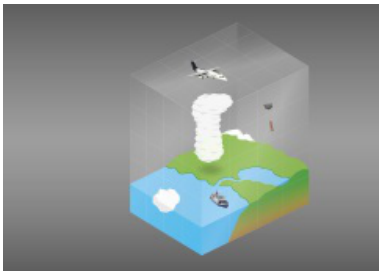

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Key Lessons from the DACCIWA (Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa) Project for Operational Meteorological Services

The DACCIWA project addressed weather, climate and air pollution problems in southern West Africa. The main field campaign in June-July 2016 produced the most comprehensive atmospheric dataset over this region to date. Operational products from ECMWF and other centres were used for a better planning of the field observations. The following conclusions from DACCIWA are highlighted as directly relevant to operational meteorological services.

The operational meteorological station network in West Africa is sparse and existing data are not always available for research, limiting evaluation of model and satellite products. Standard satellite cloud retrievals underestimate the frequency of low clouds during boreal summer by 20–30%, leading to errors in surface short-wave radiation. Inconsistent retrievals of short-wave absorption lead to uncertainty in estimating the total aerosol radiative effect. Satellite-based rainfall datasets tend to underestimate precipitation in the coastal zone (up to ˜8°N) with error compensations between different types of rainfall.

A new observations-based conceptual model for the low cloud decks of southern West Africa is now available as a benchmark for models. Warm rain and drizzle are frequent, impacting on cloud lifetime and the vertical distribution of moisture. Convective organisation is a key element of the local meteorology, creating large sensitivities to model resolution.

Skill of operational forecasts (ECMWF, MetOffice, DWD) of rainfall and cloud prediction is very low overall, with some skill evident on the regional scale when synoptic-scale vortices are present. Forecasts tend to be too cold and dry at the immediate Guinea Coast during the summer monsoon. Low clouds tend to be underestimated, leading to too much surface solar radiation. Explicit convection improves forecasts over Africa, but also medium-range forecasts elsewhere. Forecast improvements due to assimilating better observations into the operational ECMWF system are moderate at best, pointing to model errors being a substantial obstacle to better forecasts.

Primary authors: KNIPPERTZ, Peter (Karlsruhe Institute of Technology); Dr BENEDETTI, Angela (ECMWF); Dr MARSHAM, John H. (University of Leeds)

Presenter: KNIPPERTZ, Peter (Karlsruhe Institute of Technology)

Track Classification: Workshop: Observational campaigns for better weather forecasts