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Interactive comment on "The 'urban meteorology island': a multi-model ensemble analysis" *by* Jan Karlický et al.

Anonymous Referee #1

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Review of the manuscript ACP-2020-433:

The 'urban meteorology island': a multi-model ensemble analysis By Jan KarlickÃ¡, Peter Huszár, Tereza Nováková, Michal Belda, Filip Švábik, Jana Doubalová, and Tomáš Halenka

Remarks:

1. Abstract: the abstract should mention that you only study European cities. In terms of morphology they are substantially different North American cities that this caveat makes sense to mention.

2. Abstract: you indicate that there is a substantial sensitivity of the model to the selected PBL schemes and urban canopy scheme. It would be more attractive for the

reader if you can add a recommendation which settings are preferred.

3. Ln 12: choice => selection

4. Ln 13: hyphenation: boundary-layer scheme

5. Ln 31: hyphenation: boundary-layer structure

6. Ln 59: hyphenation: boundary-layer turbulence. Please check the manuscript throughout.

7. Ln 76: model resolution of 9 km: defend why this is sufficient to represent cities sufficiently. The resolved scales will be 5 * 9 km = 45 km, which means only cities of that scale are appropriately resolved, but there are not that many cities in Europe of that scale. I the feeling the cities on Belgium and Hungary are larger in your fig 1 than in reality.

8. Ln 78: 2015–2016: please defend why these years have been selected. 2015 is a rather warm year in Europe, so how representative is the selected period.

9. Ln 85: please add some sentences that defend why you have selected these schemes. I expect you have not selected them randomly but that there was a certain strategy or you built upon earlier studies.

10. Table 1: elaborate the table caption. The caption should be placed above the table. Idem for Table 2 and 4.

11. Table 1: please add a sentence that elaborates on the experiment abbreviations. E.g. the "E1U1L82C5" is not naturally related to the <SLUCM, 40, BouLac, Eta, Grell-3D> experiment. All experiment abbreviations start with "E1" so E1 can be removed. Idem for Table 2

12. Ln 118: simulations with MYJ PBL and Eta SFL schemes give notable underestimations (up to 2 deg C): link to literature, this MYJ behaviour is well known.

13. Figure 3: I have reservations against figure 3. Not about the contents but about the plot type. Now the results are shown as time series or at least the lines connect the different experiments. However there are no links between the connected experiments. So the results should be presented differently, e.g. as bar graphs. Idem for Fig 6.

14. Ln 124: Daily ECAD values from selected stations are used for more detailed model validation over european urban areas, which are the main focus of the paper: European should be capitalized.

15. Figure 4: please label all figure a,b,c, etc. This is much more easy for referencing

16. Figure 4: panel T2max and SWDOWN should have an y axis that is better adjusted (less wide range) to the data.

17. Figure 4: in columns 2 and 3 it is very difficult to see what are the differences between the runs. Better to start the y axis at a much higher value. Idem for Fig 5.

18. Figure 4 and 5: if these statistics are averaged over all cities in Table 3, it remains unclear how they are influenced by certain sites or not.

19. Fig 8 and 9: the header "surface heat island" is misleading since this is not plotted according to the caption. Furthermore I do not understand what is the functionality of these plots if you only show satellite data.

20. Ln 198: please be more precise here: about which temperature are writing here. It is daily mean T2m?

21. Ln 202: absolute humidity is the density of the vapour pressure so unit should be g/m3

22. Ln 333: it is unclear whether the statement of BEP+BEM is an advertisement for this scheme or not. Is this scheme the best, despite the biases you report about?

23. Ln 349: I have the feeling the authors are somehow too positive about the satellite data. As far as I understand them, they can only be applied for cloud free days, and

this does not occur very often, so they may give a biased picture. Please comment.