Geoscientific
Model Development
Discussions

Interactive comment on "Efficient urban canopy parametrization for atmospheric modelling: description and application with the COSMO-CLM model (version 5.0_clm6) for a Belgian Summer" *by* Hendrik Wouters et al.

Anonymous Referee #3

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General comments:

This study evaluated a scheme for deriving bulk urban parameters from urban canopy parameters and then applying them in a meteorology model with a bulk urban model. The purpose is to better account for urban effects without the additional complication and computational burden of a more detailed street canyon model. I think that this approach is a good compromise between bulk models that designate parameters according to land use category and urban canopy models that require detailed urban morphology and high resolution grids (vertical and horizontal). However, its value over

existing bulk approaches would be greatly enhanced if there were a simple way to acquire the urban canopy parameters used by SURY for any user specified domain. If we are practically limited to using default values for the canopy parameters, the result is just a modified bulk model with little added value since it would not distinguish between different cities. Thus, it would be helpful to those of us who are tempted to use this approach if some additional guidance could be provided on how to easily acquire and process the needed urban canopy parameters.

While the paper clearly presents the study, I feel that the study has two main deficiencies. One is that the primary function of the SURY, which is to incorporate geographically specific urban canopy parameters into a simple bulk urban scheme is never really demonstrated. If it is too difficult for the developers of SURY to apply it to its full extent with actual canopy parameter data at the model grid resolution for a few cities in their domain, then it is unlikely that others would find it very useful. The other main deficiency is that the base model used in this study has significant errors in temperature simulation which obscures the evaluation of the urban parameterization and the sensitivity of the parameter uncertainty. I suggest that these deficiencies be addressed before publication.

Specific comments:

Page 6, ln4: what is SAI for natural land cover? Is it LAI?

Page 6, ln9-10: What is "this parameter"? I'm guessing that you are saying that the depth where the urban substrate changes to soil is equal to the building height h. Is this correct? If so, why should the substrate depth be equal to the building height? Please explain.

Page 18, ln9-10: These large biases in day and night LST and the under predicted diurnal range make it difficult to evaluate the urban model. How do you account for these errors in the base model when evaluating the UHI results?

Page 21, ln18-21: This discussion does not agree with Figure 5. It looks to me that the REF model underestimates the stable lapse rate between the lowest 2 observations at the rural site meaning it's less stable not "more stable". Figure 5 also shows that the UHI is underestimated near the ground due to the overestimation of the rural T.

Page 24, ln13: Why would lower roughness result in lower windspeed?

Page 28, ln13-23: This is a very important paragraph. As this paragraph points out, errors in the base model are obscuring the evaluation of the SURY and Urban scheme and the sensitivity analysis of the parameter uncertainty. Since, these errors undercut the value of this study it seems like some effort should have been made to reduce these errors.

Page 30, ln19: How is transpiration modeled? There should at least be a reference

Page 30, ln26: where does Fm come from?

Page 31, ln1: shouldn't rsa differ for heat and moisture?

Technical comments:

Table 1 caption last sentence typo: Hereby

Page 5, ln13: what is meant by lateral heat transport? "...within through..." doesn't make sense

Page 9, ln28: typo – Parater should be Parameter?

Page 10, ln3-4: This sentence in incomplete. It's missing a verb.

Page 13, ln32: typos – missing period after thermocouples, temperatuere is misspelled.

Page 21, ln3: Are the values given here for SUHI bias? Should say so.

Table 6: Are the values averaged vertically? Please explain what these mean. Also, I don't see an "R" column.

Page 28, ln18: "overwhelm" might be better than "overrule"

Page 28, ln24: "natre" should be "nature"

Page 31, ln7: This seems to be an errant line

Page 32, ln16: "withouth"

Page 33, ln7: should be 49.16 W m-2