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Title: Assessment of CORDEX Models in predicting rainfall onset in West Africa

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Abstract:

Reliable forecasts of rainfall onset dates (ROD) are important for agricultural planning and food security in West Africa. This study investigates the ability of CORDEX regional climate models (RCMs) to simulate ROD in West Africa using observed data (GPCP and TRMM) as a reference for the model validation. The evaluation focuses on how well the RCMs simulate the mean, standard deviation and interannual variability of RODs in 1998-2008. Four definitions based on rainfall threshold are used to compute ROD. In agreement with previous studies, GPCP and TRMM show that the mean ROD in West Africa has a zonal distribution with a northward (inland) increase in ROD from the coast. The highest interannual variability in ROD occurs over Guinea zone. However, while Sahel zone shows the highest spread in ROD (more late onset dates), Savanna zone shows the lowest spread in ROD. ERA-Interim reanalysis fails to reproduce the mean distribution of ROD as in observed data. The performance of some RCMs in simulating the RODs depends on the ROD definition used. For instance, ARPEGE, RACMO, PRECIS, and CCLM produce a better ROD distribution than that of ERAIN when three of the ROD definitions are used, but give a worse ROD distribution than that of ERAIN when the fourth definition is used. However, regardless of definition used, CCRM5, RCA35, REMO, RegCM3 and WRF show a remarkably improvement over ERAIN. The study shows that the ability of a RCM in simulating ROD over West Africa depends on the model capability in reproducing the northward movement of monsoon systems, and the associated features. This study shows how RCM can improve the forecast of ROD and enhance food security in the region in West Africa.

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