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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Model development of dust emission and heterogeneous chemistry within the Community Multiscale Air Quality modeling system and its application over East Asia" *by* X. Dong et al.

Anonymous Referee #2

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This study updated the dust model in CMAQ with revised parameterization scheme, speciation profiles and heterogeneous chemistry. Significant improvement after the modification has been proven by its successful application in East Asia. The study is an important and very worthwhile exercise. Publication of the manuscript is recommended with minor revisions as suggested below.

General

The simulation period need to be clarified in the method section 2.4. As the analysis

is mainly focused on the spring time from 2006 to 2010, it would be better to explain how to initialize the model for each year. Temporal coverage of observation data with screening criteria is also suggested to add in Table 4.

Specific

P35598 L17, I found difficulties to understand the function (6). Should that only apply to the case when Sm is > Wmax as stated in L11?

P35602 L21, "the ACM2 PBL scheme" should be introduced at WRF part

P35603 L20, I would suggest to clarify that Dust_profile, Dust_Chem and Dust_Chem_High were performed based on Dust_Revised.

P35605 L27, the sentence of "with relatively larger discrepancy in cities close to the Gobi Desert." is confusing, please revise it

P35606 L1-2, is that based on daily records of all API sites from spring in 2006-2010?

P35607 L1-2, "The two cities are close to the Gobi Desert, as shown by Fig. 1.", Such information cannot be found in Figure 1

P35607 L19-20, need to clarify that these two observations (API and Huang et al. (2010)) cover the same time period?

P35608 L4-5, "O3 (1st row), SO2 (2nd row), SO24 (3rd row), HNO3 (4th row), NOx (5th row), and NO3 (6th row)", that doesn't match with the layout of Figure 6

P35609 L10-12, "The elevation of NOx concentration should be attributed to the conversion of gas-phase HNO3 back to NOx (Yarwood et al., 2005)" Since O3 and OH is reduced, that might also account for the change in NOx and NO3

P35635 Figure 2, the orange rectangles are hardly to find. it would be helpful to add the location of the Gobi and Taklamakan desert as well.

Editorial

P35596 L3, “simulation” to “simulations”

P35597 L20, “elsewhere” to “in”

P35599 L23, “emission” to “emissions”

P35606 L4, “simulation without dust emission” to “no dust emissions”

P35607 L15, “one set of data pairs” to “Dust_Profile”

P35614 L28, “al” to “all”

P35615 L19, “comapred” to “compared”

P35617 L7, “Model development” to “Dust model”

P35617 L16, “bye” to “by”

P35628 Table 1, “in next section” to “in this study”

P35630 Table 3, “intial” to “initial”

P35631 Table 4, please check the title

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 35591, 2015.