Geophysical Research Abstracts
Vol. 12, EGU2010-1448, 2010
EGU General Assembly 2010


# Non-stationary probabilistic downscaling of extreme precipitation

Malaak Kallache (1,2), Mathieu Vrac (1), Philippe Naveau (1), and Paul-Antoine Michelangeli (2)
(1) LSCE-IPSL, France, (2) CLIMPACT, France

General circulation model (GCM) output or reanalysis data typically provide information at a coarse spatial resolution, which cannot directly be used for local impact studies. Downscaling methods are developed to overcome this problem and to obtain local-scale surface weather from regional-scale atmospheric variables. Here the derivation of local-scale extremes still is a challenging topic. We present a probabilistic downscaling approach where the cumulative distribution function (cdf) of large- and local-scale extremes is linked by means of a transform function. In this way the cdf of the local-scale extremes is obtained for a projection period and statistical characteristics like quantiles or return levels are inferred. The extreme values used for downscaling are assumed to be distributed according to a Generalized Pareto distribution (GPD). This allows to apply the approach to many different empirical data series. Out of the resulting cdf, realisations can be generated to provide, for example, uncertainty measures. In case the large-scale variable does not solely determine the evolution of the local-scale variable in the projection period, further variables may be included in the analysis in form of covariates of the GPD parameters.

We apply our methodology to downscale NCEP reanalysis precipitation rate in winter to obtain daily precipitation at five stations in Southern France. The calibration period of 1951 to 1985 is used to project to the time period 1986 to 1999. The applicability of the approach is checked by a comparison study with verifying observations by means of, e.g., quantile-quantile plots or the continuous ranked probability score. It shows that covariates have to be chosen with care, otherwise they may worsen the results.