Title:

Parametric and Nonparametric Analysis of Temporal Trend in Extreme Values with Applications to Wind Storm Losses and Temperature Data

Abstract:

A topic of major current interest in extreme-value analysis is the investigation of temporal trends. For example, the potential influence of `greenhouse' effects may result in severe storms becoming gradually more frequent, or in maximum temperatures gradually increasing, with time. One approach to evaluating these possibilities is to fit, to data, a parametric model for temporal parameter variation, as well as a model describing the marginal distribution of data at any given point in time. In this talk we discuss some parametric trend models and illustrate the methods by application to a dataset on windstorm losses in south of Sweden. We shall also discuss difficulties which might arise in formulating structural trend-models. Motivated by datasets on windstorm severity and maximum temperature, we suggest a nonparametric approach to estimating temporal trends when fitting parametric models to extreme values from a weakly-dependent time series.

We illustrate the method through applications to time series where the marginal distributions are approximately Pareto, generalised-Pareto, extreme-value or Gaussian. We introduce time-varying probability plots to assess goodness of fit, we discuss local-likelihood approaches to fitting the marginal model within a window, and we propose temporal cross-validation for selecting window width. In cases where both location and scale are estimated together, the Gaussian distribution is shown to have special features that permit it to play a universal role as a `nominal' model for the marginal distribution.