



Regional Climate Model (RegCM3) simulation of the African Climate using ERA-Interim reanalysis at the boundaries

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To enable regional climate variability and/or change studies over topographically varied region such as Africa, "unbiased" or relatively low biased reanalysis are needed at the boundaries. This study examines the ability of the International Centre for Theoretical Physics (ICTP) Regional Climate Model (RegCM3) to reproduce seasonal mean climatologies over the entire Africa domain and rainfall annual cycle and interannual variability over different homogeneous climate sub-regions. The new European Center for Medium Range Weather Forecast (ECMWF) ERA-Interim reanalysis is used for initial and lateral boundary conditions in RegCM3 system.

Seasonal mean climatologies of zonal wind profile, temperature, precipitation and associated low level circulation are shown to be realistic. However, the regional model shows some deficiencies. The monsoon flow is overpredicted and the Africa Easterly Jet (AEJ) core underpredicted. This is linked to near surface temperature gradient between the Gulf of Guinea and southern Sahara. Overestimation of rainfall over the tropical forest and southern Sudan appears to be connected to underestimation of temperature in these same regions. However, there is a definite improvement in this model performance compared to some previous studies over Africa. Further comparisons between the performance of the regional model and the reanalysis to correctly represent rainfall annual cycle and interannual variability have been done. In general, they both capture very well the mean annual cycle in most of the sub-regions even if ERA-Interim tends to overestimate and shift some peaks in the equatorial sub-regions. The interannual variability is fairly well reproduced by the regional model improving upon the reanalysis in most of the semi-arid sub-regions. Over the near equator sub-regions, the regional model is performing as good as the reanalysis and its poor performance is connected to the poor performance of ERA-Interim.