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Published in:
Geophysical Research Abstracts

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

Geophysical Research Abstracts
Vol. 14, EGU2012-8146, 2012
EGU General Assembly 2012

Comparing Regional Climate Model output to observational data sets for extreme rainfall

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Climate model projections of changes in extreme rainfall are highly uncertain. In general, the analysis of model performance is the first step in studies that attempt to deal with this uncertainty. Model performance is often measured by comparing statistical properties of climate model output with observational data. However, in the assessment of model performance regarding extreme rainfall use of different observational datasets might lead to different conclusions. Rainfall data are often available either as point measurements or interpolated gridded data. Point measurements result in an unevenly spatially distributed dataset while gridded data obtained from the interpolation of point measurements provide data on an evenly distributed grid. Measurements of extreme rainfall events may be highly uncertain and underestimation is generally expected; furthermore, in gridded data extreme rainfall events tend to be smoothed due to the interpolation process. In addition, small variations in space and time of observed and modelled extremes may have a large impact on the assessment.
The present study assesses the effect of the choice and interpretation of observation datasets on the conclusions drawn regarding the ability of Regional Climate Models (RCMs) to reproduce extreme events. Daily extreme rainfall over Denmark from an ensemble of RCMs is compared to three different observational datasets. The observational data considered are a point measurement dataset (ECA&D), a gridded dataset (E-Obs) and a re-analysis dataset (ERA-Interim). The results are compared with other recent studies considering climate model rainfall extremes. The study shows that in climate change studies dealing with extreme rainfall one must be aware of the effect and uncertainties from the use of different sources of observations to avoid overconfident and misleading conclusions.