Geophysical Research Abstracts
Vol. 19, EGU2017-14108-1, 2017
EGU General Assembly 2017

Statistical forecasting for precipitation over West Africa based on spatio-temporal precipitation properties and tropical wave activity

Peter Vogel (1,2), Manuel Klar (2), Andreas Schlüter (1), Peter Knippertz (1), Andreas H. Fink (1), Tilmann Gneiting (2,3)

(1) Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany, (2) Institute of Stochastics, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany, (3) Heidelberg Institute for Theoretical Studies (H-ITS), Heidelberg, Germany

Precipitation forecasts for one up to several days are of high socioeconomic importance for agriculturally dominated societies in West Africa, regarding both the occurrence as well as the amount of precipitation. However, disappointingly forecasts based on numerical weather prediction models and even statistically postprocessed forecasts still do not outperform simple reference forecasts such as climatology or persistence. More elaborate statistical forecasts can hopefully lead to an improvement in the quality of precipitation forecasts above climatological or persistent ones.

In this contribution, we concentrate on the potential of statistical forecasts to predict the occurrence of precipitation, while the prediction of the amount will be addressed in the future. Using increasingly sophisticated statistical models, we start with forecasts solely relying on the spatio-temporal information contained in precipitation observations. With the necessity of a full spatial coverage of precipitation observations in order to understand its spatio-temporal properties, we rely on Tropical Rainfall Measuring Mission (TRMM) observations and use accumulation periods of 1 to 5 days for the monsoon seasons from May to mid-October of the years 2007 to 2014. Especially for the full monsoon from the end of June to the end of September, the precipitation fields exhibit clear spatio-temporal information that is meteorologically interpretable and statistically meaningful. Using Markov models, we do in fact find an increased forecast quality for this period.

While such forecasts already outperform persistent and climatological forecasts for the full monsoon, the forecast quality increases further and also covers the whole monsoon period from May to mid-October, when we add additional predictors. We find the activity of tropical waves such as Kelvin or African Easterly waves or the Madden-Julian Oscillation to be informative predictors and test for additional predictors closely linked to precipitation. Overall, these new results show some promise to eventually develop a model that could be used in operational procedures and will generate a better forecast than the current state of the art.