Extreme Values Cluster Functionals:
limit theorems under weak dependence and some applications

José-Gregorio Gómez*.
with the collaboration of Paul Doukhan

Abstract

In light of the recent developments in massive data processing via *parallel processing*, it is convenient to consider the construction of statistics in function of data blocks. In the case of extremes (rare events), we have very little data that is relevant to our estimations, but instead they are hidden among a large mass of "common data". Thus comes the natural idea of considering clustering of extremes, which here consists of obtaining the smaller sub-block of extreme values on each block, while conveniently suppressing "common" data in each block, generally assigning them a null value. Such null values may be mathematically inoffensive, yet computationally they could be an obstacle when trying to obtain quick results. These and many other reasons encourage the study of extremes cluster functionals.

This talk aims to show the small contributions to the asymptotic behaviour of extremes cluster functionals. More particularly, an extension of the β-mixing condition (dependence condition) of Drees & Rootzén [2010]'s central limit theorem for the empirical processes of extremes cluster functionals, since this family of β-mixing processes is quite restrictive, as has been shown by Andrews [1984]. We expand this result to a more general dependent processes family, known as weakly dependent processes in the sense of Doukhan & Louhichi [1999] and Dedecker & Prieur [2004]. We show a few examples including the extremogram introduced by Davis and Mikosch [2009] and the extension of the results of Drees [2011] for the extremal index.

Keywords and phrases: Extremes, clustering of extremes, cluster functional, Extremogram, extremal index, central limit theorem, weak dependence.

*Département de Mathématiques, Université de Cergy - Pontoise. 95000 Cergy - Pontoise, France. E-mail address: jose.gomez@u-cergy.fr.