Geophysical Research Abstracts
Vol. 14, EGU2012-11653, 2012
EGU General Assembly 2012

Convection-permitting ensemble forecasts for West Africa

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Is it possible to create a convection-permitting ensemble system that is reproducing the variability of organized convection in location, timing and intensity?
To address this question, we are applying our model forecasts to West Africa as there is a variety of cases of deep convection developing into mesoscale convective systems (MCSs) during the monsoon season. Therefore, the operational setup of the limited-area model COSMO (formerly known as Lokal Modell (LM) that had been developed at Deutscher Wetterdienst (DWD)) was adjusted for application in tropical regions, e.g. by increasing the vertical extent of the model layers from 22 km to 28 km to allow for deep tropical convection.
In a first step, we evaluated clustering techniques that we use to choose representative members from the ensemble prediction system of the European Centre for Medium-Range Weather Forecasts (ECMWF EPS). The clustering had to be adapted to the tropical region, i.e. the variables and heights conventionally taken for clustering were modified. The attained representative members serve as multiple initial and boundary conditions for the COSMO model.
On the other hand, the variability between the members in the ECMWF EPS is very low at the surface while we know from former studies that surface heterogeneities are of major importance for convection initiation in West Africa. Thus, the second step was to apply further variability to the surface, e.g. to surface soil moisture by adapting satellite-derived soil moisture to the soil model of the applied COSMO model. In this way we build our convection-permitting ensemble by combination of multiple initial and boundary conditions that exhibit variability mainly in the atmospheric variables and additional perturbations in the initial surface conditions.
The presentation will explain the creation of our ensemble in more detail and demonstrate first modelling results.