Geophysical Research Abstracts
Vol. 13, EGU2011-6688, 2011
EGU General Assembly 2011

Assessment of extreme events in the Mediterranean area

Elke Hertig and Jucundus Jacobeit
University of Augsburg, Institute of Geography, Augsburg, Germany (elke.hertig@geo.uni-augsburg.de)

Despite considerable advances regarding the physical realism and the spatial resolution of atmosphere- ocean general circulation models (AOGCMs), regionalization techniques are still of major importance to obtain climate change information on a regional scale. In this context statistical downscaling presents a computationally inexpensive technique which can be adapted for a wide range of applications. It is based on statistical relationships linking a set of large-scale atmospheric variables (predictors) to regional climate variables (predictands) during an observational period. The established statistical relationships have to be verified during a period independent from the calibration period and are subsequently used to predict the future response of regional climate to simulated climate model changes of the large-scale variables. In the scope of this approach careful attention has to be given to the choice of predictors. Also different techniques should be applied to a range of several AOGCM simulations. To further consider uncertainties which arise from the use of statistical downscaling techniques, non-stationarities in the predictor-predictand-relationships should also be addressed.

For a region like the Mediterranean area – located in the transitional zone between tropical and extra-tropical circulation dynamics, additionally characterized by a complex topography and generally high climatic variability – downscaling of general circulation model (GCM) output is particularly important for assessing regional climate change. To identify the behaviour of extremes indices in the recent past and to define a reference for the assessment of future changes, Mediterranean extreme temperatures are defined by means of the 5th and 95th percentiles of daily minimum and maximum temperatures, respectively. Also different percentile-based indices of extreme precipitation are defined based on daily station data as well as high-resolution gridded data: the number of events exceeding the 95th percentile of daily precipitation from the reference period 1961-1990, percentage, total amount and mean daily intensity of precipitation from these events. Thus, different indices are available to characterize changes in the frequency and intensity of heavy rainfall events.

A statistical ensemble approach is applied for the assessment of future changes of the extremes: the predictor-predictand- relationships are established in different specified calibration periods, thus covering a larger range of the observed natural variability. Model performance in the verification periods is assessed by means of the correlation coefficients between modelled and observed extremes indices. Additionally the reduction of variance is calculated, being similar to the root mean squared skill score. Consequently, a statistical ensemble is available to give future projections of regional climate change with a particular quantification of uncertainties.

Acknowledgement: Financial support is provided by the DFG (German Research Foundation).