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Type: **Talk**

## **Interpretable stochastic weather generator, application to a crop model, and climate change analysis**

*Tuesday, October 29, 2024 4:00 PM (30 minutes)*

The challenges of climate change force industrials to carefully analyze the resilience of their assets to anticipate future weather conditions. In particular, the estimation of future extreme hydrometeorological events, like the frequency of long-lasting dry spells, is critical for hydropower/nuclear generation or agriculture. Stochastic Weather Generators (SWG) are essential tools to determine these future risks, as they can quickly sample climate statistics from models. In this work, the SWG described and validated with French historical data is based on a spatial Hidden Markov Model (HMM) optimized with the maximum likelihood estimator. It generates (correlated) multisite precipitation, with a special focus on the correct reproduction of the distribution of dry and wet spells. The hidden states are viewed as global weather regimes, e.g., dry all over France, rainy in the north, etc. The resulting model is fully interpretable; it can even approximately recover large-scale structures such as North Atlantic Oscillations. We will show two applications to a crop model and climate change scenarios.

This talk will be the occasion to describe the associated Julia package `StochasticWeatherGenerators.jl` and a few associated personal Julia anecdotes and questioning.

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