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Probabilistic forecasts of the onset of the rainy season using global seasonal forecasts

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Seasonal forecasts for monsoonal rainfall characteristics like the onset of the rainy season (ORS) are crucial in semi-arid regions to better support decision-making in water resources management, rain-fed agriculture and other socio-economic sectors. However, forecasts for these variables are rarely produced by weather services in a quantitative way. To overcome this problem, we developed an approach for seasonal forecasting of the ORS using global seasonal forecasts. The approach is not computationally intensive and is therefore operational applicable for forecasting centers in developing countries. It consists of a quantile-quantile-transformation for eliminating systematic differences between ensemble forecasts and observations, a fuzzy-rule based method for estimating the ORS date and a graphical method for an improved visualization of probabilistic ORS forecasts, called the onset of the rainy season index (ORSI). The performance of the approach is evaluated from 2000 to 2010 for several climate zones (Sahel, Sudan and Guinean zone) in West Africa, using hindcasts from the Seasonal Forecasting System 4 of ECMWF. Our studies show that seasonal ORS forecasts can be skillful for individual years and specific regions like the Guinean coasts, but also associated with large uncertainties, in particular for longer lead times. The spatial verification of the ORS fields emphasizes the importance of selecting appropriate performance measures to avoid an overestimation of the forecast skill. The ORSI delivers crucial information about an early, mean and late onset of the rainy season and it is much easier to interpret for users compared to the common categorical formats used in seasonal forecasting. Moreover, the new index can be transferred to other seasonal forecast variables, providing an important alternative to the common forecast formats used in seasonal forecasting. In this presentation we show (i) the operational practice of seasonal forecasting of ORS and other monsoonal precipitation characteristics, (ii) the methodology and results of the new ORS approach published in Rauch et al. (2019) and (iii) first results of an advanced statistical algorithm using ECMW-SYS5 hindcasts over a period of 30 years (1981-2010) in combination with an improved observational database.

Rauch, M., Bliefert, J., Laux, P., Salack, S., Waongo, M., & Kunstmann, H. (2019). Seasonal forecasting of the onset of the rainy season in West Africa. *Atmosphere*, 10(9), 528.