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Comment

## ***Interactive comment on “Development of a parameterization scheme for calculating dry deposition velocity of fine, coarse and giant particles” by L. Zhang and Z. He***

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We greatly appreciate all the comments, which helped us to improve the paper. Our point-by-point responses are detailed below.

RC – Review Comments; AC – Authors Comments

RC - 1. Given the size distribution assumptions made here (the specific values of the median diameter and standard deviation) how universally applicable is this parameterization? Would the fitted parameters be identical for all other log-normal size distributions which might be characterized as “PM<sub>2.5</sub>”? or are these parameters only relevant

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if one assumes this specific size distribution? The authors should address this by exploring the sensitivity of their fitting to the assumed size distribution and discuss these results.

AC: We conducted some sensitivity tests but did not include the results in this discussion paper for the consideration of limiting the length of the paper. In the revised version, we have added a figure of the sensitivity test results and related discussions to address this comment. Briefly, the fitted parameters could change slightly and the modeled  $V_d$  using different log-normal size distribution parameters would cause uncertainties on the order of 30% or less for fine particles and of a factor of  $\sim 2$  for coarse and giant particles. These uncertainties are smaller than other known uncertainties in any existing particle deposition models.

RC - 2. It is disappointing to see only the comparison of this new scheme to the old Zhang et al. (2001) scheme. It would be far more informative to show the scheme performance against real measurements.

AC: The development of this new simplified algorithm taking the size-resolved model of Zhang et al. (2001) as the benchmark model is based on the assumption that the original model has been validated and can produce reasonable  $V_d$  values under various conditions (as shown in Petroff and Zhang, 2010, GMD; Zhang et al., 2012, ACP). Thus, comparing  $V_d$  produced from the new scheme with those from the original scheme (as shown in Figures 2, 5 and 6) is a validation of the new scheme. Further validation and application can certainly be done in the future by the community when more field flux data are available, and cannot be accommodated in this study.

RC - 3. The figures in the supplement are not very informative. I suggest that the authors eliminate the supplement (or at a minimum integrate these figures into the main text – it is distracting to have a supplement on such a short paper).

AC: We have integrated one figure originally listed in the supplement into the main body of the paper and removed the supplement file.

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RC – MINOR

AC: All minor comments provided by the reviewer have been addressed as recommended.

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 31289, 2013.

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