
Coding Stochastic Weather Generators: Challenges and Perspectives

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Abstract

This talk summarizes my experience developing and coding Stochastic Weather Generators (SWGs), with a focus on the practical challenges faced by practitioners who aim to use or implement their own models.

The goal is not to provide definitive answers to every open question, but rather to share lessons learned-particularly with Gaussian fields and Hidden Markov Models-to stimulate discussion within the community. Topics will include:

- Accessing and handling data (weather stations, simulation products),
- Model verification and validation,
- Fitting SWGs, including the use of automatic differentiation,
- Dealing with seasonality and non-stationarity,
- Computational performance and scalability,
- Reproducibility and transparency,
- Packaging and code reuse.

In a community largely centered around R, I will also introduce my Julia package, **StochasticWeatherGenerators.jl**, and highlight how the Julia ecosystem can address some of the difficulties commonly encountered.

Keywords: simulations, code, software, automatic differentiation

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