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Analysis of the Cordex evaluation runs (ERA_Interim) over Southern Africa

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The CORDEX program was instituted by the World Climate Research Program (WCRP) to develop downscaled regional climate change projections at user-relevant scales for all terrestrial regions of the world. Africa was identified as the priority domain in urgent need of attention. In light of this the Cordex-Africa Analysis campaign was initiated as a co-ordinated effort to analyse the available Era-Interim downscalings. Three regional African groups were formed (West Africa, East Africa and Southern Africa) and experts from each region tasked with the assessment of the available downscaled data. Within Africa, CORDEX has come to be viewed by many in the decision making community as the leading source of new climate change information, and expectations are high.

This paper presents the analysis performed by the southern African team in which the ability of ten regional climate models (RCMs) to simulate precipitation over southern Africa within the Cordex framework was evaluated. An ensemble of ten regional climate simulations and the ensemble average is analysed to evaluate the model's ability to reproduce seasonal and interannual rainfall characteristics over regions of the sub-continent. All the RCMs use the Cordex African domain, have a spatial resolution of $\sim$50km and are driven by the ERA-Interim reanalysis (1989- 2008). Results are compared against a number of observational datasets such as the GPCC, CRU, UDEL, TRMM etc. The spatial and temporal nature of rainfall over the Southern African region is captured by all RCMs, however, individual models exhibit wet or dry biases over particular regions of the domain. Models generally produce lower seasonal variability of precipitation compared to observations and the magnitude of the variability varies in space and time. Model biases are related to the positioning of the ITCZ as well as moisture transport. The multi-model ensemble mean generally out-performs individual models, with bias magnitudes similar to differences across the observational data sets. In the northern parts of the domain some of the RCMs and the ensemble average improve the precipitation climate compared to that of the ERA-Interim reanalysis. The models are generally able to capture the dry (wet) precipitation anomaly associated with El Niño (La Niña) events across the region. Based on this analysis, we suggest that the present set of RCMs can be used to provide useful information on climate projections of rainfall over southern Africa.