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Global-scale evaluation of precipitation datasets for hydrological modelling

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Table S1: List of additional datasets used to run WBMsed.

Dataset	Short name	Long name	Reference
Air temperature	ERA5	ECMWF (European Centre for Medium-Range Weather Forecasts) Reanalysis V5	Hersbach et al., (2020)
Relative Humidity	NCEP	NCEP-NCAR Reanalysis	Kistler et al., (2001)
Air Pressure	NCEP	NCEP-NCAR Reanalysis	Kistler et al., (2001)
Wind Speed	NCEP	NCEP-NCAR Reanalysis	Kistler et al., (2001)
Solar radiation	CRU-TS	Climatic Research Unit (CRU) time series	Harris et al., (2020)
Reservoir capacity	GRanD v1.3	global reservoir and dam database version 1.3	Lehner et al., (2011)
river network	HydroSTN30	HydroSHEDS	Lehner et al., (2008)

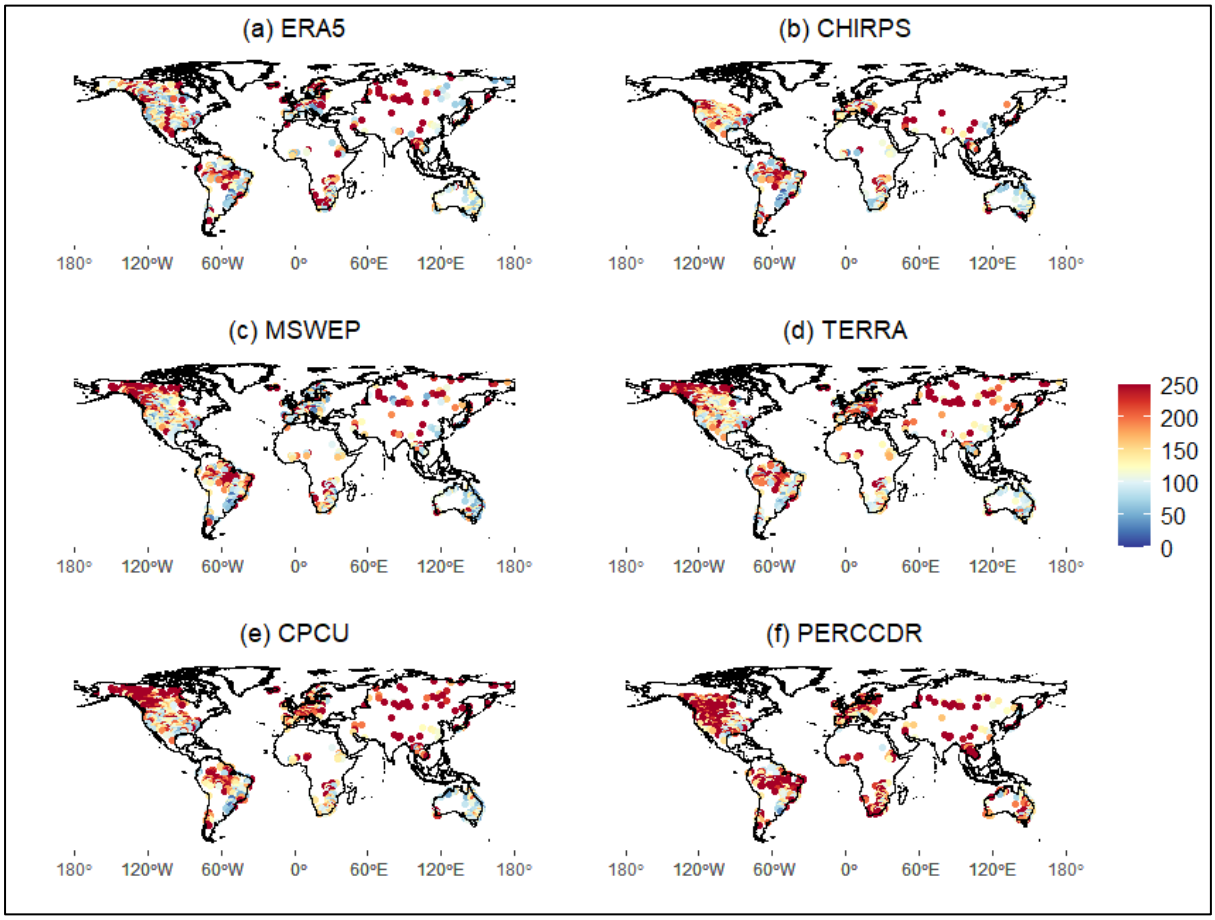

Figure S1: Normalised RMSE between observed and simulated annual discharge based on a) ERA5, b) CHIRPS, c) MSWEP, d) TERRA, e) CPCU, and f) PERCCDR.

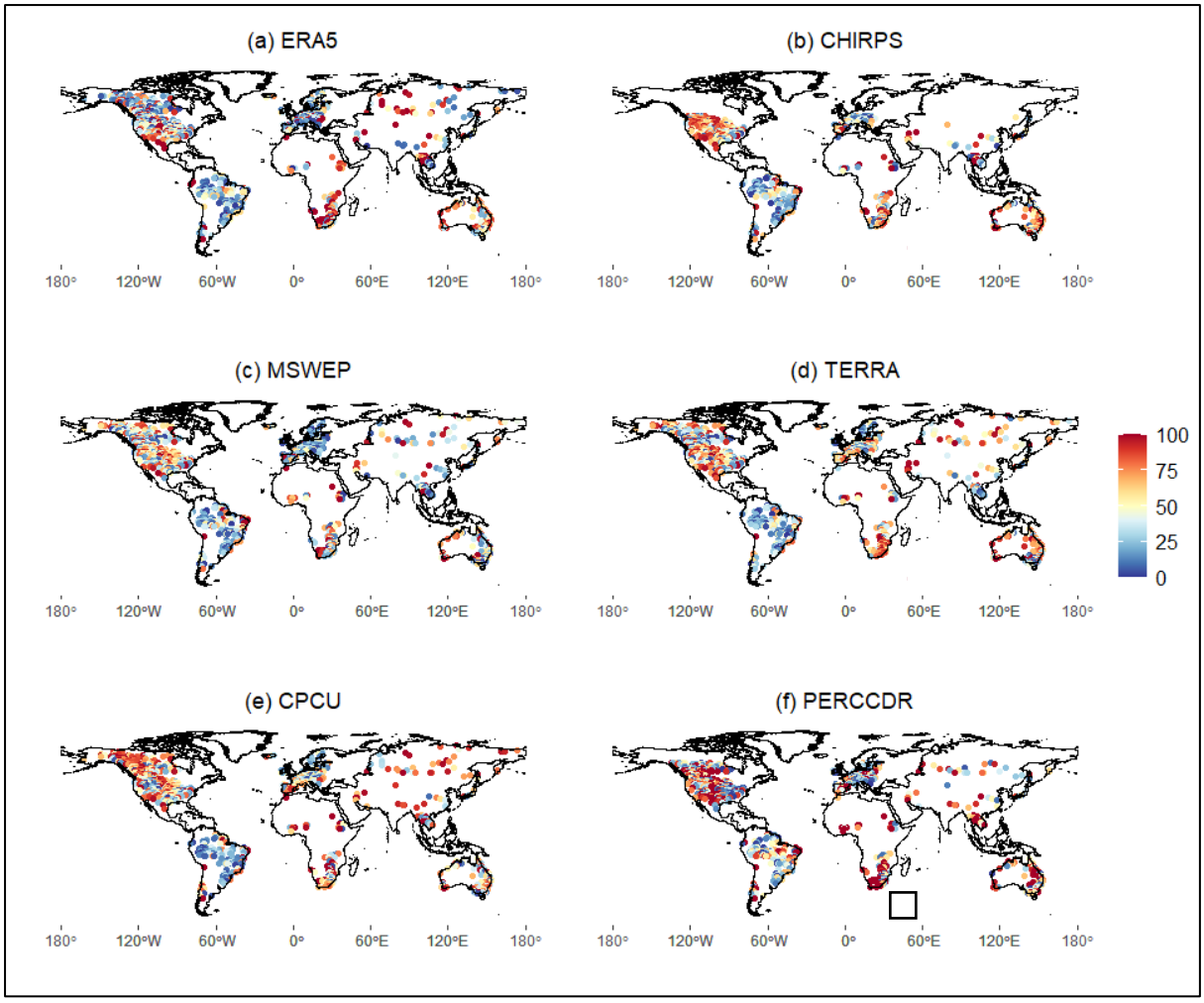

Figure S2: Pbias between observed and simulated annual discharge based on a) ERA5, b) CHIRPS, c) MSWEP, d) TERRA, e) CPCU, and f) PERCCDR.

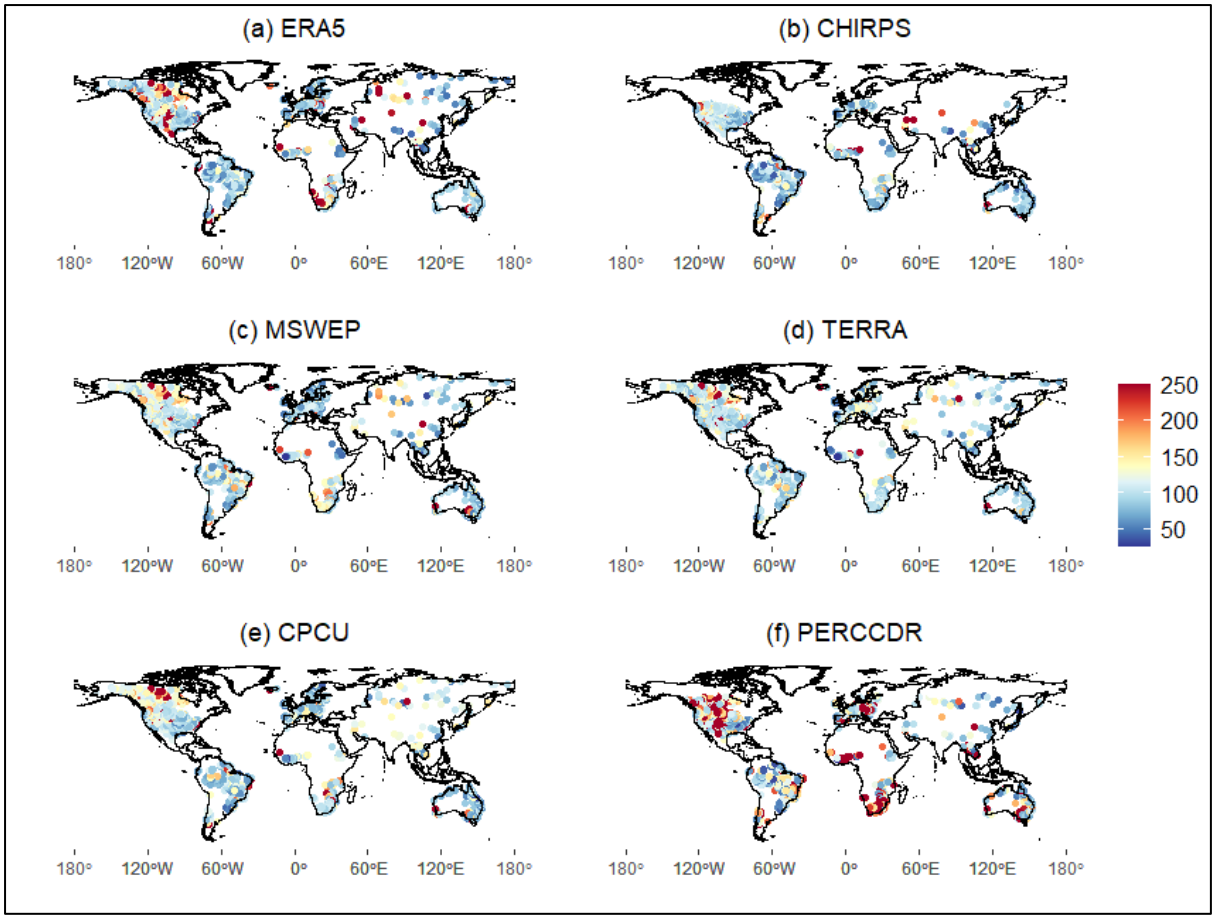

Figure S3: Normalised RMSE between observed and simulated monthly discharge based on a) ERA5, b) CHIRPS, c) MSWEP, d) TERRA, e) CPCU, and f) PERCCDR.

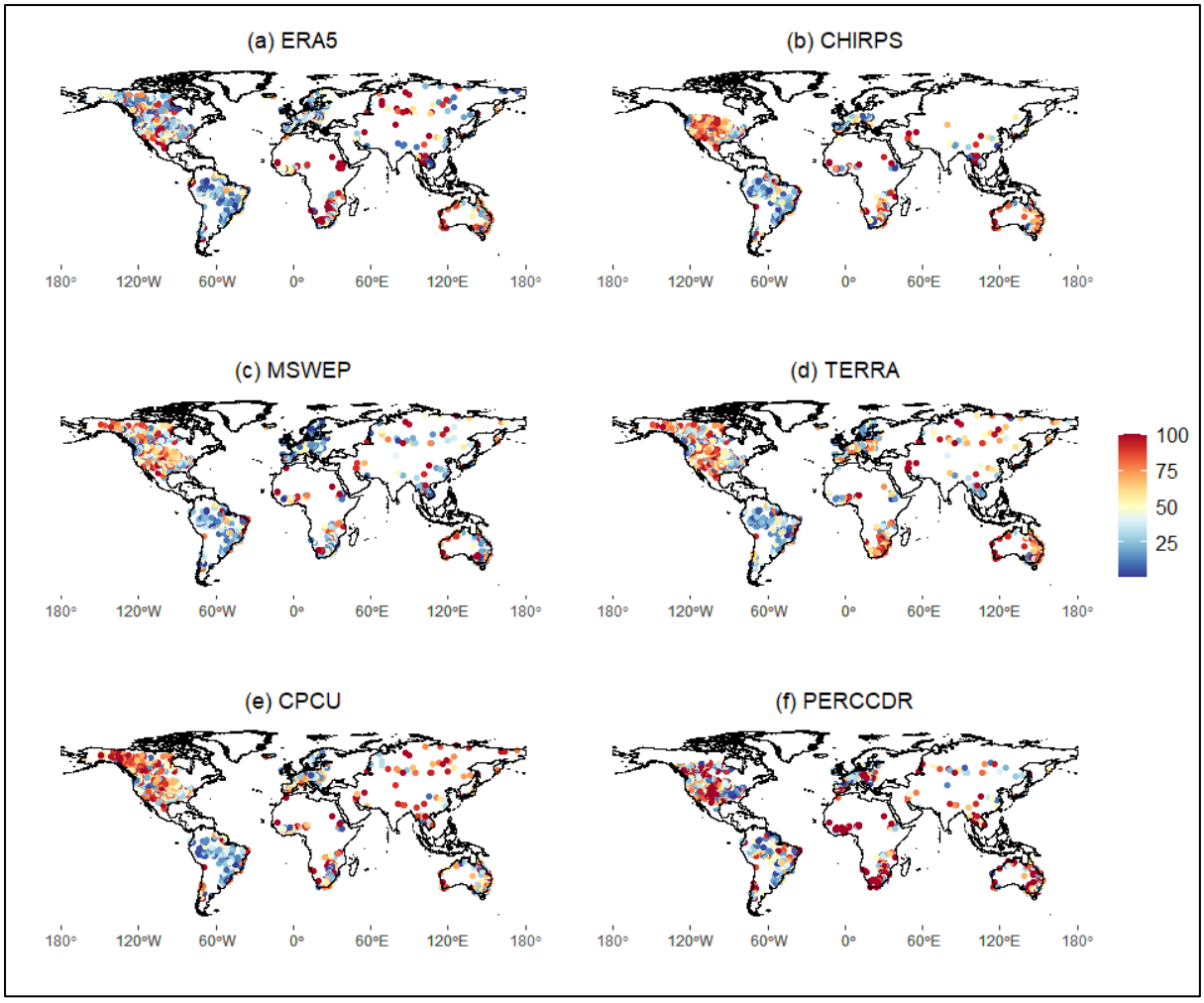

Figure S4: Pbias between observed and simulated monthly discharge based on a) ERA5, b) CHIRPS, c) MSWEP, d) TERRA, e) CPCU, and f) PERCCDR.

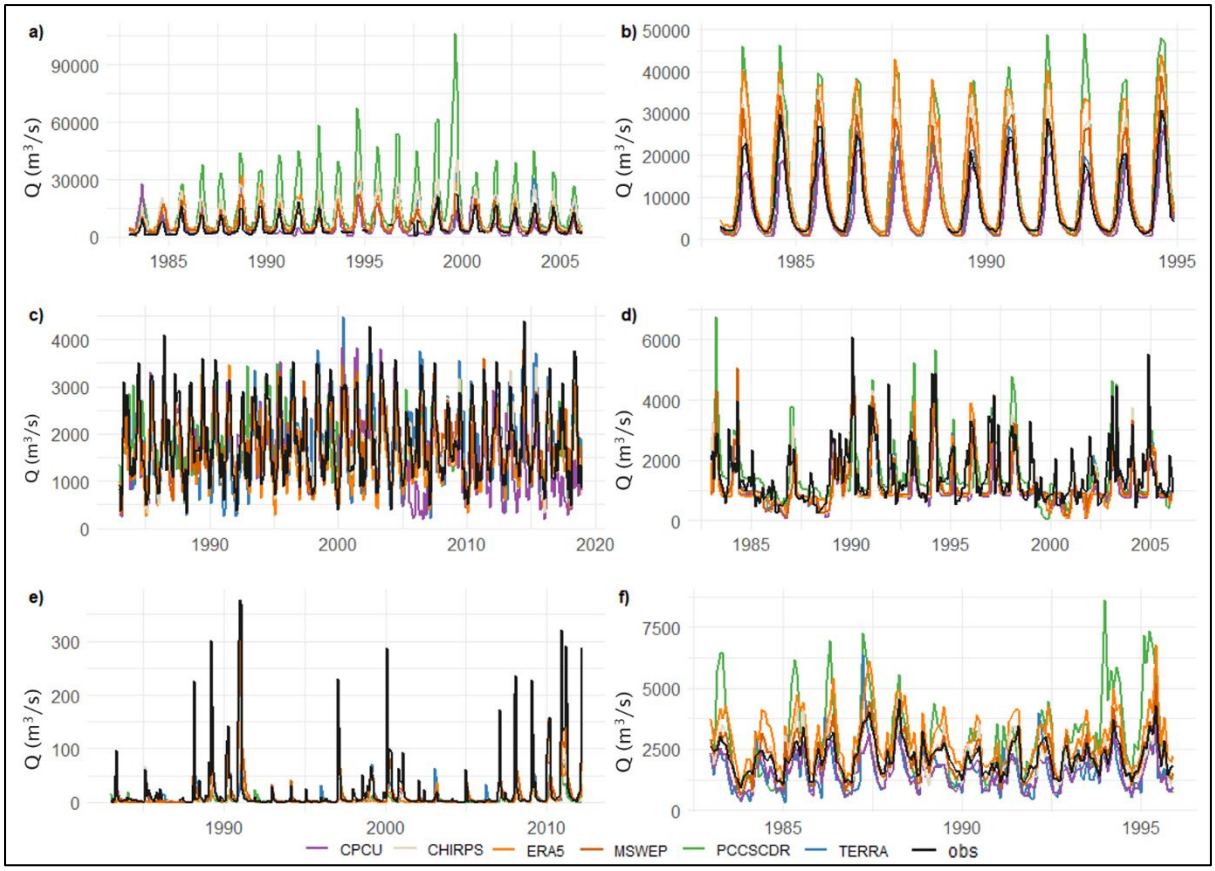

Figure S5: Time series of monthly observed (Obs) and modelled streamflow (Q; m3/s) based on MSWEP, ERA5, CHIRPS, CPCU, TERRA, and PERCCDR precipitation datasets for locations in river basins of a) Niger (Lokoja), b) Mekong (Khong-Chiam), c) Amazon (Missao-Icana), d) Mississippi (Savannah), e) North East Coast (Mirani-Weir), and f) Danube (Dunaalmas).

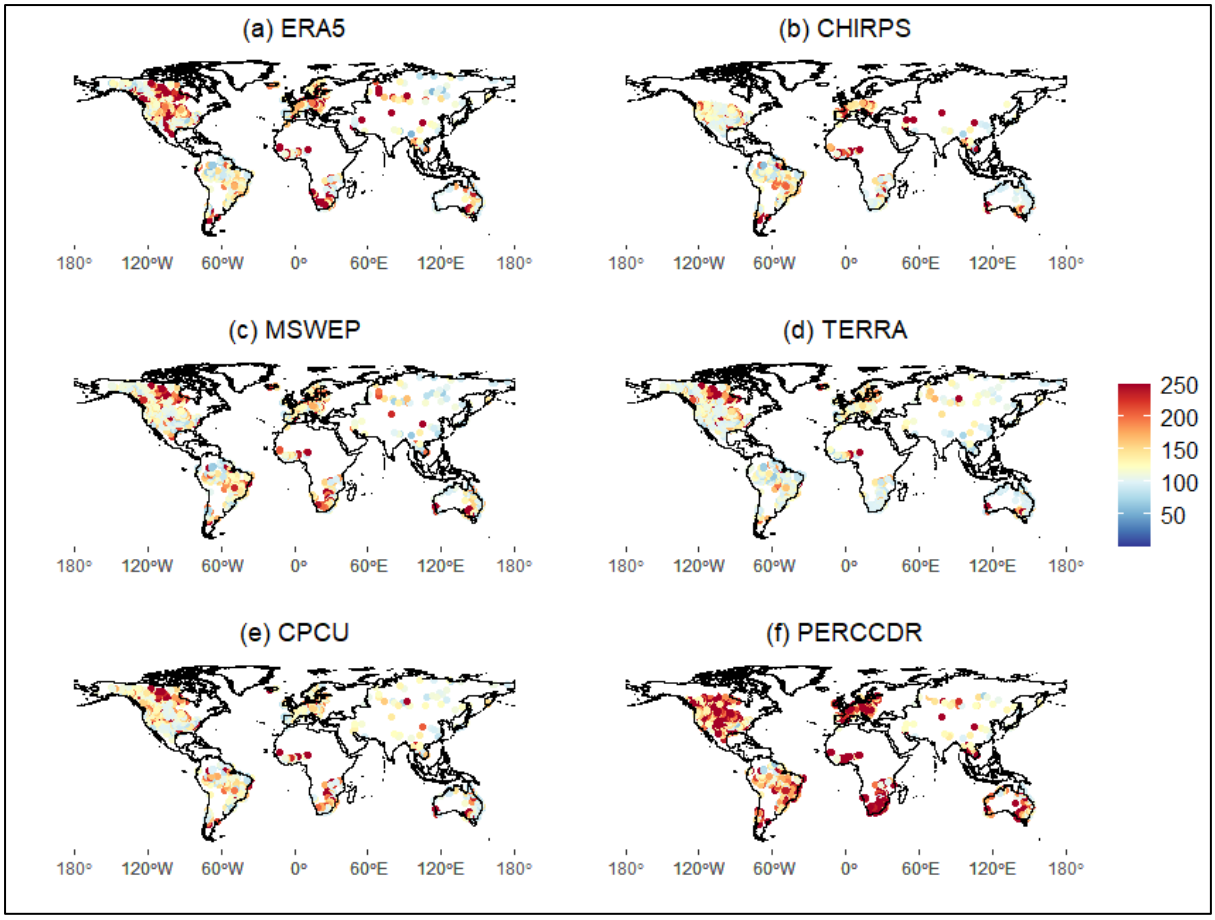

Figure S6:Normalised RMSE between observed and simulated daily discharge based on a) ERA5, b) CHIRPS, c) MSWEP, d) TERRA, e) CPCU, and f) PERCCDR.

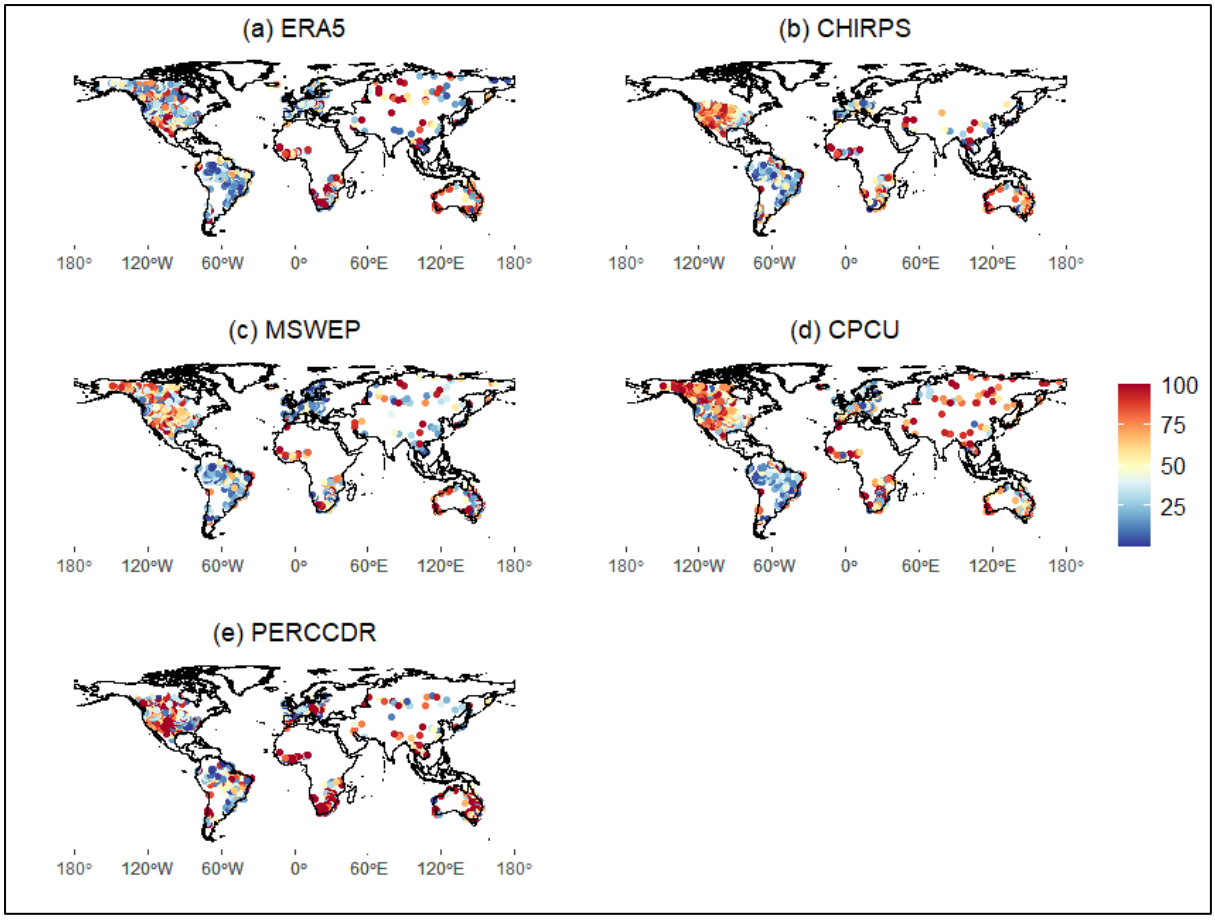

Figure S7: Pbias between observed and simulated daily discharge based on a) ERA5, b) CHIRPS, c) MSWEP, d) CPCU, and e) PERCCDR.

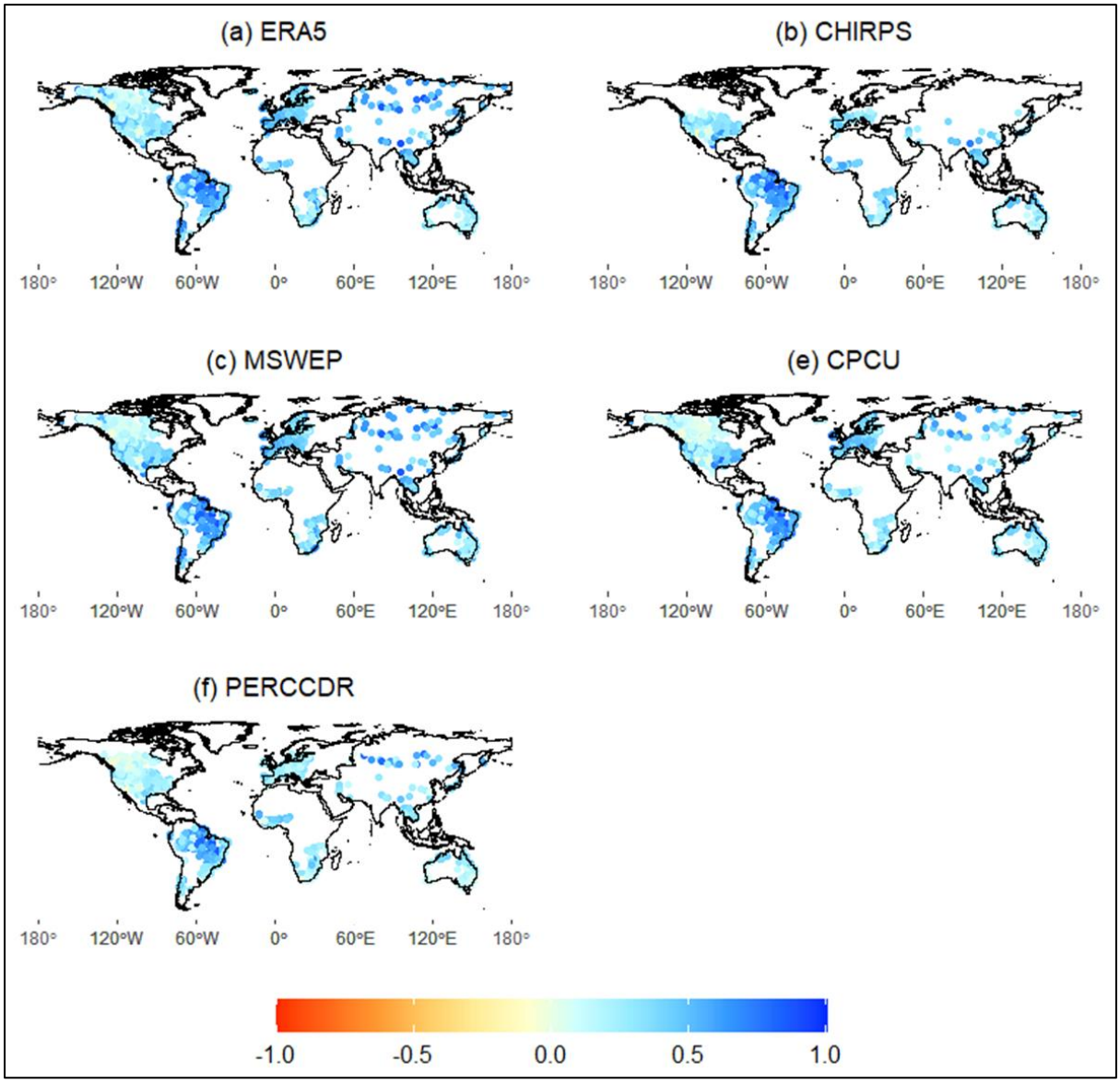

Figure S8: Correlation (CC) between observed and modelled daily extremes (Q90, low flow) using a) ERA5, b) CHIRPS, c) MSWEP, d) CPCU and e) PERCCDR precipitation datasets.

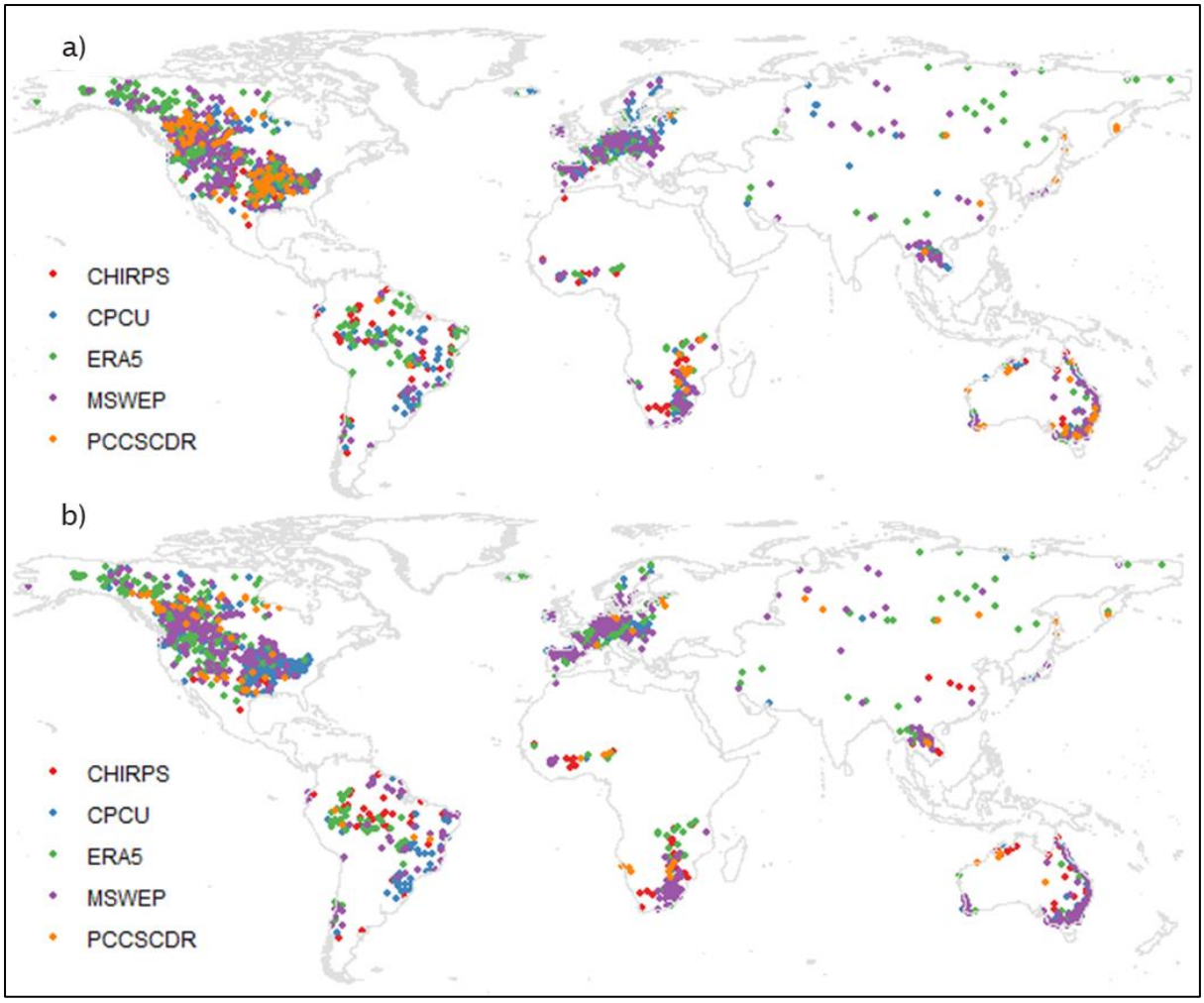

Figure S9: The best performing precipitation dataset (CHIRPS, CPCU, ERA5, MSWEP, and PERCCDR) at each of the observed discharge stations based on daily CC (a) and KGE (b).

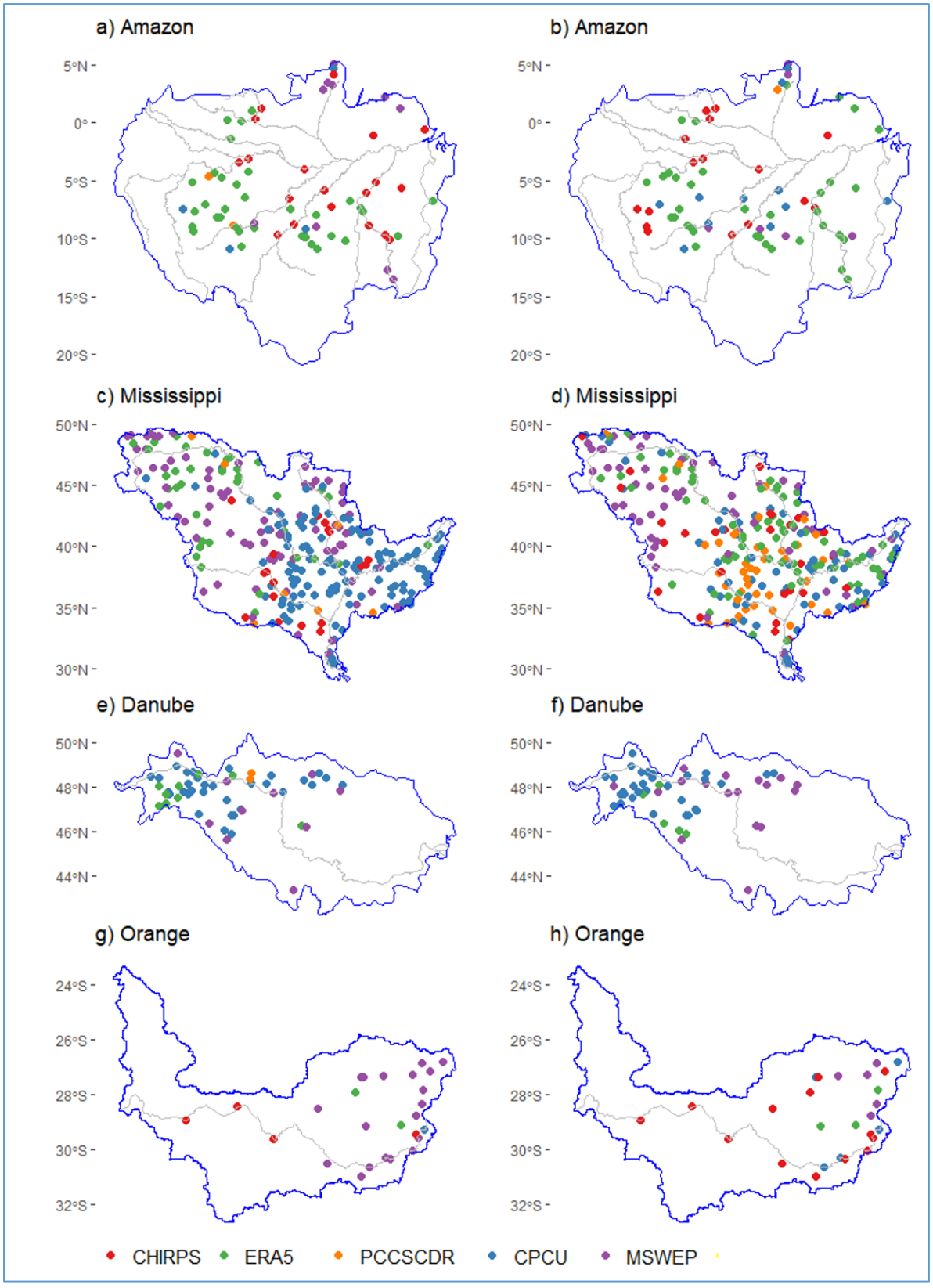

Figure S10: Performance of Precipitation Datasets (ERA5, CHIRPS, MSWEP, CPCU, and PERCCDR) at Discharge Stations in a) Amazon, c) Mississippi, e) Danube, and g) Orange River Basins based on their daily CC. The performance of the datasets based on daily KGE for the Amazon, Mississippi, Danube, and Orange River Basins is illustrated in figures b, d, f, and h, respectively.