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Sensitivity of WRF-Chem model to land surface schemes: Assessment in a severe dust outbreak episode in the Central Mediterranean (Apulia Region)

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Abstract

The Weather Research and Forecasting model with online coupled chemistry (WRF-Chem) is applied to simulate a severe Saharan dust outbreak event that took place over Southern Italy in March 2016. Numerical experiments have been performed applying a physics-based dust emission model, with soil properties generated from three different Land Surface Models, namely Noah, RUC and Noah-MP. The model performance in reproducing the severe desert dust outbreak is analysed using observational dataset of aerosol and desert dust features that includes optical properties from satellite and ground-based sun-photometers, and in-situ particulate matter mass concentration (PM) data. The results reveal that the combination of the dust emission model with the RUC Land Surface Model significantly over-predicts the emitted mineral dust; on the other side, the combination with Noah or Noah-MP Land Surface Model (LSM) gives better results, especially for the daily averaged PM_{10}.

Keywords: Dust outbreak, Land Surface Model, Gocart Aerosol model, WRF-Chem modeling