

A comprehensive high resolution hydrometeorological forcing dataset for the Rhine river basin for hydrologic modelling experiments

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Accurate and spatially and temporally continuous hydrometeorological forcing data is a necessary prerequisite to perform meaningful hydrological modelling experiments. For operational use of these models, a subsequent requirement of this data is that it needs to be available in near real-time.

We present such a dataset for the Rhine basin in Europe as part of an effort to improve the modelling of hydrological extremes in that basin within the context of the IMPREX project (van den Hurk et al. 2016). The dataset consists of hourly estimates of precipitation, temperature, downward shortwave radiation flux and potential evaporation on a 1.2x1.2 km grid covering the Rhine basin [(5.00,12.33) lon. ,(46.20,52.08) lat.]) for the period 1996 through 2015.

Precipitation is derived using the genRE interpolation method based on ground measurements and the HYRAS climatological precipitation dataset (van Osnabrugge et al., 2017). Temperature is derived from interpolation of ground measurements with correction for height using the SRTM digital elevation model and the standard lapse rate. Downward shortwave radiation is resampled and merged from the EUMETSAT Surface Incoming Solar Radiation (SIS) (Mueller et al. 2009) and Downward Surface Shortwave Flux (DSSF) (Trigo et al. 2011) products from the Climate Monitoring Satellite Application Facility (CM-SAF) and the Land Surface Analysis Satellite Application Facility (LSA-SAF), respectively. Gaps in the satellite data are filled with the ERA5 Surface solar radiation downwards (ssrd) parameter from the 4d-var reanalysis. Potential Evaporation is estimated based on the temperature and downward shortwave radiation grids using the Makkink formula (de Bruin et al. 2016).

Collection and processing of the data was performed offline, but is entirely based on data that is available in near real-time. Different options are currently investigated to produce a version of this dataset that is maintained and updated in near real-time.

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