

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

Anonymous Referee #2

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Summary The authors investigate the interaction between aerosols and urbanization during a severe haze event via the RMAPS-ST model. Results indicate that a 100% increase in PM_{2.5} (200 to 400 $\mu\text{g}/\text{m}^3$) reduced daytime urban-related warming by 20% (from 30-50%). However, urban-related warming increased approximately 28% in response to aerosols- important for haze formation. With regards to urbanization, the aerosol-related cooling effect was reduced by approximately 54%, changing little with aerosol increases. The study also found that aerosols reduced the urban-impact on the mixing layer, sensible heat flux, and latent heat flux by 148%, 156%, and 48.8%, respectively. This reviewer’s main concern is related to whether or not the authors address aerosol typology in the model. If so aerosol chemistry was considered, then how? The work could be greatly improved with better section transitions, and by ad-

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dressing several items described below.

Abstract- Which haze event? The authors should specify. Lines 30-33: Rephrase for better flow. Lines 37-38: Unclear.

Introduction- The authors thoroughly cite references to support statements and do a good job of showing the importance of aerosol-urban impacts. They also state that quantitative evaluation of urban impacts on aerosols and vice-versa has not been conducted simultaneously in metropolitan areas. There are several sentences that need to be rephrased- some of which are listed below. Lines 43-46: Rephrase to improve the flow. Lines 49-54: These lines can be connected better connected. Lines 74-75: Rephrase. Lines 87-88: Which “conclusions” specifically? Line 103: Add the word “model” after (RMAPS-ST) Line 104: Remove “the mechanism of”

Methods- The authors immediately describe four observational data types used for the study and provide a map of the locations (in Figure 1, is the shaded region topography? What units?). This reviewer was expecting a mention of the high RMSE values for longwave and shortwave (Table 1). What is this attributed to? Line 113: Rephrase to “synoptic conditions” Lines 143-154: What considerations were made for other important aerosol parameters such aerosol particle size distribution and typology?

Results- The authors first describe the haze 15-22 December 2016 haze event, thoroughly describing the evolution of the event in three stages. The specifics of the simulation are then described, but this section should be moved to Methodology (Section 3.2). Simulation results are then described. There are so many numbers in the results section that an additional table could be added. The authors could also organize the results better, as it is a bit confusing going back and forth from aerosol impact on the urban to urban impacts on the aerosol. 246 pollution and by up to 56% under heavy pollution Line 167: What makes a heavy haze event typical? Lines 194: “on” the morning of. . . Lines 222-226: Rephrase, and also consider replacing the word “obviously”. Figure 6: Are these results averaged over a specific grid? Lines 270-271: What is

meant by “a few differences”? Lines 308-309: I think I understand what you’re saying here, but this needs to be clearer. Line 329: wind fields “are” very important.

Conclusion- The authors summarize their findings and highlight the most important results. The paper ends without the authors discussing the implications of their findings their findings, and could benefit from such a discussion being added. Line 379: Why not just list the actual maximum concentration?

Figures- Figure 3: Is difficult to see, the red dashed contours are not clear on the panels. Figure 4: Add units on the left axis. Also, consider using a box instead of the extra shaded regions on the 16th, 17th, and 19th. Figure 9: This reviewer finds this plot to be well put together (just wanted to say that!).

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