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Geoscientific Model Development Discussions

Interactive comment on "Intercomparison between the Integrated Urban land Model and the Noah Urban Canopy Model" *by* Chunlei Meng and Junxia Dou

Anonymous Referee #2

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General comments:

The study compared the results from IUM and NoahUCM against the measurements in Beijing, China. The comparison is focused on the energy fluxes (upwelling components in radiation, Rn, H, LE, and G), via the discussion on the different algorithms used in the two models. Most time-invariant parameters were retrieved from the default values or look-up tables without specific calibration. The authors drew the conclusions based on the difference in model mechanisms. It is noteworthy that, however, neither model was capable of producing reasonably accurate estimation at the study site with the setting in the current study; this amounts to the main (and major) flaw of this

manuscript. The conclusions are primarily on the suggestions for future studies and applications of the two models, including the use of remote sensing albedo in NoahUCM, considering of urban street geometry in IUM, parameterization of friction velocity, and the importance of urban hydrological models, etc. Since both NoahUCM and IUM showed significant errors on the considered energy fluxes (except for upwelling shortwave radiation), these suggestions, though applicable for urban studies in the broad sense, cannot be substantiated based on the results. The lack of model calibration against observational data in this study is hardly acceptable. It is recommended that the manuscript should be revised by including appropriate and careful calibration and evaluation of, at least one model, against quality observation and compare the other to the calibrated benchmark; or to calibrate both to the observation and compare the difference in model mechanisms. For both options, the inclusion of the observation data is essential. Overall, the results are not able to fully answer the study question raised in the Discuss stage. Both the technical merit and the quality of presentation (figures, typos, etc.) of this manuscript needs to be substantively improved before it is fitting for publication. Specific comments are detailed below.

Specific comments:

1) Detail information on LULC is needed for readers, such as the average building height, canyon aspect ratio, fractions for each LULC category, etc.

2) Much redundant but unnecessary information is provided, such as content in line 258-260, line 370-372 and line 388.

3) Many vague descriptions in quantitative comparison: such as 'too high' (line 265, 295), 'little higher' (line 273), 'little lower' (line 273), 'apparently larger' (line 292, 302), etc. It is recommended to use percentage to show the difference accurately.

4) The use of capitalization in figure labels needs to be consistent. It is recommend to capitalize all labels like Figure 4b.

5) In Figure 8, it is necessary to explain the different (or relation) between ‘50% Urban’ and ‘92.9% Urban’ in the main text.

6) Figure 9 shows in waterlogging day, IUM performs significantly better than NoahUCM in LE estimation, while both models are equally bad for non-waterlogging day (Figure 7b, Figure 10e). Does ISE only work in the event of precipitation? What caused this issue?

7) In Figure 10, it is necessary to explain the difference (or relation) between ‘Grass’ and ‘Urban’ cases. Also, figure legends need to be consistent in the subfigures, i.e. use ONE of ‘Noah Grass’, ‘Noah G’, or ‘Noah grass’, not all of them in different subfigures.

8) Figure 10c has different colors from all other subfigures. It is recommend to keep color consistency in subfigures as well.

9) It is recommended to show the comparison of simulated and observed ground temperature for its importance (line 265, 286, 311, 316-317, etc.).

10) Check typos and gramma. Examples: Line 273: litter -> little; X-axis labels in Figure 3a, 3b, 4a: calenday -> calendar.

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