

Towards a better understanding of seasonal climate variability using causal discovery methods

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Résumé. The Earth's climate system is characterized by extremely complex dynamics originating from an enormous variety of intrinsically nonlinear physical processes that are acting and interacting at a vast range of temporal and spatial scales. While numerical models nowadays allow skillful weather forecasts for up to 10-14 days in advance, predicting upcoming conditions over lead times of months or even longer requires rather different approaches exploiting knowledge about processes evolving at such longer time scales. Recently, causal discovery has demonstrated to provide versatile tools for improving our understanding of so-called climate teleconnections, which manifest empirical relationships between characteristic spatio-temporal patterns separated by spatial and temporal scales far beyond classical weather regimes that are key for improved seasonal and even longer-term predictions. In my talk, I will discuss some recent advances in the development of such causal discovery methods along with selected successful applications to studying climate variability at seasonal scales in different regions of the Earth.

Summary

Reik Donner is a Professor for Data Science and Stochastic Modelling at the Department of Water, Environment, Construction and Safety, Magdeburg-Stendal University of Applied Sciences. Being trained as physicist and mathematician focusing on complex system theory, his main fields of research include nonlinear time series analysis, extreme events and complex networks, along with their application in climate as well as other fields of the Earth and environmental sciences

