



Precipitation variability in a suite of Africa-CORDEX simulations: The roles of model resolution, domain size and spectral nudging

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The WCRP Africa-CORDEX initiative aims to provide a robust matrix of regional climate simulations for the African continent, covering the period 1960-2100 and sampling a large range of driving Global Climate Models (GCMs), RCP emission pathways and different Regional Downscaling techniques. An important component of Africa-CORDEX is the evaluation of Regional Climate Model (RCM) simulations over the continent for the recent past when driven at the boundaries by ERA-interim reanalysis. In this presentation we evaluate the performance of a number of configurations of the Rossby Centre RCM (RCA4), when run over Africa at a range of model resolutions. We specifically evaluate simulated precipitation variability at a range of timescales; sub-daily, synoptic, intra-seasonal, seasonal cycle and inter-annual, from two RCA4 simulations using the full Africa-CORDEX domain, both driven by ERA-interim and run respectively at 0.44° and 0.15° resolution. Comparison of these two integrations indicates the potential benefits of higher RCM resolution for simulated precipitation variability, particularly higher intensity precipitation events and intra-seasonal variability. A number of other RCA4 configurations have also been run driven by ERA-interim boundary data and using domains geographically constrained to either West Africa or East Africa. These simulations cover the resolution range 0.44° to 0.08° . Contrasting these simulations against the full Africa-continent runs will indicate the degree of constraint provided by the RCM boundary data when the full Africa domain is used, versus domains constrained to address regionally specific phenomena, such as the West African Monsoon. Finally, RCA4 at 0.44° on the full Africa-CORDEX domain has also been run for the recent past using ERA-interim boundaries with spectral nudging employed within the RCM domain. This simulation is compared to the non-spectrally nudged equivalent to determine what benefits may arise over Africa from spectral nudging the RCM interior long waves towards those of the driving boundary fields.