



## **A copula-based stochastic generator for coupled precipitation and evaporation time series**

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In hydrologic design, one can make use of stochastic rainfall time series as input to hydrological models in order to assess extreme statistics on e.g. discharge. However, precipitation is not the only important forcing variable, also evaporation is, requiring the need for evaporation time series together with precipitation time series as input to these rainfall-runoff models. Given the fact that precipitation and evaporation are correlated, one should thus provide an evaporation time series that is not in conflict with the stochastic rainfall time series.

In this presentation, a framework is developed that allows for generating coupled precipitation and evaporation time series based on vine copulas. This framework requires (1) the stochastic modelling of a precipitation time series, for which a Bartlett-Lewis model is used, (2) the stochastic modelling of a daily temperature model, for which a vine copula is built based on dependencies between daily temperature, the daily total precipitation (obtained from the Bartlett-Lewis modelled time series) and the temperature of previous day, and (3) a stochastic evaporation model, based on a vine copula that makes use of precipitation statistics (from the Bartlett-Lewis modelled time series) and daily temperature (based on the stochastic temperature model). The models are calibrated based on 10-minute precipitation, daily temperature and daily evaporation records from a 72-year period are available at Uccle (Belgium). Based on ensemble statistics, the models are evaluated and uncertainty assessments are made.