

Interactive comment on “The Contributions to the Explosive Growth of PM_{2.5} Mass due to Aerosols-Radiation Feedback and Further Decrease in Turbulent Diffusion during a Red-alert Heavy Haze in JING-JIN-JI in China” by Hong Wang et al.

Anonymous Referee #1

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The understanding of atmospheric boundary layer and its impact on air quality is an important issue in atmospheric environment study. Focusing this scientific issue, this paper investigated the effect of aerosols-radiation feedback on turbulent diffusion during a Red-alert Heavy Haze in JING-JIN-JI in China, by employing the atmospheric chemical model GRPAES_CUACE with three simulation experiments. It is interesting to investigate the impacts of aerosols-radiation feedback on PM_{2.5} changes between the climbing stage and explosive growth stage. This study results illustrated that the

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PBL scheme in current atmospheric chemical models is probably insufficient for describing the extremely stable atmosphere in explosive growth of PM_{2.5} during severe haze events in JING-JIN-JI in China, which may involve in two important reasons: One is the absence of online calculation of AF, another is the deficient description of the extreme weak turbulent diffusion in the PBL scheme in the atmospheric chemical model. This manuscript presenting the interesting results could improve our understanding on environment changes and fall within the scope of ACP. I suggest the minor revisions before it is published as follows:

1. The paper needs to give the model settings of GRPAES_CUACE, such as physical and chemical parameterizations.
2. It needs to add meteorological factors evaluation, especially wind speed, because wind speed has a deeply influence on diffusion of PM_{2.5}, and temperature inversion in PBL.
3. It could be better to add turbulent diffusion coefficients calculated by observation data if possible.
4. Please compare the downward long radiation in three experiments to figure out the contribution of aerosols.

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