Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08135, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08135
EGU General Assembly 2008

Forecast verification of cloud cover with satellite observation over West Africa

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Three-hourly brightness temperatures (BTs) at 10.8 μm from the Meteosat Second Generation (MSG) satellite were used to document the cloud system variability over West Africa in summer 2006 and to evaluate the quality of the Meso-NH model to forecast cloud cover in the African Monsoon Multidisciplinary Analysis (AMMA) framework. Cloud systems were observed over the Guinean and Sahelian bands with more fequent occurrence and patchier structures in the afternoon. Some intraseasonal variations of the number of cloud systems were found, partly related to the intermittency of the African Easterly Wave (AEW) activity. Compared to the MSG observations, the Meso-NH model reproduces the overall variation of the BT at 10.8 μm well at D+1 forecast. The model captures the BT diurnal cycle under conditions of clear sky and high cloud cover, but misses the lowest BT values associated with deep convection. Forecasted cloud systems are more numerous and smaller, hence patchier, than those observed. These results suggest some deficiencies in the model's convection and cloud parameterization schemes. The use of meteorological scores further documents the skill of the model to predict cloud systems. Beyond some systematic differences between simulations and observations, analysis also suggests that the model high-cloud forecast is improved under specific synoptic-forcing conditions related to AEW activity. This indicates that room exists for improving the skills of weather forecasting over West Africa.