



Disaggregation of meteorological input data from daily to hourly resolution

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Meteorological input data in hourly resolution is a prerequisite for numerous hydrological applications, including hydrological modelling, precipitation runoff modelling and flood modelling in general.

Historical meteorological time series are mainly available in daily resolution. Furthermore, it is recommended to use daily or even longer temporal steps of raw projected data, which also illustrates the need of hourly projected data for climate impact assessment.

In order to be able to model these periods it is necessary to disaggregate daily values to hourly values.

We present an approach, which synchronously performs an hourly disaggregation for different meteorological measurants based on measured data. The model is applied for periods or stations where no hourly data is available. It is trained using gradient boosting and depends on the daily averages of meteorological parameters such as temperature, humidity, radiation, wind speed and precipitation. The model was tested for about 200 climate stations in Germany.

The cross validation shows very high quality measures such as root mean square error of temperature to be less than 1.2°C on average. In addition, the spatial consistency was ensured, hence the correlation of the measured hourly values of two stations is equal to the correlation of the disaggregated hourly values of the stations. This statement is valid for stations close to each other as well as for distant stations. A high correlation can be observed even for hourly precipitation values.