Project: 1439

Project title: WaRisCo - Water Risks and Resilience in Urban-Rural Areas in Southern Africa Principal investigator: Torsten Weber Report period: 2024-05-01 to 2025-04-30

Project report

The work on the ongoing project WaRisCo (see initial proposal) was delayed due to the late appointment of an employee for carrying out the model simulations. Therefore, some of the granted computing time could not be used. Dr. Thomas Frisius took over this position on 1st of January of this year.

So far, the setup of the simulations RCM REMO was prepared. This comprises the

- Creation of a surface library for the model domains WAR-22 and WAR-03
- Generating boundary fields for the simulation EVAL_WAR-22 from ERA-5 reanalysis data
- Preparation of the namelists for the simulations EVAL_WAR-22 and EVAL_WAR-03.

Furthermore, the surface library was improved. In the previous version the FAO field describing the soil type was based on coarse resolution data (about 50km grid). This is unacceptable for the 3km runs which have to be done in the project. Instead, the soilgrids data set with 1km resolution (<u>https://www.isric.org/explore/soilgrids</u>) has been used in the improved surface library developed by Dr. Katrin Ziegler from the University Würzburg. In Fig. 1. the improvement by the new data set is clearly visible.



Fig. 1: Soil type based on a) FAO (50 km) and b) Soilgrids (1km) for the model domain WAR-03.

The first five evaluation years of the run EVAL_WAR-22 are completed (1981-1985). Fig. 2 shows the bias for 2m temperature and precipitation with respect to ERA5-Land (Muñoz-Sabater et al. 2021) and CHIRPS-3 (Funk et al. 2015), respectively. In some regions there is a warm bias of 2-4K and the comparison with CHIRPS reveal some areas with a dry bias of 4 - 6 mm/day. In small areas even higher differences occur and there are also small areas with a distinct wet bias, e.g. over the Victoria lake in the DJF season. The results appear acceptable for the coarse resolution run that provides the forcing data of the high-resolution convection permitting run of which results

mostly contributes to the project. It is expected that this run can be finalized within the current allocation period.



Fig. 2: Seasonal bias of the run EVAL_WAR-22 for a) 2m temperature (K) in comparison to ERA5-Land and b) precipitation (mm/d) in comparison to CHIRPS-3.0. The evaluation extends to the period 1981-1985.

The 3km evaluation run EVAL_WAR-03 has been started. However, a first analysis of the results reveals excess precipitation in the winter season. Therefore, the model must be tuned to produce better results. Presumably, the tuning will be successfully finished until the end of the current allocation period.

a)