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# Predictability of rainfall in Equatorial East Africa from daily to sub-monthly time scales

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Despite the enormous potential of precipitation forecasts to save lives and property in Africa, the generally low skill has limited their uptake. Where the forecasts have been used, the low skill makes the forecast-based decisions questionable at best. In particular, the performance of the forecasts is spatially and temporarily variable and therefore should not be generalised. To improve the performance of the models, and hence, their uptake, validation, analysis of possible sources of predictability and post-processing should continuously be carried out.

Here we evaluate the quality of reforecast from the European Centre for Medium-range Weather Forecasting over Equatorial East Africa (EEA). The reforecasts are initialised twice a week with lead time up to 45 days and are available from the subseasonal-to-seasonal (S2S) data base at a spatial (temporal) resolution of 1.5° (6-hourly). The evaluation is done using both satellite (Integrated Multi-satellite Retrieval for Global Precipitation Measurement) and ground-based (rain gauges) rainfall observations for the period 2000–2019. Both the raw and post-processed reforecasts are analysed, from daily to sub-monthly lead times and for temporal aggregations (48-hours and 120-hours total precipitation). To assess the skill of the reforecasts, an existing ensemble probabilistic climatology (EPC) derived from the observations is used as the reference forecast (Walz et al. 2021, doi: 10.1175/WAF-D-20-0233.1). First results show that there is potential of skill in the raw forecasts up to 10 days ahead particularly in the elevated areas of EEA. There is positive skill in the forecast of rainfall occurrence and the full rainfall distribution, i.e., the Brier Skill Score and the Continuous Rank Probability Skill Score, are positive in most areas, especially over land. As expected the skill decreases with lead time, vanishing completely between day 10 and 15. Aggregating the reforecasts enhances the scores further, likely due to reduction in time and temporal mismatches. The skill also varies seasonally with the long rains in March-April-May (the major dry season in June-July-August) having the best (worst) skill over most parts of the region. The raw reforecasts have a systematic bias, being overconfident at all lead-times. To correct for this bias, post-processing the reforecast using the isotonic distributional regression (IDR) method is applied and the improvement in performance will be discussed. Overall, initial results indicate that raw and postprocessed ECMWF S2S forecasts over EEA have more skill compared to findings in related studies for northern tropical Africa.