

Bias adjustment of EURO-CORDEX and Med-CORDEX simulations over the Carpathian Region using the high resolution gridded observational database: CARPATCLIM

Csaba Zsolt Torma
Department of Meteorology,
Eötvös Loránd University and HAS Post-Doctoral Research Program,
Budapest Hungary

2004: Msc in Meteorology and Astronomy, ELU (Budapest)
2011: Phd in Meteorology, ELU (Budapest)
2012-2016 : Post-doctoral fellow, ICTP (Trieste)
2016-: Post-doctoral researcher ELU-HAS (Budapest)



Csaba Zsolt Torma
e-mail: tcsabi@caesar.elte.hu



objective

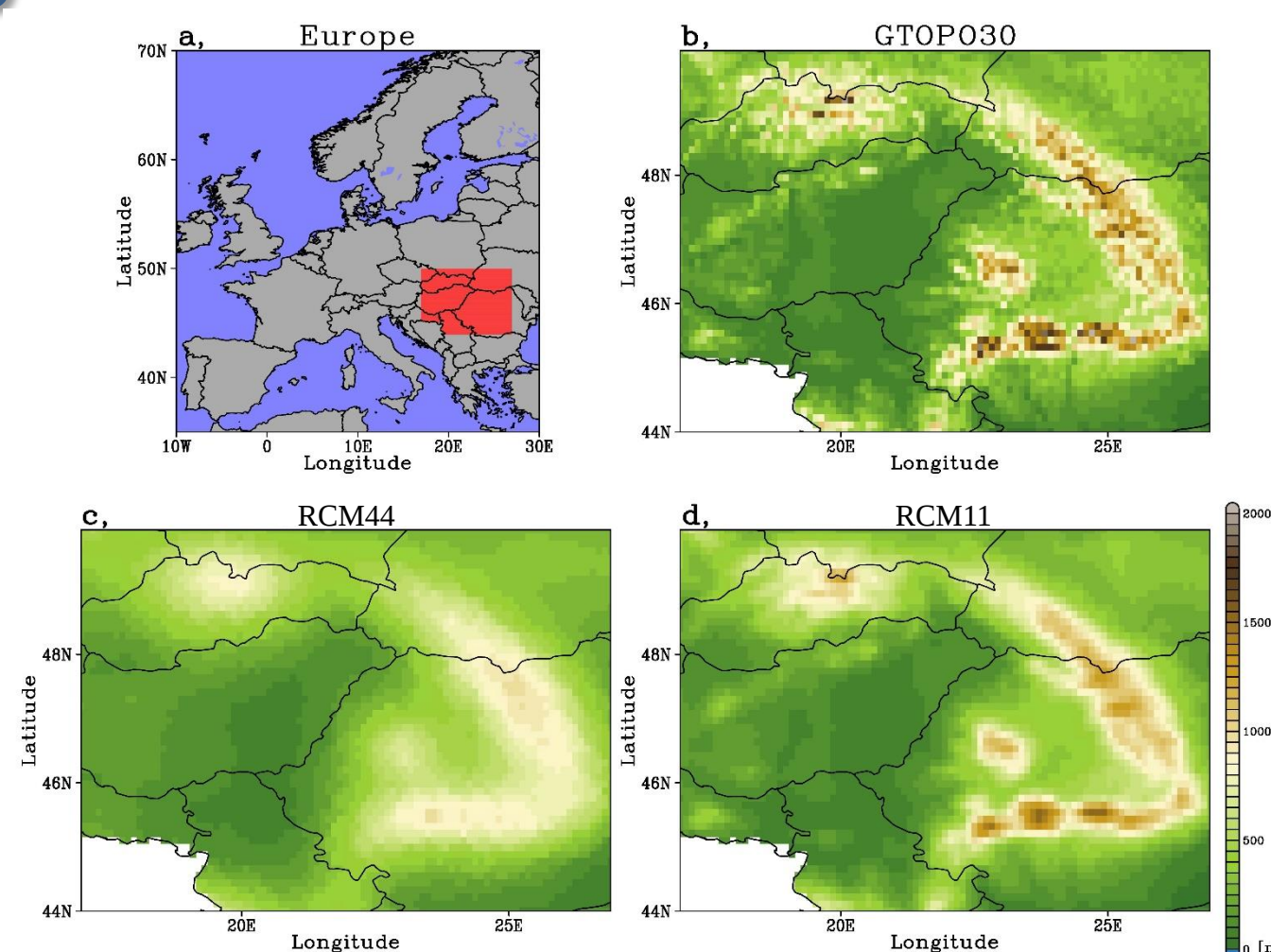
Bias adjustment of the **EURO-CORDEX** and **Med-CORDEX regional climate model (RCM)** simulations accomplished at medium (**50 km**) and at high (**12 km**) resolutions, with a focus on the **Carpathian Basin** including low lands and the entire Carpathian chain. **Precipitation** data from ensemble of RCM simulations are analyzed for the periods: **1976-2005, 2021-2050** and **2070-2099**.

experimental design

The RCM experiments used for this study are from: EURO-CORDEX and Med-CORDEX initiatives. Daily precipitation provided by **8 GCM driven RCM simulations** (50 km and 12 km) were bias corrected over the Carpathian Basin based on high quality, fine scale (**~10 km**) gridded observational dataset (**CARPATCLIM**, Szalai et al., 2013). The **quantile mapping** method was used in order to adjust systematic bias in precipitation fields. The effect of bias correction on precipitation change was evaluated based on all RCM simulations with and without bias correction. The analysis of different climate indices were also included in the assessment of RCM simulations with and without bias correction, such as **heavy precipitation days** (days with a total rainfall of at least 10 mm, **R10mm**), **maximum consecutive dry days** periods (**CDD**).

results

1 Field of interest



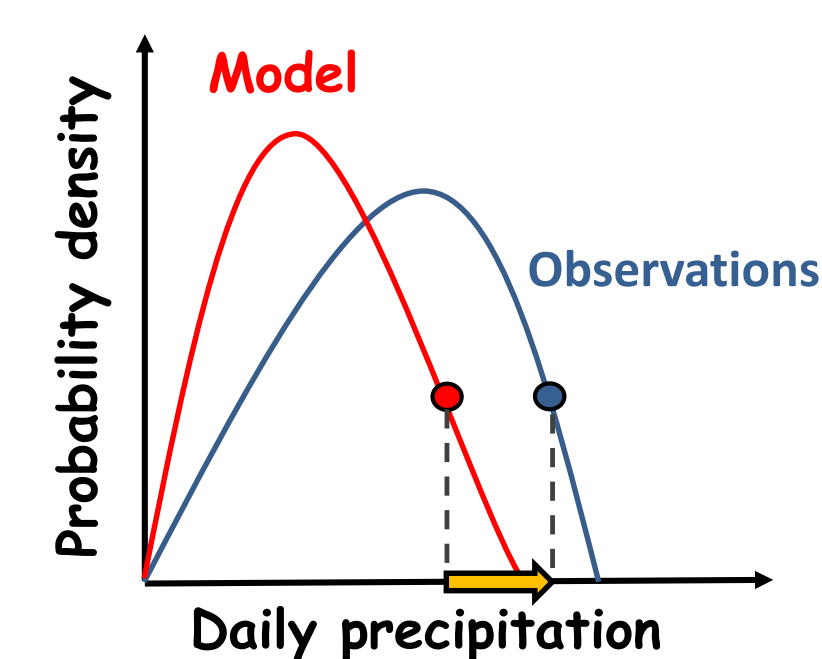
Topography for the Carpathian Basin at the nominal CORDEX resolutions: 0.44° and 0.11°. RCM44 and RCM11 represents the mean of investigated RCMs.

2 Applied models and methodology

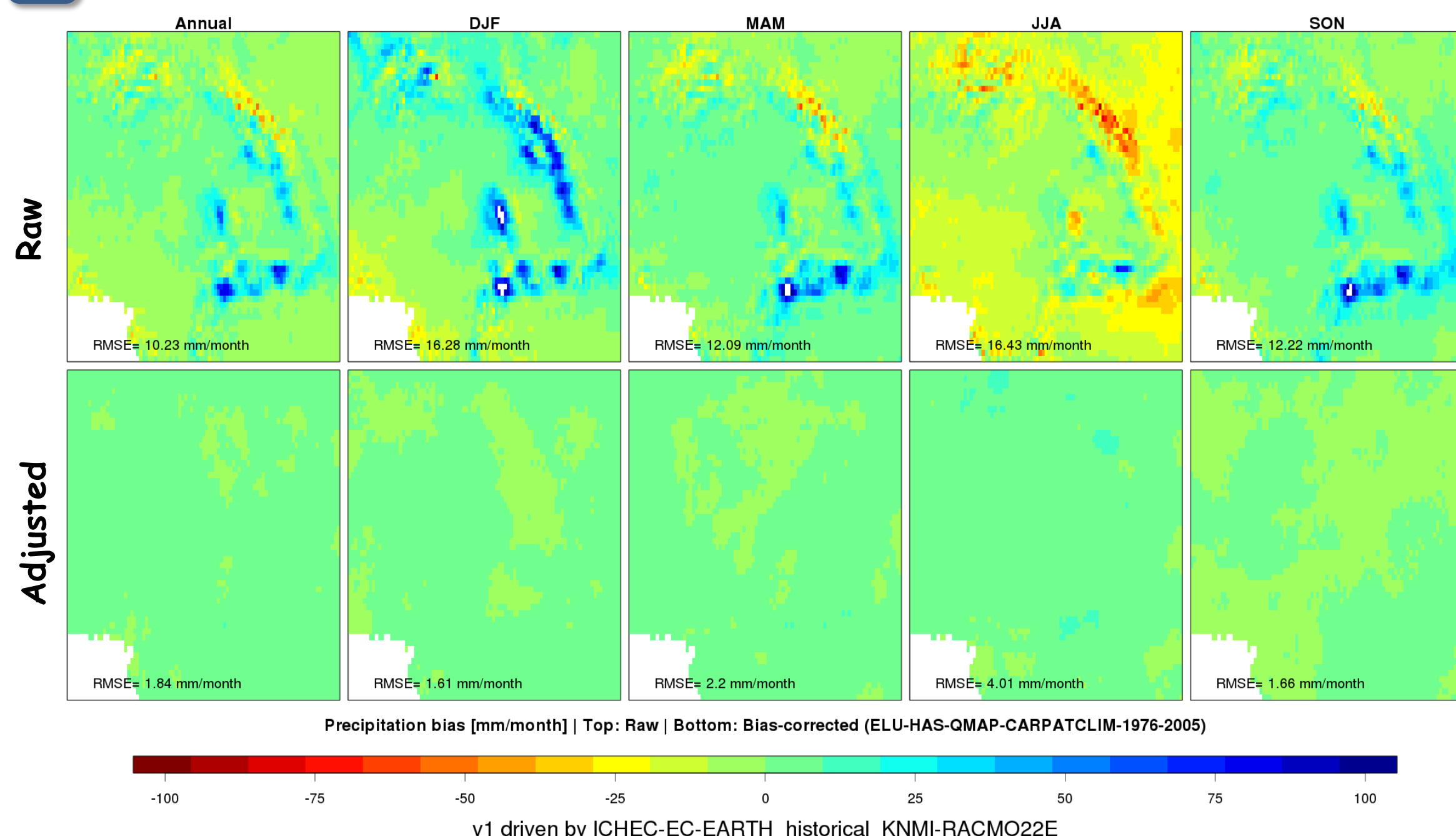
CNRM-CM5_ALADIN*
MPI-ESM-LR_CCLM
EC-EARTH_HIRHAM
HadGEM2-ES_RCA4
EC-EARTH_RACMO
MPI-ESM-LR_REMO
HadGEM2-ES_RegCM*
IPSL-CM5A-LR_WRF

List of models involved in the assessment and provided the daily precipitation data for the bias correction. GCM_RCM pairs are given, while Med-CORDEX simulations are marked with an asterisk.

Following the work of Mezghani et al., 2017, quantile mapping method was implemented on a seasonal basis.

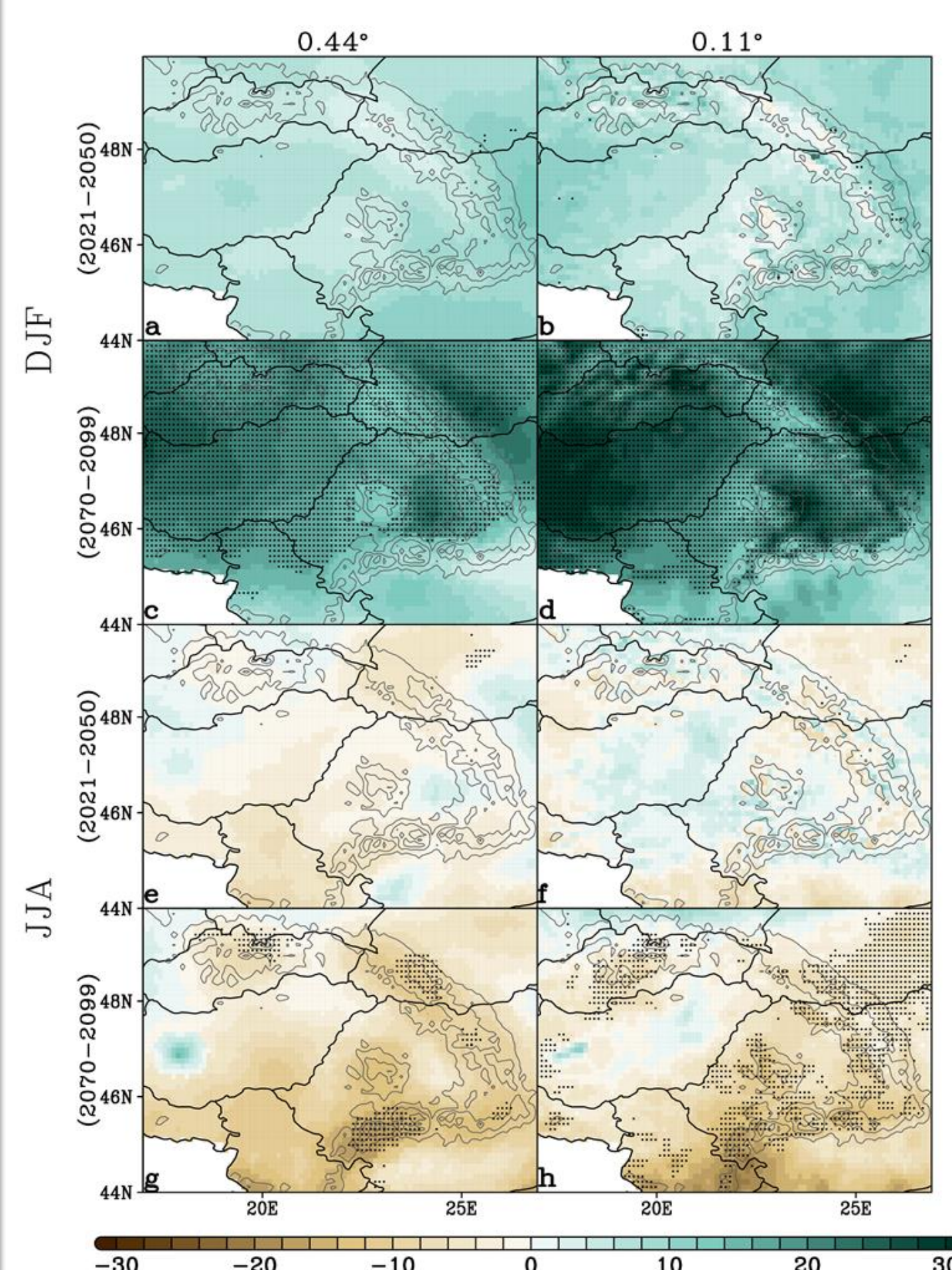


3 Present (1976-2005)

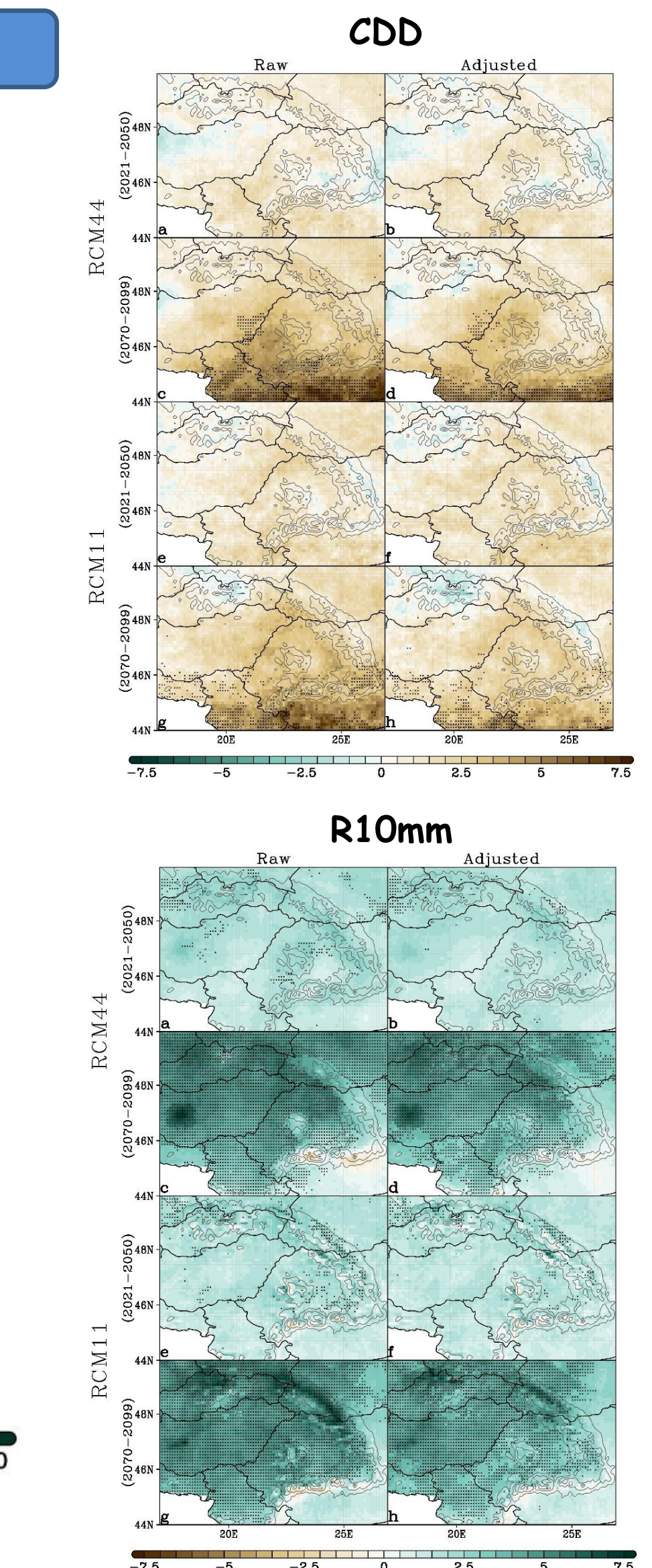


Example for the mean annual and seasonal bias fields based on the original RCM11 model output (top row) and based on the bias corrected RCM11 simulation data (lower row). Information on RMSE is reported on the bottom left corners of each sub-panels. The represented model is the KNMI-RACMO.

4 Future (2021-2050 and 2070-2099)



Expected seasonal (summer-JJA, winter-DJF) precipitation changes for future periods of 2021-2050 and 2070-2099 (reference period: 1976-2005). Dotting indicates regions where most models show (at least 5 out of 8) significant changes (two sided t-test, $p=0,1$). Results are in %.



Projected changes for 2070-2099 in CDD and R10mm. Results are on annual basis. Dotting indicates regions where most models show (at least 5 out of 8) significant changes (two sided t-test, $p=0,1$). Units of days.

summary

- ❖ In total 8 RCM44 and RCM11 CORDEX simulations were bias adjusted based on the high-quality and high-resolution observational dataset: CARPATCLIM.
- ❖ Preliminary results show that both, magnitude and spatial distribution of mean changes were not significantly distorted.
- ❖ Present work is in favor of providing a high resolution bias-corrected database which can serve as input for climate change impact and adaptation studies for different sectors over the Carpathian Region.

Get the poster in .pdf! →

