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ABSTRACT

Cloud parameterization is very essential in climate model because they represent weather quantities and processes that are extremely small or complex to be physically represented (Arakawa, 2004). The challenge of climate modelers to successfully and completely parameterize clouds reduces the confidence in climate simulations. In an attempt to improve climate simulations over West Africa, it has become indispensable to represent these uncertainties in the Regional Climate Model known as RegCM due to convective parameterizations (Bowler, 2008). The performance and sensitivities of five (Emanuel, Grell, Tiedtke, Kain Fritsch and Betts Miller) convective schemes were evaluated against Climate Research Unit (CRU TS) observational data over a five year period (2010 - 2014)

on a spatial resolution of 25km over the West African climatic sub-regions (Guinea coast, Savannah and Sahel regions). All simulations were forced with ERA-Interim reanalysis data. Precipitation and surface temperature were evaluated against CRU and relative humidity against ERA5 dataset for the seasons of December-January-February (DJF), March-April-May (MAM), June-July-August (JJA) and September-October-November (SON). This study observed a dominant wet bias for precipitation and relative humidity and warm bias for surface temperature. The wet (warm) bias for Emanuel (Grell) scheme significantly reduced over all sub-regions but the former outperformed the rest over the JJA analyses. The Emanuel scheme control parameters was stochastically perturbed to quantify uncertainties associated with convective cloud parameterization in simulating precipitation and surface temperature. The perturbed scheme improved the simulation of precipitation but not surface temperature, even though the statistical skill of surface temperature were not degraded by the perturbations.

References

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