LONDON MATHEMATICAL SOCIETY
EST. 1865

Mini-Workshop on Extreme Value Theory [1]

Recent Challenges and Spatial Applications

When?
6th February 2018 in the afternoon.

Where?
School of Mathematics
Cardiff University
Senghennydd Road
CF24 4AG Cardiff (UK)

All talks take place in room E/2.20.
If you arrive before 13:15, please also go to room E/2.20.

Lunch takes place at Aberdare Hall (Corbett Road CF10 3UP),
which is a 10 minute walk away from the workshop venue.
Participants joining lunch will leave the School at 13:15 starting from room E/2.20.

Schedule

13:30-14:15	Lunch	Aberdare Hall
14:30-15:25	Jonathan Tawn *Modelling Spatial Extreme Events*	Room E/2.20
15:25-15:50	Coffee/Tea break	UCAS Room M/1.04
15:50-16:45	Jennifer Wadsworth *Multivariate GPDs and other random scale constructions*	Room E/2.20
16:45-16:55	Short break	Room E/2.20
16:55-17:35	Kirstin Strokorb *Simulation of Brown-Resnick processes*	Room E/2.20

The meeting will be followed by a dinner at 19:30 (venue to be confirmed).
To reserve a place at the dinner, please also email the organiser (see below).

Registration
Please send an email to the local organiser Kirstin Strokorb until 31st January 2018:
`StrokorbK@cardiff.ac.uk` (Registration fee: £10 payable in cash upon arrival)

Please provide the following information:

- *Your name and workplace (department/institution or equivalent).*
- *Are you joining lunch?*
- *Are you joining the dinner? (approx. £30)*
- *Do you have any special requirements (such as vegetarian food or food allergies)?*

[1]The meeting is supported by an LMS Celebrating New Appointment grant.

Abstracts

Modelling Spatial Extreme Events

Jonathan Tawn, Lancaster University

When assessing the risk posed by environmental processes it is necessary to consider not only the extreme values of the process at separate sites but also the spatial extent of the extreme values in the same event. This spatial information is vital for assessing losses for the insurance industry from flooding or for determining the risk of heatwaves. Clearly events that have a more localized spatial extent to the extreme values will tend to have less severe impacts; so efficient estimation of the spatial behavior of the process is essential for risk assessment.

Extreme value theory provides a very flexible class of asymptotically justified probability distributions to describe the behaviour of the extreme values. In the univariate case the well-established class of distributions fully described by a 3 parameter class of models. This parsimony and flexibly provides a strong basis for modelling. In multivariate and spatial extremes the dependence structure also has critical structure imposed on it by focusing on extreme events. The nature of the structure imposed though depends on the form of the asymptotic argument used and in no case is it fully parameterized.

For spatial modelling of extreme values one asymptotic approach has led to the class of max-stable processes being widely used. A major weakness of these max-stable models is that the spatial profile of events is independent of their peak magnitude. However, for many processes (such as all Gaussian processes) the extreme events becoming increasingly localized as the magnitude of the events become more extreme. In this talk I will introduce spatial extreme value processes that allow for both these of types of spatial extreme process. The properties of these models will be illustrated with applications to the risk assessment for river-flows, heatwaves and offshore waves.

Multivariate GPDs and other random scale constructions

Jennifer Wadsworth, Lancaster University

Multivariate generalized Pareto distributions (MGPDs) play an important role in extreme value analysis, since they arise as the only possible limiting distributions when conditioning on at least one component of a random vector being extreme. Some interesting properties, simulation, and new statistical models for MGPDs follow through exploitation of a random scale representation, and in the first part of the talk I will discuss some of these properties, model construction, and likelihood-based inference. Whilst MGPDs are represented by a specific type of random scale construction, similar copula constructions are widespread (e.g. elliptical and Archimedean) and display highly varied extremal dependence behaviours. In the second part of the talk, I will describe work to characterize how different aspects of the construction feed into the extremal dependence properties obtained. Arising from this, two new models that can capture both asymptotic dependence and asymptotic independence will be illustrated. Whilst both aspects of the talk will be in the finite-dimensional setting, connections to modelling spatial extremes will be highlighted.

Based on joint work with: Anna Kiriliouk, Holger Rootzen and Johan Segers (MGPDs), and Sebastian Engelke and Thomas Opitz (other random scale constructions).

Simulation of Brown-Resnick processes

Kirstin Strokorb, Cardiff University

Among max-stable processes the class of Brown-Resnick processes seems particularly attractive for practical use. Meanwhile several algorithms have been suggested for its simulation. While the efficiency of such algorithms can be viewed as a function of the number of points on which the process is simulated, it is more difficult to understand the role of the simulation domain in which they lie, on which we focus in this project. Our suggestion improves the efficiency and/or accuracy of a stopping-time based algorithm. We show that a relatively simple and non-costly adjustment of previous algorithms can be very beneficial.

Based on joint work with: Marco Oesting.
