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Effect of an African squall line on desert dust cycle: a case study during AMMA 2006

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Accurate modeling of African squall lines is a prerequisite condition when investigating African climatology in the Sahara/Sahel region as they are a prominent feature of this region. Squall lines are known to have an important impact on desert dust cycle when the underneath surface is arid or semi-arid. However, modeling this dust cycle related to these perturbations is still complex: it is necessary to use fine resolution and a detailed cloud microphysics.

The questions we address here are:

- What is the dust emission intensity, spatial extension and duration?
- What is the amount of deposited dust (dry and wet scavenging)?
- What is the fate of the remaining particles? In other words, how can we assess the concentrations of these aerosols, in particular at higher levels? This question is related to the potential role of desert as ice nuclei.

We have modeled a 5-day period during the AMMA experiment (June, 29 – July, 3, 2006) over Niger. During these days, a succession of perturbed systems passed over the experimental site of Banizoumbou, including at least a squall line (during the night from July, 1 to July, 2). We used the mesoscale RAMS model [*Cotton et al.*, 2003] coupled online with the dust production model (DPM) developed by *Marticorena and Bergametti* [1995].

We show the prominent role of the complex 3D circulation associated with the squall line on the boundary layer wind field, which, in turns, strongly controls the aeolian dust emission. The model validation is based above in-situ measurements, as well as remote sensing. We outline the mass budget (mobilization and deposition) and concentration profiles.