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Geoscientific
Model Development
Discussions

Interactive comment on "Development and validation of a size-resolved particle dry deposition scheme for applications in aerosol transport models" *by* A. Petroff and L. Zhang

Anonymous Referee #3

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The paper is for a size-resolved particle dry deposition scheme for application in large-scale models. Authors propose to improve dry deposition scheme for several land use used in model from Petroff et al. (2008a; 2009). Mosty dry deposition scheme is developed based on vegetated surface. However, this paper show dry deposition velocities of other land types as water surface, desert, and snow/ice covered surface are considered. This appoarch is important especially in global model. Also, Authors compared with observations limited to evaluate present model. They show that results in this study is more representive than previous model. It is interesting to concern phoretic effect as well as gravity to drift velocity and to assign a constant small value to phoretic effect. For these reasons, I agree with the publication of this paper in the

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Interactive Discussion

Discussion Paper

GMD journal with some minor revisions.

Abstract

I think that it is need taht you describe explicitly your results in abstract.

1. Introduction You compare your results with the result of Zhang et al (2001) in several graph. What do you think the reason why dry deposition developed by Zhang et al (2001) is higher than most earlier models? I do not see what difference between Zhang et al (2001) and your module has. I think you need to clarify this.

2. Theoretical considerations

aerodynamics P1326 line: explain reason using constant as 5 x 10-5 m s-1 to Vphor to water, ice, and snow surface. Also, if water and ice/snow have different Vphor, how much this affects the change of dry deposition velocity?

P1330 eq(23): In general, collection efficiency for Brownian diffusion is used the equation of Wesely. Why this equation is chosen?

P1331 line 18-19: Do you calculate or approximate Cb, Cin, Cim, and Cit? justify how to obtain these constants.

P1333 line 1-5: Are z0/h and d/h sensitive to dry deposition velocity? If these values are sensitive, how can these be applied in 3-d air quality models?

fig 1: I do not know what information it shows.

fig 2: In graph, there is not explanation box for lines. It is better you change shape of line to distinguish between lines.

3. Results In comparing present resutls to the results of Zhang et al, it seems that your results generally represent observation data rather than Zhang et al (2001). Why?

P1334 line 12, P1335 line 6, and P1336 line 4: justify why zr is chosen.

You used each zr according to land surface. When this dry deposition module is applied

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to air quality models, do you think zr is used as a constant or different values according to land use? values?

Interactive comment on Geosci. Model Dev. Discuss., 3, 1317, 2010.

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