Atmos. Chem. Phys. Discuss., 7, S7388–S7390, 2007
www.atmos-chem-phys-discuss.net/7/S7388/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Dust aerosol radiative effect and influence on urban atmospheric boundary layer" *by* L. Zhang et al.

Anonymous Referee #2

Received and published: 29 November 2007

Review for "Dust aerosol radiative effect and influence on urban atmospheric boundary layer"

By Lei Zhang, Min Chen, and Lei Li.

This paper investigated the influence of dust aerosol radiative effect on urban atmospheric boundary layer, particularly on the profiles of temperatures and horizontal velocities. The authors used LOWTRAN to calculate heating rates of dust on the basis of in situ lidar measurements of dust aerosol extinction coefficients. The calculated heating rates were then input into the first author developed 3-D non-stationary atmospheric boundary layer model (ABL) that was coupled with the WRF model in the present study. The results showed that dust aerosols have a heating effect on the ABL

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in daytime while they have a cooling effect at night. The radiative effect of dust aerosols increases horizontal wind speeds in daytime, but the effect is reversed at night. The techniques present in this study are right and the paper?s topics is interesting. I suggest to publishing it after some minor revisions. The authors can probably add some introduction on the integration of the three models used in the present study, this will benefit the readers who are not familiar with modeling. I leave the decision on this issue to the authors.

Specific Comments:

1. Title is probably changed to ?Dust aerosol radiative effect and its influence on urban atmospheric boundary layer?. Or, the authors can find a better way to describe their work in the title.

2. Page 1, Abstract, line 3. Full name for AML.

3. Page 1, Abstract, line 5, ?heats up? should be ?heat?.

4. Page 3, Equation (1), left term, Iv(tau, mu, phi).

5. Page 4, Equation (2), left term, tau(z).

6. Page 4, what atmospheric profiles were used for calculating radiation flux?

7. Page 4, Equation (5). What is Cp, g, and rho?

8. Page 4, third paragraph. Add some introduction on the ABL model since the model is one basis for investigating the dust aerosol radiative effect.

9. Page 5, first paragraph. What are the atmospheric profiles for? Probably this part can be move to another suitable place.

10. Page 7, first paragraph. It is better to add more information on involving heating rates into the ABL model.

11. Page 8, reference. Li Xingsheng et al., and the last five references. Using the

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universal style for ACP.

12. Figure 1. Typo in tickname of x-axis. Minute.

13. Figure 2. Tickname of x-axis, add unit of 1/km.

14. Figure 3. The figures show profiles of temperature and horizontal velocity. So suggest to changing the caption to, ?Profiles of temperature and horizontal velocity from simulations with aerosol and without aerosol, respectively, at??

15. Figure 4. Same as the comment in 14.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 15565, 2007.