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Comment

Interactive comment on “Effect of explicit urban land surface representation on the simulation of the 26 July 2005 heavy rain event over Mumbai, India” by M. Lei et al.

Anonymous Referee #3

Received and published: 4 June 2008

This manuscript describes an investigation into whether explicit representation of the urban surface in a land surface model coupled to a mesoscale atmospheric model improves the simulation of a specific heavy rain event over Mumbai, India.

General Comments:

Although this particular monsoon event has been well-studied, the present paper fills a gap in our understanding of this event in that possible urban influences have not previously been examined. The atmospheric model, RAMS, the land surface model, LEAF-2, and the urban energy balance model, TEB that are used here are all well-documented models with a history of producing reasonable results. A nice introduction

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is provided which describes previous efforts to model this event as well as a synopsis of urban effects on precipitation. The experiments are described adequately and the results are analyzed thoroughly. Overall, the paper is generally clearly written and presented (and improved over an earlier version of the manuscript) and the appropriate literature is cited. I recommend the manuscript be published with minor revisions noted below.

Specific Comments:

1. Regarding the use of the TEB model: There are other key input variables needed for TEB, for example, the thermal conductivity and heat capacity of the city roof, walls, and road, the thickness of the roof and walls, and the albedo of these surfaces. Table 1 should be expanded to include these. How were values for these chosen? How were the values of traffic and industrial heat fluxes determined? Were these applied at each time step of the model or was a diurnal cycle imposed (e.g., traffic fluxes generally have a diurnal cycle). How important were these anthropogenic fluxes to the simulation of the UHI?

2. Section 4.1, line 4: It's clear that RAMS TEB simulates an urban heat island, but I'm not sure one can say that it is "well-simulated" since there are no comparisons to observations of temperature made here.

3. Section 4.1, line 18: I don't quite understand the statement that "TEB did not change the latent heat flux significantly due primarily to the very low evaporation over the urban region". I would think that the control run (black line in Fig. 11) would have higher evaporation than TEB since presumably LEAF-2 is using some vegetation type to represent the urban area.

Technical Corrections:

1. Abstract, line 5: suggest: "We conducted experiments using the Regional..., coupled with and without an explicit urban...".

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2. Abstract, line 21: change "TEB/urban" to "TEB".
3. Section 2, line 16: the last sentence is repetitive.
4. Section 2, line 17: suggest: "The urban model was coupled to RAMS over the inner-most region..."
5. Section 2, line 23: suggest: "...quickly produced spatial heterogeneity in the region."
6. Section 2, line 18: Is there a reference for the USGS global data set? What is the spatial resolution of this dataset?
7. Section 3.2, line 2: suggest: "...the majority of the 950mm total occurred..."
8. Section 4.3, line 20: suggest: "Fig. 15 shows the cloud water mixing ratio at 12Z, 26 July."
9. Figure 10 caption: suggest: "July sensible heat fluxes in both simulations and their differences..."
10. Section 4.2, line 27: The text refers to Figs. 13a-d, but the figure only has labels for 13a and 13b.
11. Section 4.3, line 25: The text refers to Fig. 15c, which doesn't exist.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8773, 2008.

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