Project: **945**
Project title: **SASSCAL**
Project lead: **Andreas Haensler**
Report period: **1.1.2016 - 31.12.2016**

The Climate Service Center Germany is leading the workpackage 2, task 006 (“Expanding the database for a robust regional climate change assessment and uncertainty analysis”) of SASSCAL funded by the BMBF. A profound and robust data base of quality controlled high-resolution climate projections is necessary to estimate the potential impacts of future climate change on the water resources, agriculture, forestry and human livelihoods over the SASSCAL region. Within the task, therefore already existing high-resolution climate change projections were identified and analyzed as an initial activity. But also the design and realization of new high-resolution climate change projections over the region were implemented in the process, as the rapid development in computational capacity also allows that more and more processes affecting the climate system are included in the projections. The resulting ensemble of high-resolution climate projections can now serve as basis for assessments to quantify the degree of robust climate change in contrast to climate variability and inherit model uncertainty in ongoing and upcoming investigations. The focus of this task was on the expansion of the data base of quality controlled high-resolution climate change projections over the SASSCAL region. Furthermore, large emphasis is still given to the ongoing knowledge transfer and capacity building to facilitate the research institutions of the SASSCAL region in analyzing existing observations and climate change projections, running regional modelling systems and assessing the possible future scenarios and associated uncertainties.

In the previous reporting period, four transient regional climate change projections using REMO forced with GFDL-ESM2G (RCP2.6), IPSL-CM5A-LR (RCP2.6 and RCP8.5) and HADGEM2-ES (RCP2.6) were finished and analysed. In the actual reporting period, one transient regional climate change projection using REMO forced with MIROC5 (RCP2.6) data was simulated successfully for the period 1949 to 2100. The initially foreseen regional climate projection using the forcing data CSIRO-Mk3-6-0 (RCP2.6) could not be carried out since the promised data from the CSIR in Pretoria was not delivered. Therefore, the decision was made to downscale the MIROC5 (RCP2.6) instead of the CSIRO-Mk3-6-0 RCP2.6 global projection. Herewith, all five regional climate change projections using REMO foreseen in the SASSCAL-project were finished and were all uploaded to the Earth System Grid Federation System (ESGF).

An analysis of these five climate change projections shows that the models project an increase in mean temperature of 0 to 3 °C for the low emission scenario (RCP2.6) and of 4 to 8 °C for the high emission scenario (RCP8.5) until the end of the century over the Africa CORDEX domain (Fig. 1a-e). The strongest warmings are projected for northern and southern Africa. For the mean daily precipitation (DJF) the models simulate changes between -0.5 and 0.5 mm/day over northern Africa and between -2 and 2 mm/day over southern Africa for the low emission scenario (RCP2.6) (Fig. 2a-e). The bandwidth of mean daily precipitation change extends to -3 to 5 mm/day for the high emission scenario (RCP8.5) over southern Africa until the end of the century.

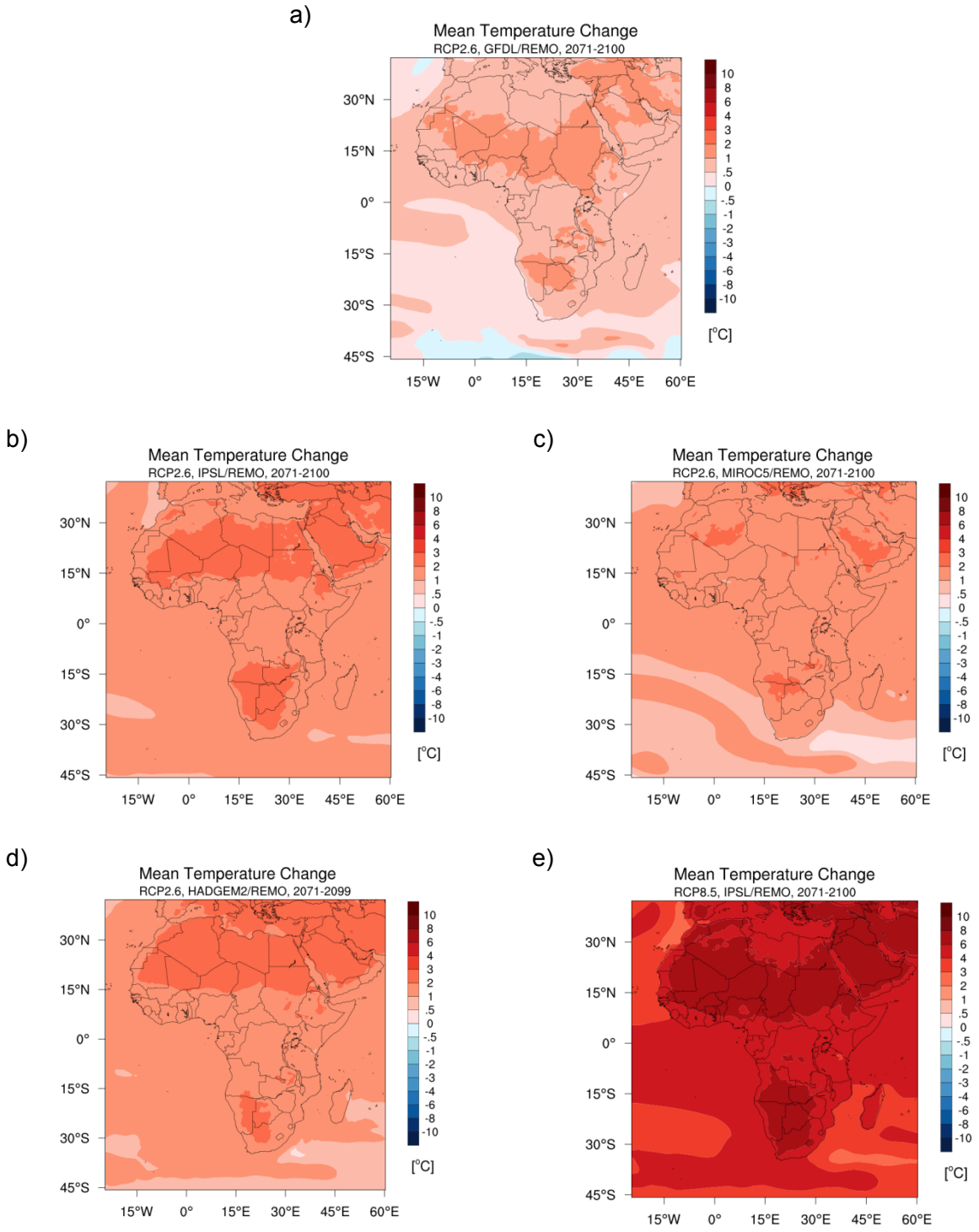

Fig. 1: Projected mean temperature change by REMO for the end of the century respective to 1971-2000 using different global forcing data and emission scenarios. a) GFDL-ESM2G RCP2.6, b) IPSL-CM5A-LR RCP2.6, c) MIROC5 RCP2.6, d) HADGEM2-ES RCP2.6 and e) IPSL-CM5A-LR RCP8.5.

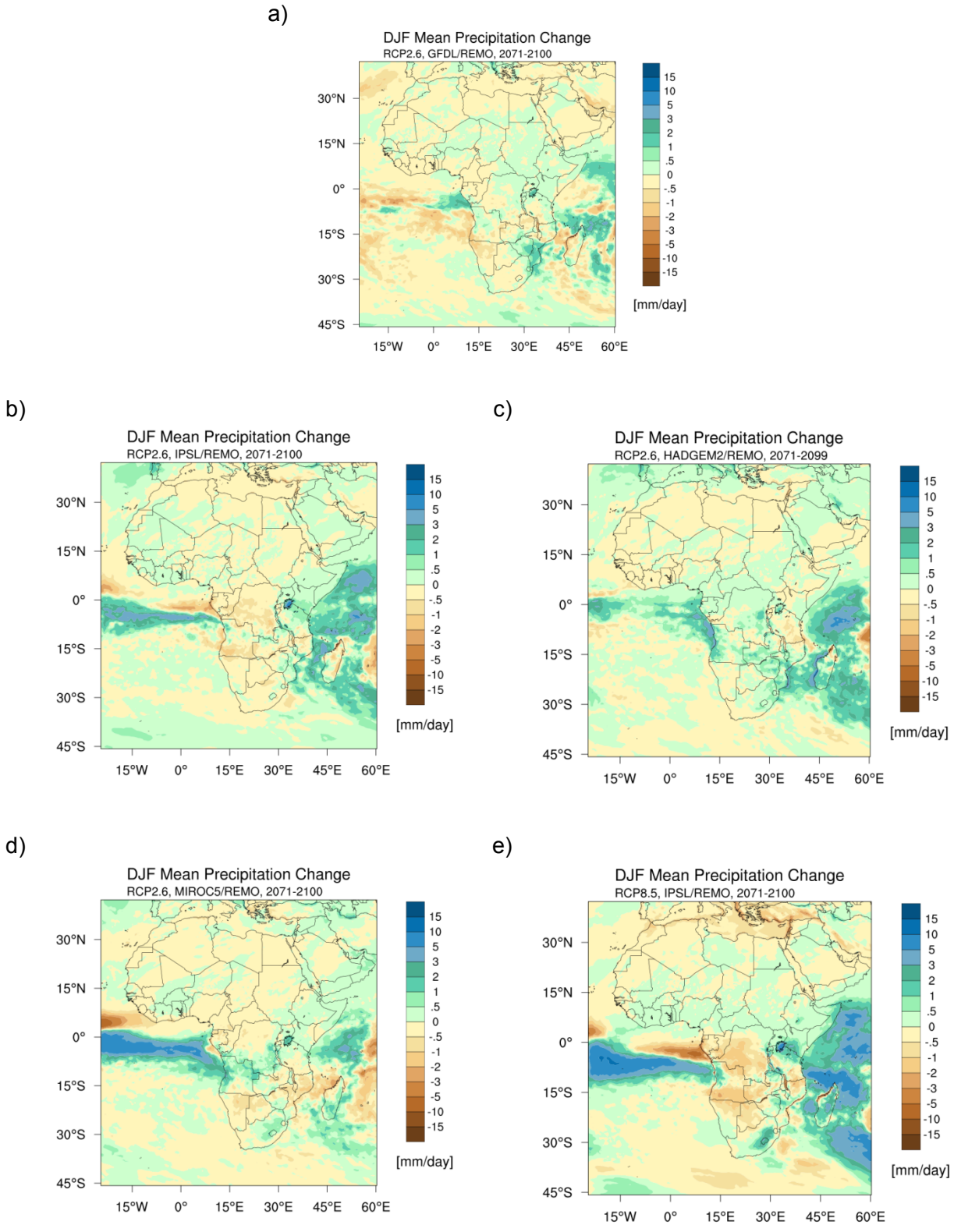

Fig. 2: Projected mean daily precipitation change for Dec. to Feb. by REMO for the end of the century respective to 1971-2000 using different global forcing data and emission scenarios. a) GFDL-ESM2G RCP2.6, b) IPSL-CM5A-LR RCP2.6, c) MIROC5 RCP2.6, d) HADGEM2-ES RCP2.6 and e) IPSL-CM5A-LR RCP8.5.