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Interactive comment on "WRF-Chem v3.9 simulations of the East Asian dust storm in May 2017: modeling sensitivities to dust emission and dry deposition schemes" *by* Yi Zeng et al.

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To the Editor: I find it very difficult to read the paper with the figures in the end of the paper. I do not understand why journals still like to see the figure in the end. These days, most people read the paper and do the review online. While reviewing online, it is inconvenient to go and see the corresponding figure by scrolling all the way to the end of the paper, and then come back again to continue reading the text. The figure should be placed inline with the text, near the text when the Figure is mentioned first. Anyway, this is an editorial issue and I am not sure how we can change this system.

Detailed Review: The paper is mostly well written and well structured. The main sci-

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entific value of the paper is that it helps to identify the best depositional scheme for WRF Chem model. However, the model simulations were performed over a short period so the conclusions are questionable. Line 215: cite the figure that shows the study domain. 219: You say here: The meteorological conditions are reinitialized every 24 hours. But then you say only chemical conditions are reainitialized. Which one is true? Please specify the details explaining how exactly you implemented this in WRF Chem and which variables you updated. MOSAIC 8 bin scheme is computationally intensive and it is understandable why the authors chose 4 bin option. But I don't understand why you conducted simulations only for a dust episode (1week). Whenever one intends to evaluate a model, he/she must design the experiment more consciously. A year-long simulation is ideal because seasonal aspect has to be covered. This could be achieved by increasing the resolution or reducing the size of the domain. Of course, we must find a balanced model set up that serves to investigate our research goal. 245-285: These results are just some comparison and are not of much scientific value. There are several other previous studies which have compared different dust emission schemes. You have compared the simulated AOD with MODIS AOD which is good enough. Dust depositional aspect is not covered in the literature much so I suggest the authors to stick to the depositional aspect on this paper. I don't see why it was necessary to conduct simulations with different dust schemes because the main purpose of the study was to investigate the dry deposition processes. 200: It might be wise to define rebound effect, interception and collection efficiency in a simple, understandable language for the benefit of readers. Coming to the world of 'reality' from the world of 'equations' and giving some practical definition would be good. What happens when the dust falls on the leaves or a surface? What is the effect of type/condition of surface on dust deposition? Wet surface or dry surface, does it matter? And what happens after deposition? Does the deposited dust get blown away, or does it get washed away? Are these equations of depositions considering realistic processes? Or Are they just some 'theoretical' equations? 232: ....stations...please mention "locations shown in results section". 403-404: On what basis? Based on Table 4? Please refer to the

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correlation/rmse values and discuss. 845: Figure 6, you mentioned that 1000 stations data were used but in the figure, it appears that most stations lie outside the six boxes chosen. Why not use all the stations? 850 Figure 7: Are the statistics calculated using daily-mean data? Please mention about this in the Figure caption. Line 368-373: The study domain is big and there exist time differences in different areas. How did you extract output at 13:00pm local time? If you are using level-3 MODIS data, using daily-average data would be fine because 1:30 pm local time is only at equator. Figure 8, the shaded color appears only in northern China region and data look empty in most region. Why so much data gaps in the model results? And why only use the data for May 7? My suggestion is to use time-averaged AOD during the dust episode and do the comparison. 380-384: Low correlation is understandable because WRF Chem can't reproduce dust events at hourly or daily time scale. It is extremely challenging to model short-lived dust events. So don't blame it to MODIS data. But, it would be better to time-average the data during the whole period (1-7may) and calculate spatial correlation coefficient and corresponding RMSE. Were R and RMSE calculate in this manner?

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