# Spatio-Temporal Variography of Wind Speed in Complex Region

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Wind speed spatial prediction and temporal forecasting are an important issue in renewable energy and risk assessment. Due to its turbulent nature and extreme distributions, wind speed analysis in complex topographic regions is a challenging task. To gain insight from data and uncover real data patterns, an efficient exploratory spatio-temporal study is necessary.

The main objective of the present research is to provide a coherent and consistent exploratory spatio-temporal data analysis of wind speed in Switzerland, which has a complex orography.
The real dataset consists of ten years of wind speed time series measurements, at a frequency of 10 minutes, available at several hundreds of stations. After treatment of missing values, the raw data are explored with statistical methods and visualization tools, including analysis of local distributions, functional box plots, analysis of spatial and temporal trends, moving window multivariate correlations and others. Then, a comprehensive analysis of spatio-temporal correlations, using variographic tools, is carried out. Taking into account the quality and quantity of data, it is possible to perform space-time variography at different temporal resolutions and spatial scales using traditional and robust variography. An important attention is paid to the space-time separability of covariance functions.

The preliminary results demonstrate a rich picture of spatio-temporal correlations of wind speed in complex mountainous regions. This work reveals underlying structures, which allow to develop suitable predictive models.

References
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