

Abstract:

We discuss the problem of modeling the joint distribution of duration (N), maximum (Y) and magnitude (X) of stochastic episodes (events). An event is defined as consecutive observations of a process above (or below) a threshold. Examples of events include growth (or decline) periods of a financial series or climatic or hydrologic episodes, e.g. flood, draught, heat wave, cold spell, etc. The distribution of the vector (N, X, Y) is of direct interest to water management, energy management companies, disaster management, health departments, investors, actuaries, as well as state and federal regulatory agencies. We present exponentially and heavy tailed models and a likelihood ratio test for deciding between them. We illustrate the modeling potential of these distributions using questions and data from climate, hydrology and finance.