ISDC
DATA CENTRE FOR ASTROPHYSICS

UNIVERSITÉ DE GENÈVE
FACULTÉ DES SCIENCES
Département d'astronomie

ASTROPHYSICS SEMINAR

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Pattern recognition for climate extremes

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Abstract. The huge impact of catastrophic events like windstorms, heavy rainfall or heatwaves on economy and human life and their random nature makes their investigation one of the hottest topic of statistics. What sea level will be likely to be exceeded only once during the next thousand years at a specified dyke on the shores of the Netherlands? How often would a windstorm of the strength of Lothar sweep over a particular industrial site or large city? How often can we expect long heatwaves similar to that of the summer of 2003?

There are now many statistical models that describe various aspects of such extreme events: their size distribution, their spatial distribution, their tendency to arrive in groups. However, there is at present no method that can estimate both the sizes of the extremes in simultaneous time series and their clustering, and remains at the same time flexible enough to be generally applied. A model, called the *multivariate maxima of moving maxima* (M4) process has the potential to allow such an estimation procedure. This process models the neighbourhoods of extreme events by classifying them into types. Risk estimation and prediction can be built on the estimated frequency and profile of these types. There are many difficulties in fitting the model: we don't know exactly the onset and the end of the extremal clusters, the clear profiles of the theoretical model are blurred by many effects in the observations, and the type of an observed extreme cluster is unknown. We propose solutions to these problems, sketch the estimation procedure, and discuss the present problems and the future development of the model.
This work is joint with A. C. Davison.

Additional Information

The seminars are given in the ISDC "Pavillon" building
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