



Forecast Quality of West African Dry-Season Rainfall Events in ECMWF Operational and Reanalysis Data

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Case studies of unusual dry-season rainfall events in tropical West Africa show a close tie to forcing from the extratropics and a comparatively good forecast by the operational system of the European Centre for Medium-Range Weather Forecasts (ECMWF). This novel result raises the question whether there is a general tendency for better forecasts of such rare, but high-impact dry season rainfall cases. In order to investigate this question, we identified periods with anomalously high 72-hour rainfall sums averaged over a box spanning most of the West African Soudan and Sahel zones (7-15°N, 10°W-10°E). Two different datasets are considered: (a) Operational forecasts from the ECMWF archive for the period 1985-2006; (b) Forecasts made in the course of the generation of the ERA-40 re-analysis dataset for the period 1979-2001. The investigations are restricted to the boreal winter half year from November to April, i.e. the Sahel and Soudanian dry season. For the identification of significant events an exceedance threshold was set to three times the average monthly precipitation, also calculated from the 72-hour forecasts. The identified events were then subjectively validated against daily precipitation observations from synoptic stations in the region provided by the National Climatic Data Center (NCDC) in order to get a qualitative estimate of hits and false alarms. Unfortunately, the quality of the observational data does not allow a reliable estimate of misses and correct negatives.

The results reveal surprisingly large differences between the two datasets. On average 12.9 events per winter half year were identified in the operational forecast but only 6.7 events in ERA-40. This is mainly due to very high numbers of events in

the former dataset during the early part of the considered period, when rainfall tends to penetrate unrealistically far into the continent in the model. During the late 1990s and early 2000s, after several substantial improvements to the forecast model and the assimilation system by the ECMWF, much less events are predicted and these turn out to be mostly hits. In the ERA-40, where all forecasts were made with the same prediction model, there is no trend in the occurrence time series, but substantial interannual variability spanning values from 0 to 17 events. More robust statistics from this investigation will be presented at the conference.