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Dynamical downscaling of ECMWF ensemble seasonal forecast over East Africa with RegCM3

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Dynamical downscaling of ECMWF ERA-interim and ENSEMBLE seasonal hindcast is performed with ICTP's regional climate model (RegCM3) over the horn of Africa. The result from the ERA-interim reanalysis ('perfect boundary') condition run indicated that the regional model reproduced both the spatial and inter-annual variability of the regions rainfall. It also captured the teleconnection between ENSO and the regions precipitation pattern well. As these results were encouraging, the ECMWF ENSEMBLE seasonal hindcast experiment run were downscaled from May 1st to October 1st for each year for the period of 1991 - 2000 to produce nine RegCM3 ensemble hindcast. The one month lead ECMWF and RegCM3 ensemble seasonal (JJAS) precipitation hindcasts were assessed in a deterministic and probabilistic mode. The deterministic verification suggested that for most part of the East African domain both RegCM3 and ECMWF hindcasts reproduce the spatial and temporal variability very well, but overestimate the mean and variability over the Arabian peninsula and miss the teleconnection between ENSO and precipitation over the western Indian ocean. This positive bias over the Arabian peninsula and the teleconnection error between ENSO and precipitation anomalies over the western Indian Ocean in RegCM3 are due to the propagation of errors from the driving GCMs to the regional model. The probabilistic assessment (ROCS and RPSS) indicated that both ECMWF and RegCM3 are better than a random forecast and climatology suggesting the potential utility of dynamical forecast over the region. Comparing the skill of ECMWF and RegCM3 probabilistic hindcasts, ECMWF generally performs better on grid point by grid point comparison and at homogeneous zones over Ethiopia but RegCM3 performs better when aggregated on a country scale and when compared against high resolution rain gauge dataset.