Usefulness of ECMWF system-4 ensemble seasonal climate forecasts for East Africa

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This study evaluates whether European Centre for Medium-Range Weather Forecast (ECMWF) system-4 seasonal forecasts can potentially be used as input for impact analysis over East Africa. To be of any use, these forecasts should have skill. We used the 15-member ensemble runs and tested potential forecast skill of precipitation (tp), near surface air temperature (tas) and surface downwelling shortwave radiation (rsds) for future use in impact models. Probabilistic measures verified the ECMWF ensemble forecasts against the WATCH Forcing Data methodology applied to ERA-Interim data (WFDEI) climatology for the period 1981-2010. The Ranked Probability Skill Score (RPSS) assesses the overall forecast skill, whereas the Relative Operating Curve Skill Score (ROCSS) analyses skill of the forecasted tercile at both grid cell and over sub-regions with homogeneous rainfall characteristics. The results show that predictability of the three variables varies with season, location and forecast month (lead-time) before start of the seasons. Quantile-quantile bias correction clears biases in the raw forecasts but does not improve probabilistic skills. The October-December (OND) tp forecasts show skill over a larger area up to lead-time of three months compared to the March-May (MAM) and June-August (JJA) seasons. Temperature forecasts are skillful up to a minimum three months lead-time in all seasons, while the rsds is less skillful. ROCSS analyses indicate high skill in simulation of upper- and lower-tercile forecasts compared to simulation of the middle-terciles. Upper- and lower-tercile precipitation forecasts are 20-80% better than climatology over a larger area at 0-3 month lead-time; tas forecasts are 40-100% better at shorter lead-times while rsds forecasts are less skillful in all seasons. The forecast system captures manifestations of strong El Niño and La Niña years in terms of precipitation but the skill scores are region dependent.