

Generating a set of temperature time series representative of recent past and near future climate and estimating extreme heat and cold wave frequency

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Temperature plays a relevant role in electricity demand and generation and in the current changing climate, planning and prospective studies require information on possible temperature evolution in the next decades, and more precisely on their distribution. This thus necessitates a large sample of plausible trajectories.

We will present a way of combining past observations and climate model simulations to generate a large number of temperature time series covering for example the period 1981-2040. It is based on the decomposition of the temperature signal between deterministic parts (smooth trends and seasonalities in the mean and the variance) and stochastic residuals. Once the observed signal is decomposed for a given long enough period, new temperature time series can be built by using conveniently bias adjusted climate simulation trends, observed seasonalities and generated stochastic residuals.

The approach will be first described and validated in a cross-validation setting with a special focus on extreme cold and heat waves. Then the methodology will be used to generate a large set of temperatures covering recent past and near future, which will be used to identify changes in the frequencies of heat or cold waves in the near future compared to recent past.