Likelihood-based inference for max-stable processes: some recent developments

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Max-stable processes are an important class of models for extreme values of processes indexed by space and / or time. They are derived by taking suitably scaled limits of normalized pointwise maxima of stochastic processes; in practice therefore one uses them as models for maxima over many repetitions. However, the complicated nature of their dependence structures means that full (i.e., d-dimensional, where a process is observed at d locations) likelihood inference is not straightforward. Recent work has demonstrated that by including information on when the maxima occurred, full likelihood-based inference is possible for some classes of models. However, whilst this approach simplifies the likelihood enough to make the inference feasible, it can also cause or accentuate bias in parameter estimation for processes that are weakly dependent. In this talk I will describe the ideas behind full likelihood inference for max- stable processes, and discuss how this bias can occur. Understanding of the bias issue helps to identify potential solutions, and I will illustrate one possibility that has been successful in a high-dimensional multivariate model.