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Developing a correction for simulated rainfall from global climate change models.

Challenges

Increased concentrations of greenhouse gases are not only associated with rising global temperatures, but are also expected to lead to considerable changes in global rainfall. The current resolution of climate change models is insufficient for estimating rainfall changes on small spatial scales, which is where the effects of flooding and drought, for instance, have the greatest impact upon humans.

Solution

There is often a need to 'downscale' the output of coarse-resolution global climate models in order to provide rainfall estimates for the 'local' scale. Here, we use a new downscaling approach called Model Output Statistics, which involves applying a statistical correction to the model-simulated rainfall field. We anticipate that downscaling methods using this approach will be more robust when applied to future climate simulations and potentially global in application

Results

Our statistical corrections are shown to outperform some traditional downscaling approaches and have great potential for application to future simulations. The next step is to apply these corrections to the climate change simulations used in the most recent Intergovernmental Panel on Climate Change Assessment Report (IPCC AR4) and to derive more confident estimates of changes future rainfall distribution.

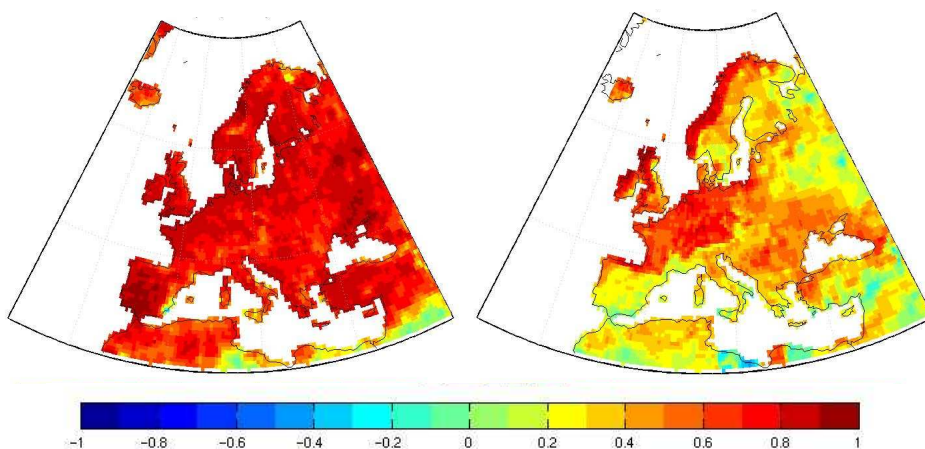


Figure 1: Reconstruction of January rainfall over Europe using Model Output Statistics (left) shows greater correlation with observations than the reconstruction derived from a traditional downscaling approach (right).



Client Profile

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Product Used

COSMOS-1.0.0 Earth System
Model (developed at Max-Planck
Institute for Meteorology in Ham-
burg); installed and run on Blue-
BEAR.
Matlab; statistical, mapping and
parallel toolboxes.
Windows HPC for parallel Matlab
programming.

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