Table 1. Model parameters calibrated using full data records

Month	λ $[h^{-1}]$	ι [mm]	α [-]	α/ν $[h^{-1}]$	κ [-]	ϕ [-]
Jan	0.013	0.223	0.780	4.407	0.769	0.026
Feb	0.012	0.203	0.982	4.120	1.001	0.033
Mar	0.015	0.216	0.975	6.209	0.572	0.027
Apr	0.012	0.312	0.712	5.723	0.408	0.020
May	0.015	0.521	0.642	6.856	0.388	0.038
Jun	0.013	1.183	0.464	7.619	0.132	0.022
Jul	0.018	1.440	0.612	6.480	0.106	0.032
Aug	0.012	1.834	0.437	4.907	0.076	0.021
Sep	0.013	1.141	0.480	5.496	0.161	0.030
Oct	0.011	0.303	1.060	5.859	0.508	0.022
Nov	0.042	2.028	1.993	0.477	1.798	20.00
Dec	0.012	0.248	0.725	4.559	0.686	0.023

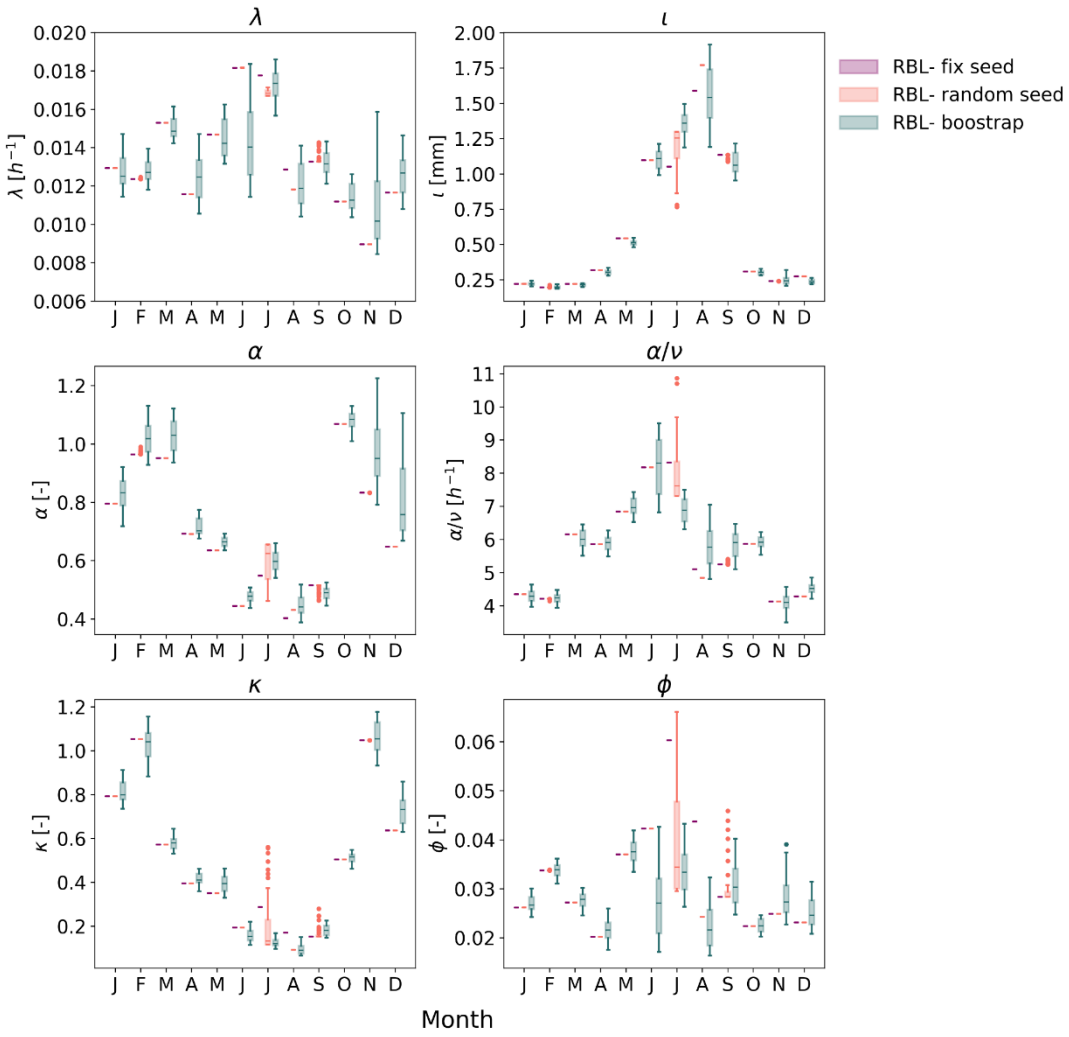

Figure 1. Variability of model parameters calibrated under three different scenarios: (1) fixed random seeds, (2) varying random seeds for initial guesses, and (3) the bootstrapping method.

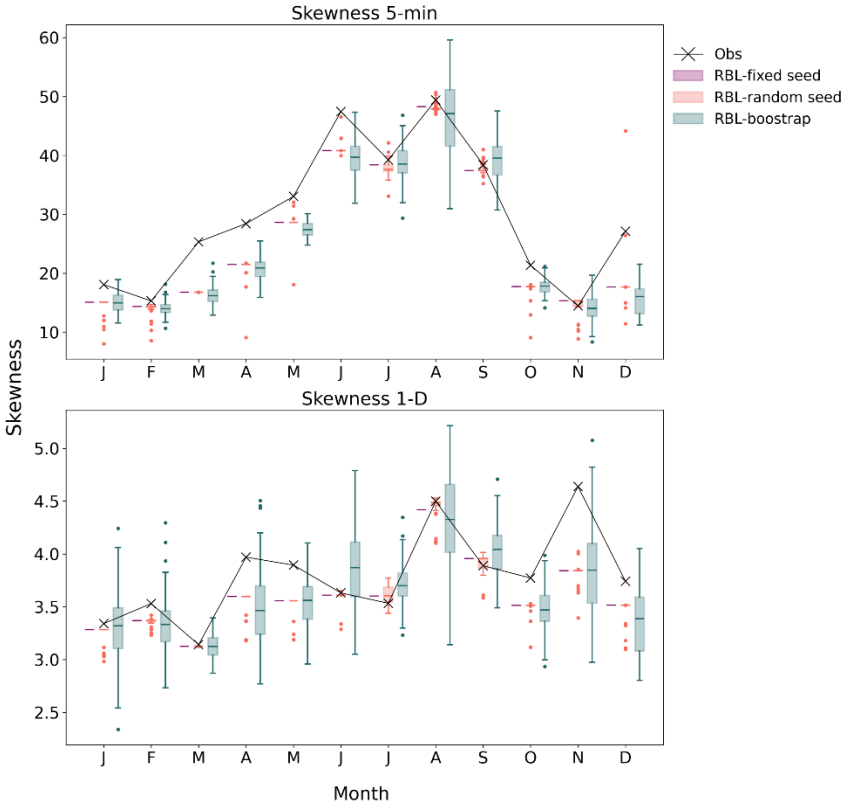

Figure 2. The corresponding 5-min and 1-day skewness estimates computed using the model parameters shown in Fig. 1.

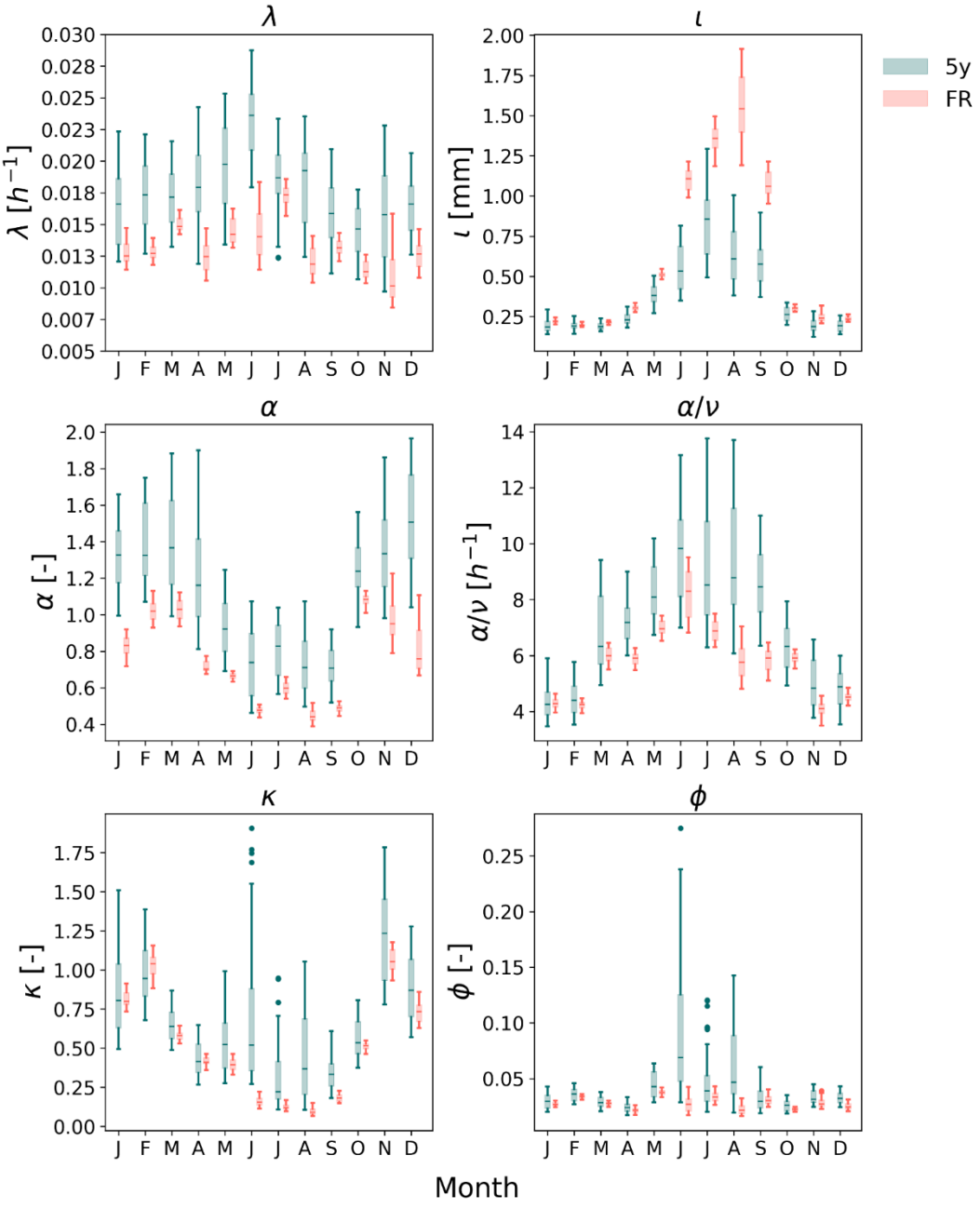

Figure 3. Boxplots of monthly model parameters (storm arrival rate (λ), cell intensity ratio ι), cell duration shape (α), cell duration scale (ν), cell arrival rate (κ), and storm duration rate (ϕ)) calibrated using different record lengths (light blue boxes: 5 years, green boxes: full records). Each member of 100 bootstrapping iterations is calculated, and their interquartile ranges (IQR) are presented.

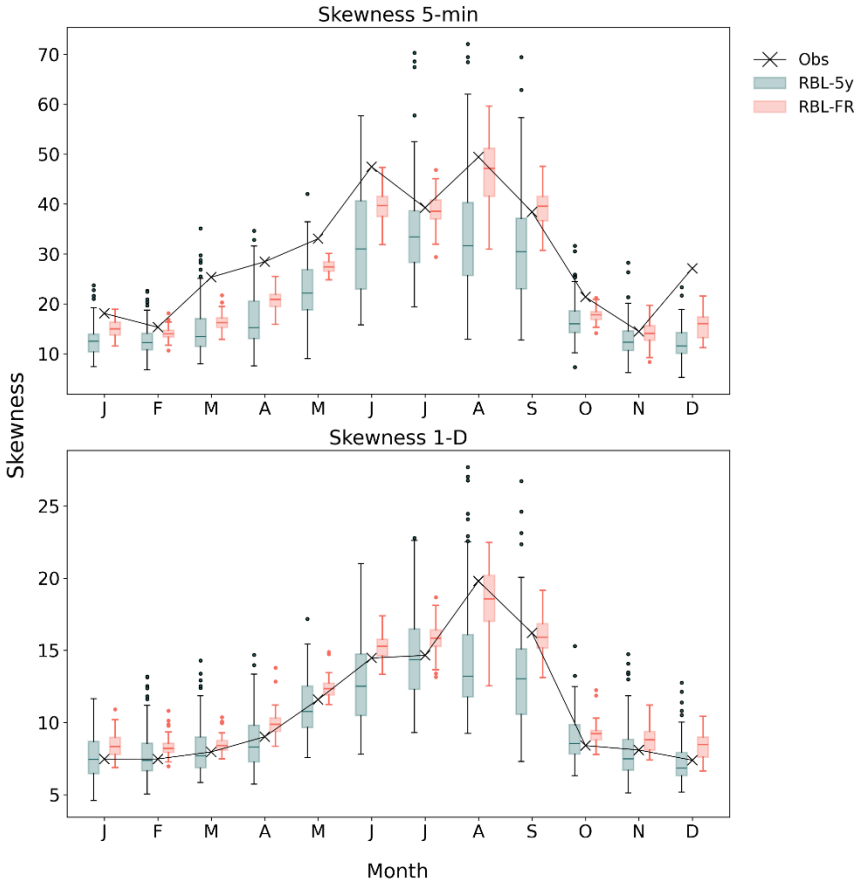

Figure 4. The corresponding 5-min and 1-day skewness estimates computed using the model parameters shown in Fig. 3.

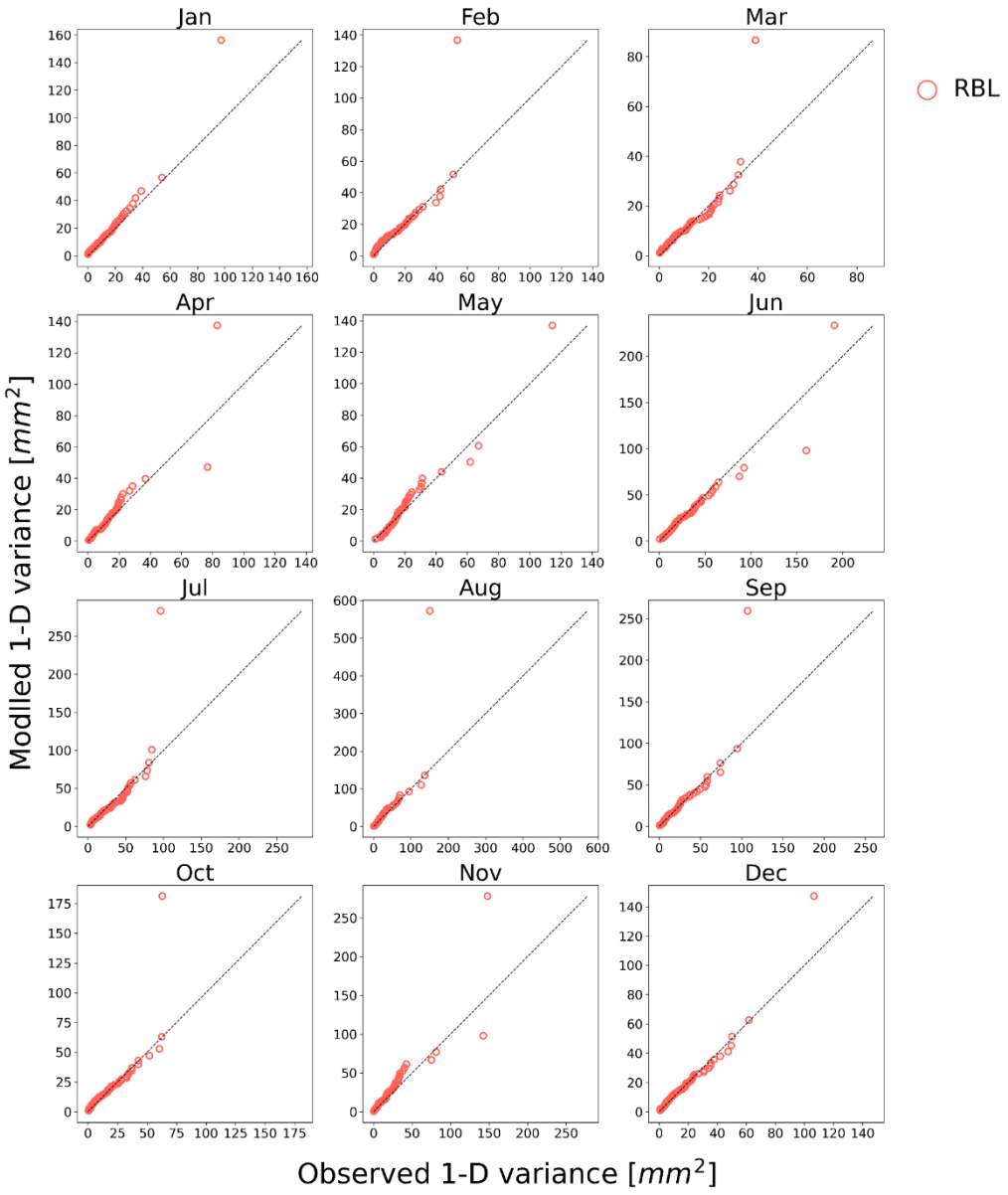

Figure 5. Relationship between observed monthly variances of mean daily rainfall and the corresponding quantiles of the monthly variance derived from 100 sample time series. Red dots indicate pairs of observed and sampled monthly variance over 69 years; the diagonal dashed line represents perfect match.

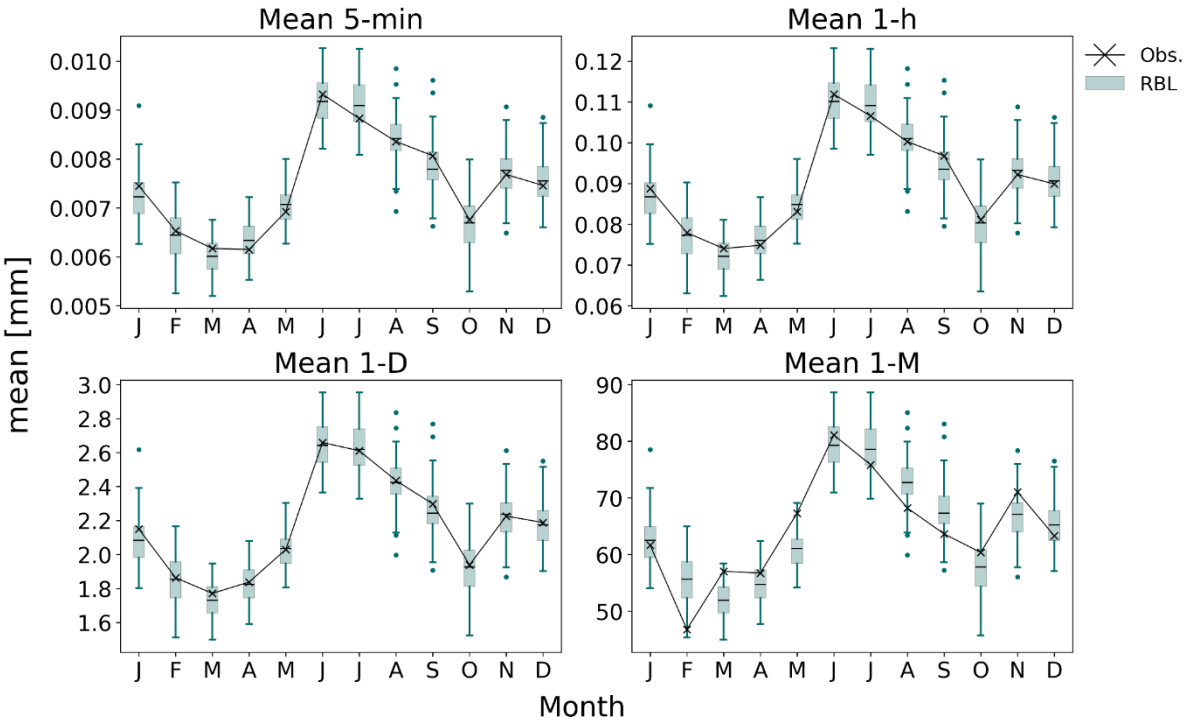

Figure 6. Mean by month at Bochum: comparison between RBL (boxes) and observation (crosses)

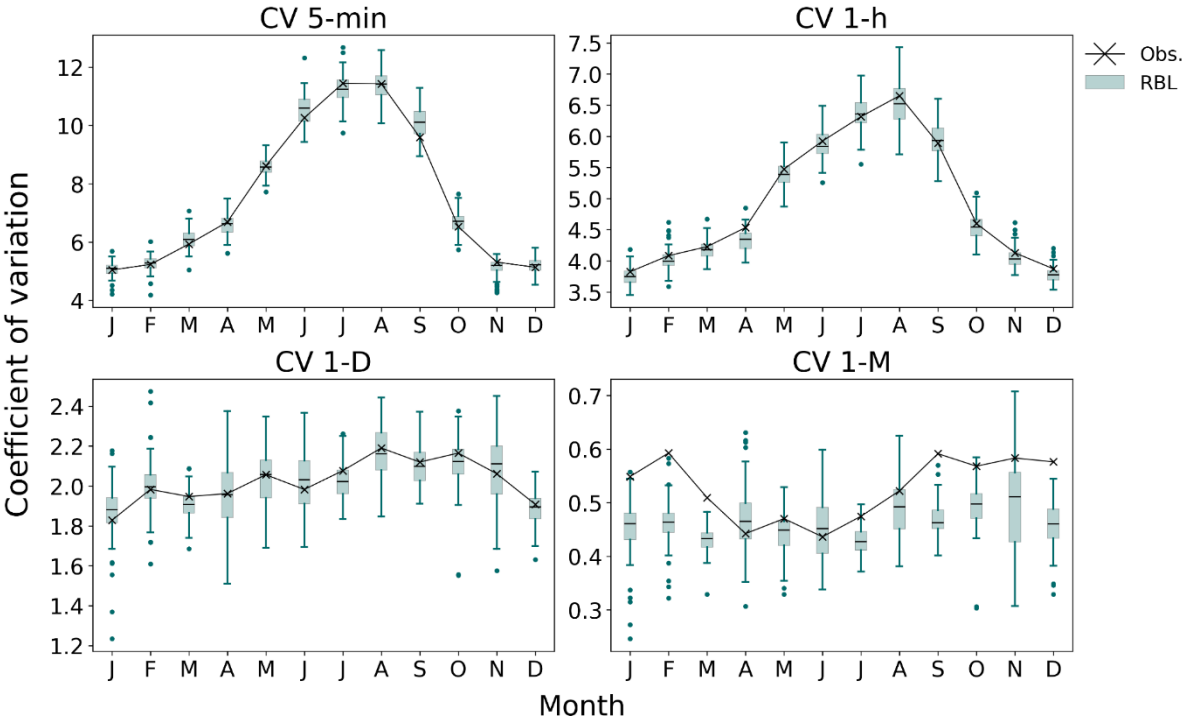

Figure 7. Coefficient of variation (CV) by month at Bochum: comparison between RBL (boxes) and observation (crosses)

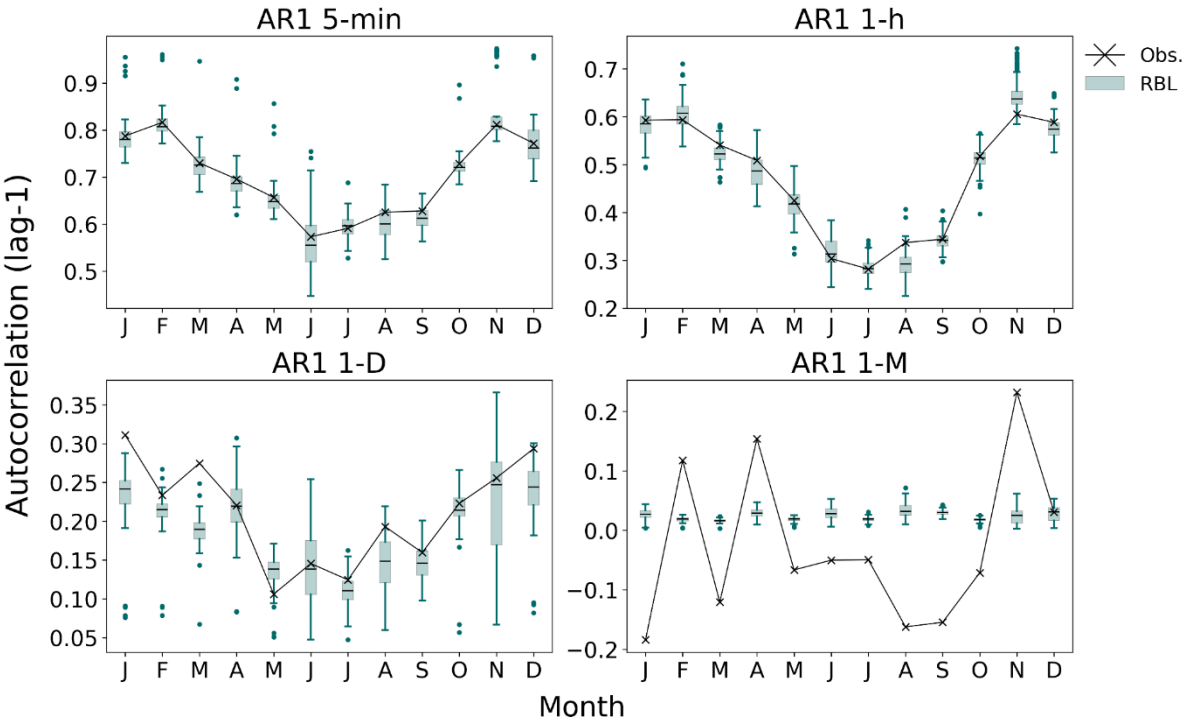

Figure 8. Lag-1 autocorrelation (AR1) by month at Bochum: comparison between RBL (boxes) and observation (crosses)

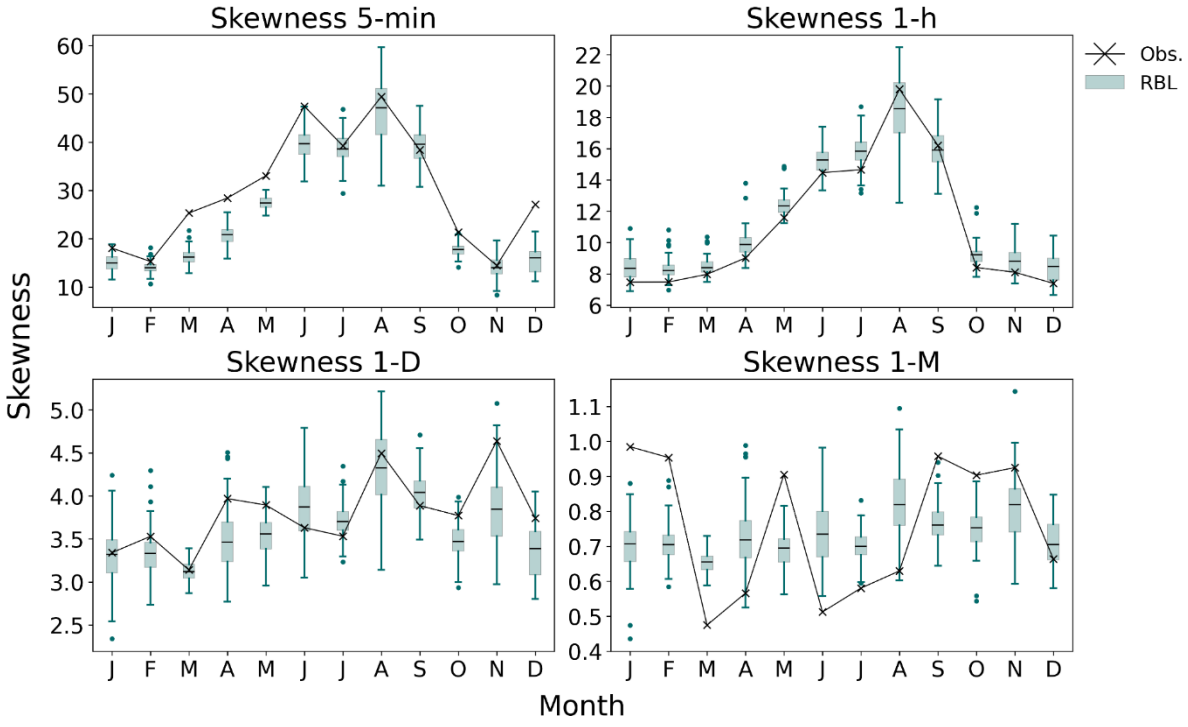

Figure 9. Skewness by month at Bochum: comparison between RBL (boxes) and observation (crosses)

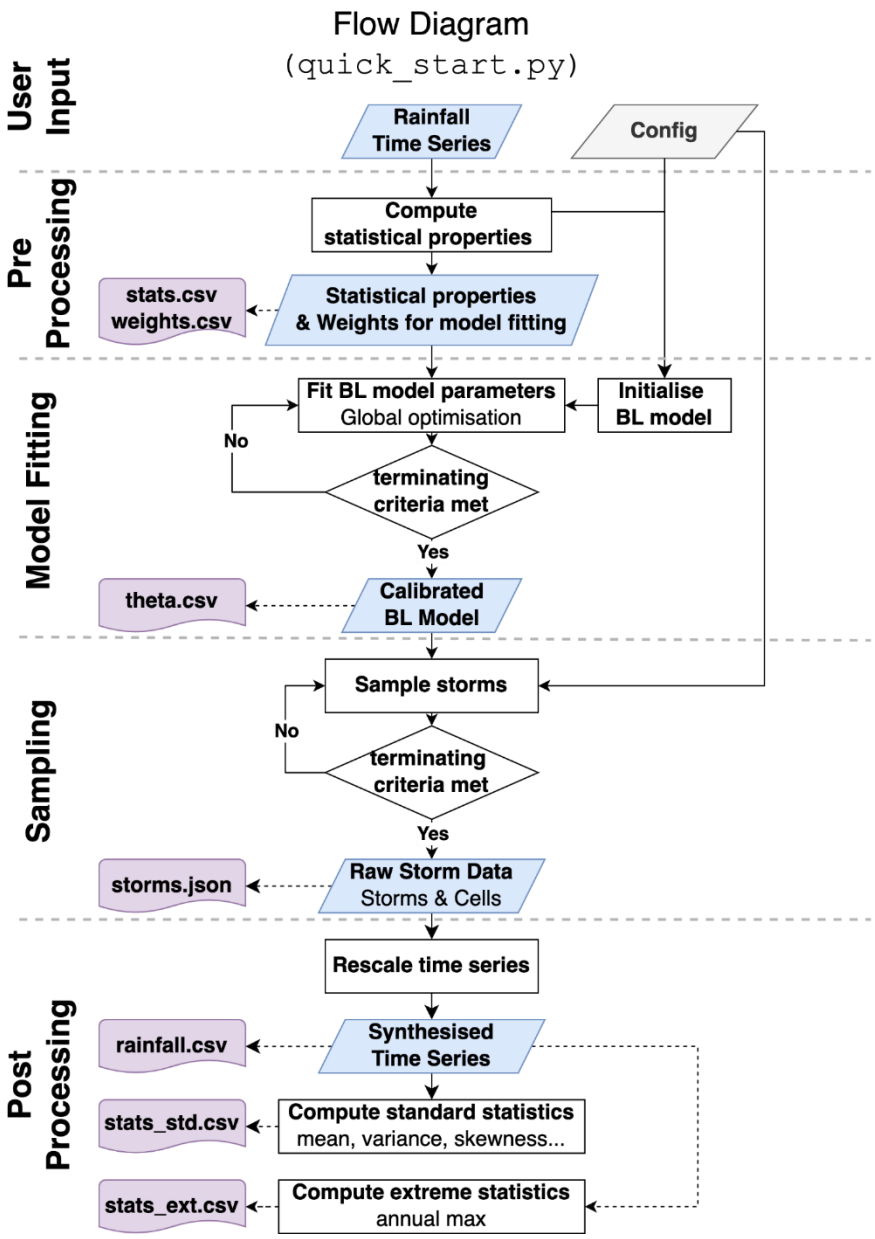

Figure 10. Workflow for generating synthetic rainfall time series using historical records with the pyBL package.