Regional Decadal Climate Prediction for Europe (REDCLIP)

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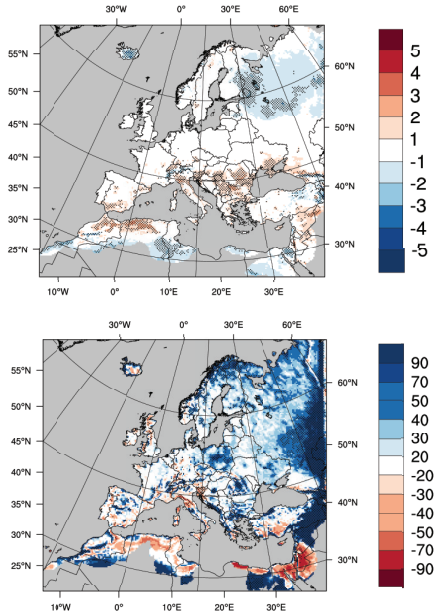

FIGURE 1: Differences of multi-annual means between the REMO validation run and E-OBS 7.0 observations (1979-1998). Top: For near-surface temperature in K. Bottom: Relative precipitation difference in percent. Stippled areas indicate regions with larger deviations compared to the standard-error given by E-OBS. Grey shaded areas show missing values in the observations.

1. Introduction

REDCLIP aims to improve decadal predictions by means of ensemble techniques for regional climate models (RCMs) and statistical post-processing of model output using a re-calibration method, such as the climate conserving re-calibration (CCR) by Weigel et al. (2009). In the first year, validation simulations have been carried out. Results of this simulations are presented here.

2. Model set-up

For REMO (Jacob et al., 2007) the following set-up is used, as agreed upon within MiKlip Module-C (Regionalisation):

- Lateral boundary forcing by ERA-Interim
- Horizontal resolution of 0.22° covering the CORDEX Europe domain
- 241x241 grid boxes
- Integration period 1979-2008

Acknowledgements

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3.1 Validation run results compared to E-OBS 7.0

Yearly mean near-surface temperature (Figure 1 top):

- Underestimation of ~2 K in North-East Europe
- Overestimation of ~2 K in South-East Europe

Yearly mean precipitation (Figure 1 bottom):

- Mostly overestimations but E-OBS is known to have too low values.
- High values in arid regions due to presentation as relative differences

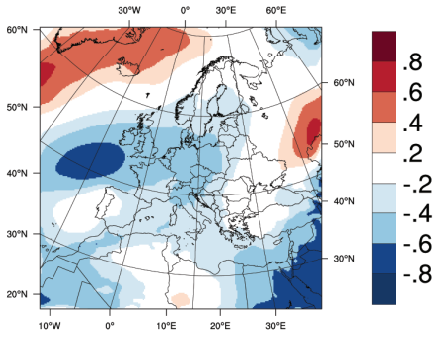

FIGURE 2: Correlation of SST-Index with simulated MSLP fields for summer. A 4-year running mean was applied to the SST timeseries and MSLP fields.

3.2 Large scale correlations

Figure 2 shows the correlation between an SST-Index, defined as 4-year running mean of SST averaged over the North-Atlantic sector from 40°W-15°W and 50°N-60°N, and the mean-sea-level pressure (MSLP) of the RCM simulation (as computed by Müller et al., 2012). REMO captures the main features of the expected correlation pattern. Nonetheless, a shift of the positive correlation area over Eastern Europe to the East can be seen.

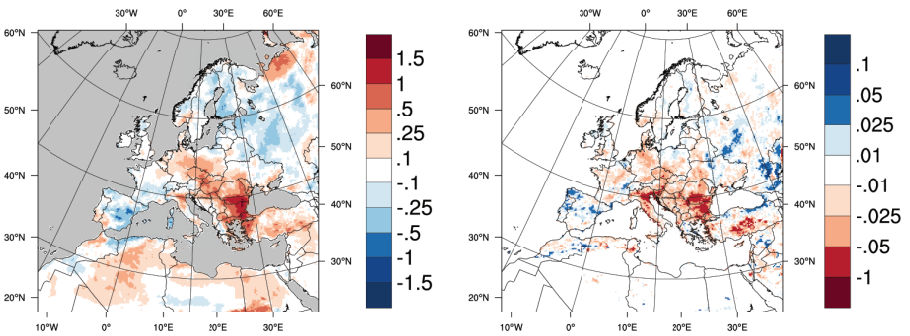

FIGURE 3: Differences between warm and cold start averaged over the summers (JJA) of years 2-5 after initialization. Left: For near-surface temperature in K. Right: For soil moisture in m.

3.3 Model initialization

Figure 3 depicts differences between a warm start, where initial values for soil moisture and temperature are taken from a model climatology, and a cold start, where initial values come from the driving model directly. Differences in the mean summer temperature can be up to 1.5 K (Figure 3 right). The pattern of the differences is mostly related to differences in soil moisture (Figure 3 left).

4. Conclusion & Outlook

- REMO is able to reproduce the climate in a reasonable way.
- Large scale correlation patterns can be reproduced by the downscaling.
- Soil initialization plays an important role for the RCM (this topic will be tackled in more detail by other projects within MiKlip)
- Baseline1 simulations will be downscaled in coarser resolution (0.44°) to have a big set of hindcasts for the application of CCR

References

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