



A bivariate seasonal hidden Markov model for temperature and precipitation

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Anticipating renewable energy productions necessitates long time series of consistent evolution of different climate variables, such as temperature, wind, solar radiation and rainfall. As a first step, a bivariate seasonal generator of daily temperature and rainfall has been developed in collaboration with Paris-Sud University in the framework of a PhD thesis. Based on hidden Markov models, it is able to produce arbitrarily long daily temperature and rainfall simulations which reasonably well reproduce different features of observed time series at a single site, including seasonality, rainfall occurrence, daily distributions of rainfall, dry and rainy spells or heat and cold waves. The seasonality of the correlations between temperature and rainfall are well represented too. The principle of the model will be presented, together with applications in different locations in Europe experiencing different types of climate. The modelling framework can be adapted to the addition of other related variables such as wind and solar radiation, which will be done in the future