Statistical down-scaling of extreme events using quantile regression

P. Friederichs and A. Hense

Meteorological Institute, University of Bonn (pfried at uni-bonn.de)

In order to provide reliable forecasts of the occurrence of extreme events under an anthropogenic emission scenario, climate models have to be validated and calibrated using data available during the 20th century. Climate models have been validated for they expectational behavior, and model output statistics (MOS) are applied for re-calibration and down-scaling concerning expectation values. However, only recently this became a topic of research regarding extreme events.

We present a statistical down-scaling approach for extremes using quantile regression. Conditional quantiles of station data (e.g., daily precipitation sums) in Europe are estimated by means of the large scale circulation as represented by the NCEP re-analysis data. The procedure accounts for the binary character of precipitation events. This approach can be used to overcome the problem of change of support between model and observational data which is essential to model validation. Furthermore, the different behavior of the inner (near median) and outer (extremal) conditional quantiles of an observable is investigated. In so doing, the specific dynamics leading to extreme events are identified.