Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2020-303-RC1, 2020

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The interaction between urbanization and aerosols during the typical haze event" *by* Miao Yu et al.

Anonymous Referee #1

Received and published: 25 April 2020

The interaction between aerosols and urbanization during haze events is investigated due to the surface energy balance using the Rapid-Refresh Multiscale Analysis and Prediction System-Short Term (RMAPS-ST). Aerosols reduce urban-related warming during the daytime. It was found that atmospheric warming decreased by 30 to 50% if the concentration of PM2.5 increased from 200 to 400 μgÂům-3. Aerosols enhance the urban-related atmospheric warming at night during such an PM2.5 increase by approximately 28%. This is important for haze formation. Urbanization reduced the aerosol-related cooling effect by approximately 54% during the haze event, and the strength of the impact changed little with increasing aerosol content. The impact of aerosols on urban-related warming is more significant than the impact of urbanization on aerosol-related cooling. Aerosols decreased the urban-impact on the mixing layer

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Discussion paper

height by 148% and on the sensible heat flux by 156%. Furthermore, the aerosols decreased the latent heat flux, and the impact was reduced by 48.8% due to urbanization. The impact of urbanization related changes in on the reduction of pollutant concentrations is more important than that of aerosols. The radiation interaction between urbanization and aerosols may enhance the accumulation of pollution and decrease transport of pollution. General comments A general description of physical processes between aerosols or PM2.5 and warming and cooling are missing in the abstract. A more general discussion of the atmospheric physics which is studied here is required to understand what the authors want to tell us. This topic is much better handled in the chapter Introduction. But the last sentence of the Introduction is producing questions so that this statement should be deleted here but discussed in the chapter Conclusions. The description of methods is missing an overall statement which data are required and why. There it is necessary also to show what is available and which data are missing. It should be explained why the data basis is complete for this study. Then the algorithms and models should be discussed by the same view: why you do what and why this way can provide the expected results or answers to the hypothesis. The description of results is very detailed so that more information for understanding is required as mentioned above. The chapter Conclusions are a summary, a discussion and some conclusions. The discussion is missing the relation of the study results to the overall knowledge. What is new? What are the conclusions for the overall knowledge and the study area? The paper addresses relevant scientific questions within the scope of ACP. The paper presents novel concepts, ideas, tools and data. The scientific methods and assumptions are valid and clearly outlined so that substantial conclusions are reached. The description of experiments and calculations allow their reproduction by fellow scientists. The results are sufficient to support the interpretations and conclusions. The quality of the figures is good. The figure captions should be improved so that these are understandable without the overall manuscript: terms must be explained, description of parameters (Fig. 2c). The related work is well cited so that the authors give proper credit to related work and own new contribution. The title reflects the whole content of

the paper. The abstract must be improved (see above) to provide a concise and complete summary. The overall presentation is well structured and clear. The language is fluent and precise but must be improved in very much details. It is necessary that a native speaker is improving the manuscript. The mathematical formulae, symbols, abbreviations, and units are generally correctly defined and used. No parts of the paper (text, formulae, figures, tables) should be reduced, combined, or eliminated. The number and quality of references is appropriate. Specific Comments Please follow the guidelines to write the references: the authors of papers are incomplete, after the title you set a"." or a ",", some paper references include the doi number and other not. Technical corrections Line 76 Crutzen instead of Cruten.

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