

Detection of a human influence on regional precipitation change in Europe

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On global to continental scales, anthropogenic climate change has been successfully detected for several climatic variables including surface air and sea surface temperature, tropopause height, sea ice extent, and many more. However, it is the changes in local to regional climatic conditions (e.g. changes in the frequency of heatwaves, severe winds, intense precipitation, etc.) that have the greatest impact on human societies. Therefore, this study aims at detecting the human influence on regional precipitation change over Europe.

Since long homogenized precipitation records are hardly available, we are using both the gridded precipitation data set of the Climatic Research Unit as well as reanalysis data of the REgional MOdel (REMO) as the observational record within which we try to detect a human influence. The expected change due to anthropogenic forcing is estimated from different model experiments with Regional Circulation Models carried out as part of the PRUDENCE project. Furthermore, long control simulations with GCMs will eventually be used in order to estimate the range of natural variability. These data are analysed using pattern similarity and optimal fingerprint methods.

Preliminary results show high correspondence between recent trends in precipitation (both using observational and reanalysis data) and the expected changes due to anthropogenic forcings (derived from model experiments) especially in winter and summer. In autumn and spring, however, the signal is far less clear and correspondence with observed trends is much lower. In addition, similar analyses will be carried out for temperature extremes and wind as well.