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Interactive comment on "Incoming data quality control in high-resolution urban climate simulation: Hong Kong-Shenzhen area urban climate simulation as a case study using WRF/Noah LSM/SLUCM model (Version 3.7.1)" *by* Zhiqiang Li et al.

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Dear Reviewer,

We appreciate you for spending time to review our paper and providing some valuable comments. It is your valuable and insightful comments that led to possible improvements in the current version. We have carefully considered the comments and tried our best efforts to address every one of them. However, some revisions still cannot

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Discussion paper

meet your high standards. The authors welcome further constructive comments, if any. We provided the point-to-point response first and will provide the updated version of the paper after proofreading complete. Below we provide the point-by-point responses. All modifications in the manuscript have been highlighted in red.

Sincerely,

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[General Comment] The paper addresses the importance of incoming data quality control and presents a robust method for evaluating its impact on climate simulation results. The authors find that the high-quality land surface input data would provide more distinct spatial details in the modeling results but would not bring significant improvement to weather prediction. This finding is a very interesting point and is critical to the model development. The study is valuable to be published in a high impact journal.

Response: Thank you very much for your valuable comments. We are also happy that you agree with our points of view on climate model evaluation.

[Comment 1] Please provide more explanation on TCSV, PSS and PDF results. For example, what is the indication of 'the PSS annual mean values of Case-ULSD deteriorated 2.7% in precipitation' while 'the annual mean values of the specified interval of the PDFD of Case-ULSD improved 2% in precipitation'?

Response: Thank you very much for the comments. Indeed, we provided detailed explanations of the evaluation methods (TCSV, PSS, and PDF) in its companion paper - Li, Z., Zhou, Y., Wan, B., Chung, H., Huang, B., & Liu, B. (2019). Model evaluation

of high-resolution urban climate simulations: using the WRF/Noah LSM/SLUCM model (Version 3.7. 1) as a case study. Geoscientific Model Development, 12(11), 4571-4584. Moreover, we added a note in Subsection 2.2 [Pg3, Ln17-19].

[Comment 2] The surface temperature seems very important in the modelling as shown in the Figure 11. Could you provide more explanation of the 'surface temperature'? In addition, is the 'surface skin temperature' in the MODIS/Aqua product the same as the 'surface temperature' from the WRF model? By the way, I really like your Figure 11, a very good presentation to show the interplay among different factors.

Response: Thank you very much for the comments. In a physical meaning, the land surface temperature in MODIS/Aqua product and the surface skin temperature in WRF simulation are two different concepts. The land surface temperature is the grid-mean brightness temperature of the earth, which is calculated base on the blackbody radiation theory. The surface skin temperature is a land's state variable in WRF, which is adjusted iteratively in each calculation base on the balance of the radiation, the sensible heat flux, the latent heat flux, and the soil heat conduction flux. The value of the surface skin temperature may diff a bit from one of the land surface temperatures in the same grid. However, these two variables are highly correlated. Therefore, we use the land surface temperature to evaluate the quality of the surface skin temperature in the WRF simulation. We added a technical note regarding the surface skin temperature and the land surface temperature, [Pg3, Ln29 – Pg4, Ln4]. Moreover, we also corrected a mistake (Surface temperature is incorrect. The correct on is Surface skin temperature) in Figure 11.

[Comment 3] Please add TCSV figures of land surface temperature, relative humidity, precipitation and wind speed in the supplementary material.

Response: Revised accordingly: added Section S5 into the Supplementary material.

[Comment 4] Please provide more information for the model setting (e.g. model version, domain boundary) and data sources of input data.

Response: Thank you very much for the comments. We added Section S6 into the Supplementary material for providing more information on model setting. We already provided the information on data sources of input data in Subsection 2.3.

[Comment 5] Based on your findings, what are your suggestions for modeling development, e.g. balancing incoming data quality and parameterization schemes for a better weather prediction?

Response: It is a good question. Admittedly, the incoming data quality contributes to improving the quality of modeling results. The sensitivity of land surface processes to input land surface data are also crucial for improving the quality of modeling results. For further steps in the atmospheric model development, we suggested improving the sensitivity of the urban land surface model to the input land surface data. We added a suggestion for modeling development in Section 4.

[Comment 6] Corrections: (1) Figure 4 and Figure 5: the plots and figure captions are not consistent. (2) In the first paragraph of section 3.2, it should be 'Figure 6' instead of 'Figure 5'.

Response: Thank you very for the reminder. (1) Revised accordingly: Figure 4 [Pg5, Ln4], and Figure 5 [Pg6, Ln1]. (2) Revised accordingly, [Pg6, Ln8].

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