



Analyse of direct and indirect effects of Saharan dust on convection and on the African monsoon circulation during the FENNEC project using WRF-CHEM

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The aim of this study is to analyse the local impacts of dust on convection and on the West African monsoon circulation. Using the regional models WRF-CHEM, different dust schemes have been tested to quantify the impacts of dust on convection and on the main components of the West African monsoon, such as the West African Heat Low (WAHL), African Easterly Waves (AEWs), monsoon and harmattan winds.

The specific pre-onset period of the monsoon precipitation over the Sahel has been simulated, in 2011 during the FENNEC project. We have investigated a 15-day period from June 10th to 25th. During this period, high dust concentration over the Sahara has been detected using satellite observations and the WAHL settled in its summer Saharan location.

In this study, we have observed that WRF-CHEM is able to reproduce dust outbreaks and transport as detected in the satellite and airborne observations. This study also highlights the two effects of dust on the monsoon circulation over the Sahara: a so-called direct effect associated with dust radiative heating, which increases the WAHL thickness, and a so called indirect effect that modifies mid-level and deep convection over the Sahel.