



Tuning dust Schemes in Weather Research Forecast For Simulating Severe Events Over Egypt

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Weather Research and Forecasting model coupled with chemistry (WRF-Chem) was used to simulate selected severe dust storm events over Egypt in terms of the aerosol optical depth (AOD). Two severe events on 22 January 2004 and 31 March 2013 are included in this work. The model results are compared against satellite data From the Moderate Resolution Imaging Spectroradiometer (MODIS) on board NASA's Aqua Satellite. The Spatial Resolution for both data sets are 10 km. Sensitivity analysis for dust emission schemes in the model was performed to identify the best dust scheme able to simulate the events.

The analysis includes three dust schemes; the Goddard Chemistry Aerosol Radiation and Transport (GOCART) dust emissions, the GOCART dust emissions with Air Force Weather Agency (GOCART-AFWA) modification and the GOCART with University of Cologne (GOCART-UOC) modifications.

Each scheme was tested by adjusting scheme coefficients related to the dust flux. The results of the WRF-Chem simulations underestimates the AOD for all the three schemes. By tuning the scheme coefficients, it was always possible to reduce the bias of model output as compared to satellite data. Different tuning were required for each case depending on the origin and composition of the dust storm. Model output and MODIS data were also compared against Aerosol Robotic Network (AERONET) Cairo Station.