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Evaluation of the European Seasonal forecast Models for hydrological forecasting for improved water management in Africa

Solomon Hailu Gebrechorkos and Justin Sheffield
School of Geography and Environmental Sciences, University of Southampton, Southampton, United Kingdom
(shg1f19@soton.ac.uk)

Extreme drought and floods have a large societal impact if not appropriately monitored and if mitigation/adaptation measures are not developed and modified based on early warning of these events. Currently, there are only a few global seasonal forecast models available with a high temporal (e.g., daily) but coarse spatial resolution (~1°) that can provide early warning operationally. Application of these forecast models for long-term (up to 6-7 months) hydrological forecasting first requires evaluation of their skill against observed data. In this study, five European seasonal forecast models; Copernicus Climate Change Service (ECMWF), UK Met Office, Météo France, Deutscher Wetterdienst (DWD), and Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC), are used. The Multi-Source Weighted-Ensemble Precipitation (MSWEP) and Princeton Global Forcing (PGF) available at high spatial and temporal resolution are used as a reference dataset for precipitation and maximum and minimum temperature, respectively. Multiple methods such as correlation, percentage of bias and root mean square error and rainfall onset and cessation are used to evaluate the skill of individual models on daily, monthly, seasonal, and climatological periods. In addition, extreme indices (e.g., consecutive dry and wet days) developed by the Expert Team on Climate Change Detection and Indices (ETCCDI) are used. Finally, a bias-corrected multi-model weighted ensemble forecast is developed as input into a global hydrological model (Variable Infiltration Capacity (VIC)) for seasonal hydrological forecasting in Africa.