Geophysical Research Abstracts
Vol. 14, EGU2012-4773-1, 2012
EGU General Assembly 2012

Comparing bias correction methods for high-resolution COSMO-CLM daily precipitation fields

O. Gutjahr and G. Heinemann

University of Trier, Geography/Geosciences, Environmental Meteorology, Trier, Germany (gutjahr@uni-trier.de)

Regional climate models (RCMs) are approaching to the 1km scale. This is necessary, since impact models, like hydrological or species distribution models, forced with the output of RCMs need input data on this high resolution in order to capture adequately the behaviour of the system on small scales and the extreme statistics. However, RCMs are still subject to systematic biases when compared to observations. Especially precipitation is often affected with large and non-linear bias. Since extreme values are critical to any impact model, a special care must be established for the tails of the distributions.

Within the "Global-Change"-project of the Research Initiative Rhineland-Palatinate (http://www.uni-trier.de/index.php?id=40193&L=2), a new parametric bias correction method has been developed, which includes an extension for extreme values. Daily precipitation fields from COSMO-CLM (version 4.8.11) model output for the time period 1991-2000 and 2091-2100 were then bias corrected. This new method is compared to existing parametric and non-parametric methods in order to answer the question whether an extension with an extreme value distribution for the tail is necessary. Additionally, the effect of the bias correction on the climate signal is investigated, which should be the same after the corrections. As observations, 128 precipitation stations (DWD/LUWG) were used.

Both parametric bias correction methods are able to correct the precipitation fields and are thus valid replacements for the empirical method but the extension with an extreme value distribution is an improvement, especially concerning estimated return values, which were underestimated in the uncorrected model and did not show any similarity to observations. Without an extension for extreme values, the pattern of the climate change signal deviates largely from the original and reveals another source of uncertainty.

The comparison of the methods demonstrates the importance of special treatment of the extremes within a bias correction framework. Since the extreme values were underestimated in the uncorrected model data and after applying the existing parametric correction, this would transfer wrong information into impact models. After applying the extended method, the extremes are now close to the observations and will improve the forcing data for impact models.