Network Analyses for Space-Time High Frequency Wind Data

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Recently, network science has shown an important contribution to the analysis, modelling and visualization of complex time series. Numerous existing methods have been proposed for constructing networks. This work studies spatio-temporal wind data by using networks based on the Granger causality test. Furthermore, a visual comparison is carried out with several frequencies of data and different size of moving window.

The main attention is paid to the temporal evolution of connectivity intensity. The Hurst exponent is applied on the provided time series in order to explore if there is a long connectivity memory. The results explore the space time structure of wind data and can be applied to other environmental data.

The used dataset presents a challenging case study. It consists of high frequency (10 minutes) wind data from 120 measuring stations in Switzerland, for a time period of 2012-2013. The distribution of stations covers different geomorphological zones and elevation levels.
The results are compared with the Person correlation network as well.