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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mesoscale modeling study of the interactions between aerosols and PBL meteorology during a haze episode in China Jing–Jin–Ji and its near surrounding region – Part 1: Aerosol distributions and meteorological features" *by* H. Wang et al.

Anonymous Referee #1

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Review comment on "Mesoscale modeling study if the interactions between aerosols and PBL meteorology during a haze episode in China Jing-Jin-Ji and its near surrounding region- Part 1: Aerosol distributions and meteorological features" by H. Wang et al.

General comments This manuscript, using chemistry transport model GRAPES_CUACE results to investigate aerosol properties including aerosol optical depth (AOD), single scattering albedo (SSA) and asymmetry parameter (ASY)

and meteorological conditions during a haze episode in Jing-Jin-Ji, the national capital region of China also known as biggest urbanized regions in Northern China. The model results are validated with measurements from ground-based stations and space-born satellites (e.g. MODIS, CARSNET, and AERONET). The model simulations are in good agreement with observations and provide the characterized atmospheric aerosol properties during the haze episode. The analysis shows that PBL processes such as horizontal transport and vertical turbulent diffusion within PBL height play a key role in the formation of haze with high PM2.5 concentrations. The results are interesting and the study is meaningful for understanding the formation of the regional haze in China. However, the manuscript is not written in clear and concise English. Please have the manuscript examined by a native English speaker or ask for editor's help to improve the overall language of the paper. I recommend its publication basically in a revision in accordance with the following comments.

Major comments

1. The major analysis in this study pays much attention to comparison between modeled and observed data. I prefer this study, based on interaction between gas/aerosol chemical and physical processes, to answer the question how the haze episode builds up makes more scientific sense and that may require further work.

2. The introduction to datasets used for the model initialization and updating boundary conditions is not clear for both chemistry and meteorology. Line 8 on Page 31685: "The initial values of all tracer gases and aerosol concentrations are based on the 24h forecast made by the previous day's model run". I am wondering what data are used for initialization at very beginning of model runs. Do not you use simulations from global (or over a larger domain) chemical transport model to serve as initialization and time-dependent boundary conditions?

Minor comments 1. Line 8 on Page 31685: "The initial values of all tracer gases . . ." might be "The initial values of all long-lived gases in RADM2. . .". As per my under-

standing, tracer gases are inert in chemistry.

2. Line 26 in Abstract: “The momentum transmitting downward of the cold air from above the PBL to the low PBL and surface lead to an increase in surface wind speeds and haze dispersal” may be changed into “The cold air above PBL with high momentum downward to lower atmosphere and surface layer is responsible for increase of surface wind speed. That leads to decreasing of PM2.5 concentration”.

3. Line 4 on Page 31679: What is the definition of “pollution strength”.

4. Line 5-14 on Page 3167: The presentation in this part is not clear. Please re-write clearly, correctly, and concisely.

5. Line 2 on Page 31685: “. . ., formed the simulation basis of this research.” may be changed to “. . ., serve as the base simulations for this research.”

6. Line 20 on Page 31685: “. . . which fills in data gaps left by . . .” might be “. . . which fills in data gaps remaining in . . .”.

7. Line 22 on Page 31686: “. . . (SACOL) station on the Lanzhou University campus . . .” should be “. . .(SACOL) station located at the Lanzhou University campus . . .”.

8. The first paragraph of section 4.2 need to be re-written because it is not logically clear on PBL and processes involved in PBL.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 31675, 2014.