Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2017-250-RC1, 2018

Geoscientific Model Development Discussions
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Interactive comment on "The Microscale Obstacle Resolving Meteorological Model MITRAS: Model Theory" *by* Mohamed H. Salim et al.

Anonymous Referee #1

Received and published: 12 April 2018

General:

The paper by Salim et al. supplies a comprehensive overview of model physics, numerical procedures and computational techniques adopted by the obstacle resolving model MITRAS. It may serve, and is intended to serve as kind of a reference manual of the model, therefore going into some detail in places.

Overall vote:

I consider the paper as acceptable with minor changes. However, I would suggest to think about shortening the paper by leaving specialised applications of MITRAS (e.g. wind turbines) to the follow-up article to present typical applications as announced in the authors' outlook in section 7. Shortening would also leave some space to discuss

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software and hardware requirements of the model system. This is just a suggestion, I would also accept the paper in its current scope.

Detailed remarks:

1. The combination of a terrain-following coordinate system with blocked-out cells representing buildings is an interesting approach. From the figure presented to illustrate it, however, the impression arises, that coordinate surfaces will be exactly horizontal already at the height of the highest buildings. I assume that this is not the case and the impression is owed to the graphic depiction. If so, the authors should comment on the figure in more detail.

2. I recommend a re-structuring of section 2.2. The sub-sub-sub-sections about the closure methods should be 'lifted' by one level, because these methods don't apply to fluxes of scalar quantities only.

3. In section 2.3.2 (page 8) the sentence starting at line 19 is hard to understand. Of course, the value of a quantity, in this case diffusivity, will increase if one adds more of that quantity. A more precise formulation would be appreciated.

4. In section 3.1 (page 10) after the citation of Tiedtke and Geleyn resp. Deardorff, the word 'equations' is misplaced.

5. In section 3.3 (page 11) some detailed numbers concerning the Rayleigh damping would help: typical vertical extent of the model domain in terms of k, typical value for the index of lowermost damping layer.

6. In section 4, an equation for the roughness length for the temperature at buildings falls from the sky. Assumably, the equation follows Brutsaert's suggestions, but the authors should include a citation as well as a slightly deeper explanation at this point, e.g. what leads to the value of 442413.

7. The symbol 'ny' is used for cinematic viscosity as well as thermal conductivity. This is not advisable, better use a different symbol for the latter. The unit of the thermal

conductivity should start with a capital W for Watt, the table shows a lower case w.

8. In the list of references, several German titles (Eichhorn, 1989; Gierisch, 2011; Linde, 2011; Lopez, 2002: Molly, 1978; Schlüter, 2006) appear with all capitalized starting letters, these should be transferred to correct German notation. Also, in places regular German vowels are used instead of “Umlauts” (Bachlin, Schlunzen, etc.)

9. There is no publication by Eichhorn, J. and Anke, K. but one by Eichhorn, J. and Kniffka, A.

10. Comments on figures:

Figure 4: Keep the order of the data items (terrain – building – surface cover – vegetation) before and after preprocessing.

Figure 5: Add a note to the caption or to the text, telling about the number of vectors plotted.

Figure 8: Think about different color schemes for wind speed and tke. Most of the tke values are small, therefore I would suggest to use a colorbar starting with a less dominant color than dark blue. Add letters A and B to the figures.

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