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Discussions

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Interactive comment on "**Assessing atmospheric dust modelling performance of WRF-Chem over the semi-arid and arid regions around the Mediterranean**" *by* **Emmanouil Flaounas et al.**

Anonymous Referee #3

Received and published: 5 July 2016

Review of the acp-2016-307 paper

This paper reports on testing the performance of a regional dust-atmospheric modeling system. The study aims at optimizing the WRF-Chem model performance with added dust aerosol component in order to be capable to operationally forecast of dust transport over the eastern Mediterranean. The presented model is another one in the family of dust prognostic systems which development follows the interest of community to better predict dust process and its various impacts.

The authors successfully performed a series of tests to understand the performance of three used emission schemes, and to tune the model to achieve the optimal accuracy in different regions of the model domain. I recommend this paper to be accepted for

publication after the authors consider suggestions and revisions as listed below:

Page 1 line 28: Tuning the model performance by applying a coefficient to dust emissions I agree this is the most straightforward way to vary the intensity of emissions and accept it as one of ways to tune the model. However, by this approach only a linear change of values every time everywhere is done. There are other possibilities as well such as e.g. modifying values of the threshold surface wind or friction velocity, aeolian surface roughness length, etc. Please discuss more this aspect and other possible ways for tunning.

Page 3 line 138: we nudged wind, temperature and water vapour at each grid point to the ERA-I reanalysis The authors claim that one of their objectives is ...to establish an empirically tuned dust forecasting model for the effective forecast of dust transport... By using nudging, operational features of the model could be contaminated. Once used, why nudging is not applied only to wind as the most critical parameter for emission? My general concern is that frequent nudging as applied in the experiment could affect the thermodynamic features of the atmosphere with unknown consequences. Please discuss possible impact of nudging to the operatibility of the model and eventual affecting the model thermodynamic balance.

General: The presented extensive verification is certainly a good guidance how to select model setup based on more reliable emission options. However, since the authors' intention is to have a well tested model to be used for forecasting purposes, I strongly suggest that they select one of major dust storms during the considered experiment period and present a more close-up view so that a reader could get a better feeling on the model capability to successfully predict particular dust events.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-307, 2016.