



Sub-seasonal precipitation prediction for Africa: Skill assessment and impacts of the MJO

Felipe Andrade, Elisabeth Thompson, Matthew Young, Caroline Dunning, Linda Hirons, Emily Black, and Steven Woolnough

University of Reading, National Centre for Atmospheric Science (NCAS), Meteorology, Reading, United Kingdom
(f.marquesdeandrade@reading.ac.uk)

This study analysed sub-seasonal precipitation hindcast quality over Africa using three operational ensemble prediction systems (ECMWF, UKMO, and NCEP) from the Subseasonal to Seasonal (S2S) prediction project database during the November-April and May-October extended seasons for the 1999-2010 period. Deterministic and probabilistic verification metrics were employed to evaluate weekly accumulated precipitation hindcast anomalies at lead times up to four weeks in advance. Correlation scores were found to be higher during the first two weeks and dropped as lead time increased, maintaining meaningful signals over west and east tropical Africa, particularly in the ECMWF model during May-October. The value of the ensemble mean of all available members in each model was contrasted to the value of ensemble size sampling using the same number of members for each model. This showed ECMWF and UKMO to be the top scoring models even when the minimum common ensemble size is considered. Systematic errors were measured through Mean Squared Skill Score (MSSS), exhibiting large errors after the first week. The Relative Operating Characteristic (ROC) showed probability scores better than climatology over tropical Africa for up to approximately three weeks. In order to verify how Madden-Julian Oscillation (MJO) teleconnections, affecting sub-seasonal African precipitation, are reproduced by the ECMWF model we investigated precipitation anomaly composites stratified according to MJO phase. These results reveal consistent variability patterns when compared with observations. Skill dependence based on initial MJO state is also demonstrated over selected tropical African regions.