Geophysical Research Abstracts,
Vol. 11, EGU2009-6878, 2009
EGU General Assembly 2009

Nonstationary risk analysis of climate extremes

V. Chavez-Demoulin, A. C. Davison, and M. Suveges
Institute of Mathematics, EPFL, 1015 Lausanne, Switzerland (Anthony.Davison@epfl.ch, +41 21 693 4250)

There is growing interest in the modelling of the size and frequency of rare events in a changing climate. Standard models for extreme events are based on the modelling of annual maxima or exceedances over high or under low thresholds: in either case appropriate probability distributions are fitted to the data, and extrapolation to rare events is based on the fitted models. Very often, however, extremal models do not take full advantage of techniques that are standard in other domains of statistics.

Smoothing methods are now well-established in many domains of statistics, and are increasingly used in analysis of extremal data. The crucial idea of smoothing is to replace a simple linear or quadratic form of dependence of one variable on another by a more flexible form, and thus to 'allow the data to speak for themselves,ánd thus, perhaps, to reveal unexpected features. There are many approaches to smoothing in the context of linear regression, of which the use of spline smoothing and of local polynomial modelling are perhaps the most common. Under the first, a basis of spline functions is used to represent the dependence; often this is called generalised additive modelling. Under the second, polynomial models are fitted locally to the data, resulting in a more flexible overall fit. The selection of the degree of smoothing is crucial, and there are automatic ways to do this.

The talk will describe some applications of smoothing to data on temperature extremes, elucidating the relation between cold winter weather in the Alps and the North Atlantic Oscillation, and changes in the lengths of usually hot and cold spells in Britain. The work mixes classical models for extremes, generalised additive modelling, local polynomial smoothing, and the bootstrap.

References

Chavez-Demoulin, V. and Davison, A. C. (2005) Generalized additive modelling of sample extremes. *Applied Statistics*, **54**, 207–222.

Süveges, M. (2007) Likelihood estimation of the extremal index. *Extremes*, **10**, 41–55.