

# Functional peaks-over-threshold analysis with an application to extreme European windstorms

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To model large complex datasets, it is natural to consider Gaussian models for their conceptual and computational convenience. However, these models can strongly underestimate the occurrence and the dependence of extreme events. The aim of the talk is, first, to illustrate why classical spatial statistics fails to capture the tail behaviour of rare events, and then to explain how extreme value theory provides a flexible framework to accurately model tails of distributions. We describe functional peaks-over-threshold analysis, which allows one to define complex extreme events as special types of exceedances, and then describe their limit distribution for increasingly high thresholds, namely the generalized  $r$ -Pareto process. We present a model based on log-Gaussian functions, which enables to use classical Gaussian covariance structures to model extremal dependence. We use these results to develop a stochastic weather generator for extreme windstorms over Europe.

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