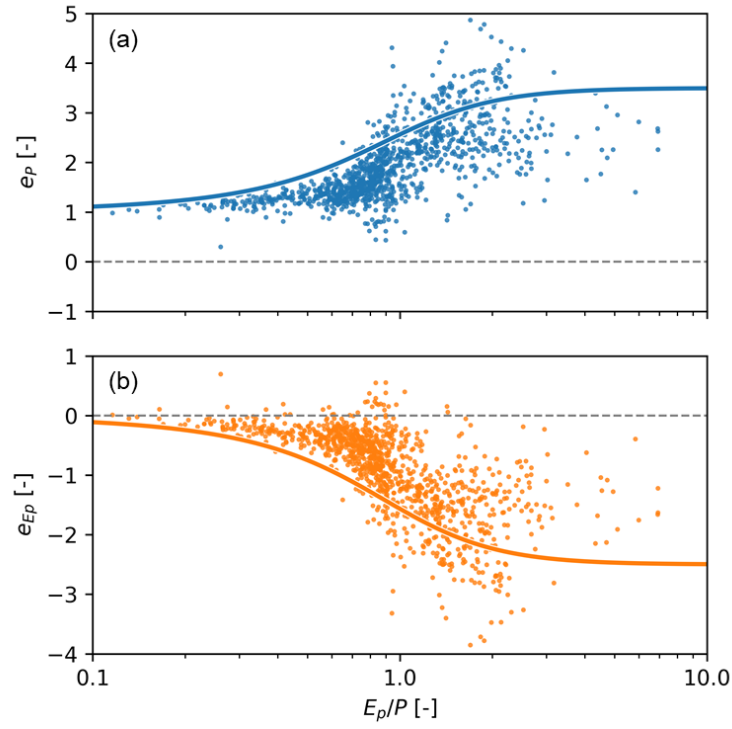


Figure S5: Streamflow elasticity to precipitation (a) and potential evaporation (b) calculated using multiple regression method #1 with observations from 1121 catchments. Both panels show empirically calculated values (dots) and theoretical values based on the Turc-Mezentsev model (dashed lines). Note that the y-axes are capped for better visibility.

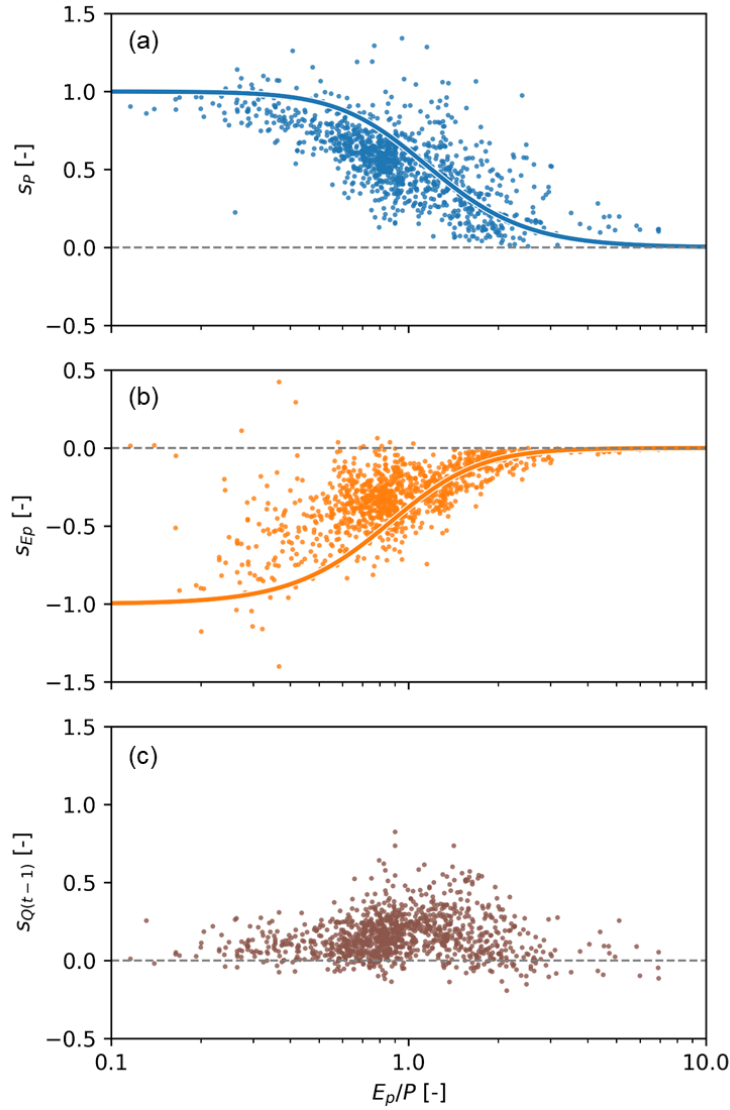


Figure S6: Streamflow sensitivity to precipitation s_P (a), potential evaporation s_{EP} (b), and (c) storage $s_{Q(t-1)}$ (using previous year's streamflow $Q(t-1)$ as a proxy), calculated using multiple regression method #1 with observations from 1121 catchments, but now with an additional storage predictor. Both panels show empirically calculated values (dots) and theoretical values based on the Turc-Mezentsev model (dashed lines). Note that the y-axes are capped for better visibility. The median R^2 for the storage model leads to a slight improvement from 0.65 to 0.69, suggesting that it can explain a larger proportion of the variation in the data, while the values for s_P and s_{EP} remain relatively stable.