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Surface wind and erosion in the Sahel within CAVIARS

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During the past decades, the Sahel experienced major climatic fluctuations, notably in precipitation, vegetation and land use. The precise role of these changes on wind erosion remains unclear though. The CAVIARS (for Climate, Agriculture and Vegetation : Impacts on Aeolian ERosion in Sahel) aims to address this issue with the help of coupled state of the art models of wind erosion and vegetation, fed by comprehensive input datasets, among which the surface wind field.

In the Sahel, deep precipitating convective events generate strong gust episodes which contributes significantly to wind erosion over bare soil, even though they take place over very limited time and space scales. These scales are much finer than the grids of current meteorological analyses of surface wind speed used to fed erosion models. Such a lack of representation of convectively-induced wind gusts is also shared by most climate models and raise major issues about the modelling of wind erosion in the Sahel.

Within CAVIARS, we are currently developing a methodology to improve the surface wind field provided by the ECMWF reanalyses (ERA-40 and ERA-Interim), by explicitly taking into account these gusts. The approach is largely based on a statistical analysis of multi-day convection-permitting (a few km grid) and large-eddy (a few hundreds of metres) simulations of Sahelian deep convective events (see poster by Largeron et al., this session).

In this talk, we will first provide an overview of the CAVIARS project. Then we will focus on surface-wind related issues, and discuss the physical processes responsible for convective gust winds. We will review existing methodologies attempting to account for convectively-generated winds and further illustrate this topic with our recent results.