



Sensitivity of the hydrological cycle to corrections of the sea surface temperature biases over southern Africa in a regional climate model

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High resolution climate change projections and subsequent detailed analysis of the hydrological cycle are of particular importance for southern Africa since possible changes of the climate will affect the water availability and thus the lives of the people in this region. In order to obtain high resolution climate change information for the future, regional climate models (RCMs) are used to downscale climate change projections generated with general circulation models (GCMs). These GCMs are usually coupled with an ocean model providing ocean parameters such as sea surface temperature (SST) needed by GCMs. However, the global ocean models often have deficiencies in resolving regional to local scale ocean currents, as it is the case in the oceans offshore the southern African region. Here, the cold up-welling Benguela current flows northward along the west coast of southern Africa in the Atlantic Ocean whereas the Agulhas current flows southward along the east coast in the Indian Ocean. The hydrological cycle and therefore also the water availability of southern Africa is strongly affected by the moisture transport from the Atlantic and Indian Ocean and, consequently, from their SSTs.

To analyze the impact of the deficiencies in the SST representation on the regional hydrological cycle we perform several simulations with the regional climate model REMO at a spatial resolution of $25 \times 25 \text{ km}^2$ with corrected SST. Five sensitivity experiments, each covering five years, were carried out with a) SST as given by ERA-Interim, b) SST of Atlantic ocean and Benguela current replaced by ERA-Interim, c) SST of Indian ocean including Agulhas current replaced by ERA-Interim, d) SST as given by ECHAM6, and e) as d), but with pertubated atmospheric conditions to assess the internal model variability of REMO.

The results show a distinct impact of the SST biases on the hydrological cycle in southern Africa. In particular, the contribution of the SST bias of the Atlantic Ocean is stronger, which should be taken into account for climate change projections.