

Comments Received from Reviewer # 1

We thank Ali Oskouie for carefully reviewing our manuscript and providing valuable suggestions. We have revised the manuscript following his comments. Our responses are compiled in the supplement, where we have addressed each comment individually and detailed the respective changes to the manuscript (**RC: reviewer's comment**, **AR: author's response**).

RC: The work presented here has special significance for researchers in terms of narrowing down their options based on parametrization made in this work. The authors have extensively discussed various variables involved in dry deposition process that looked like a textbook format. The authors should make every effort to shorten the text and eliminate some of the fundamental discussions as related to dry deposition along with the equations. There are some grammatical issues that needs to be addressed; however, it is minimal.

AR: We have omitted the first sentence of the introduction section and former Eq. (1), which was used to express the timescale for particle deposition. However, we think that it is necessary to keep the equations from five dry deposition parameterizations evaluated here in their original forms in the manuscript because they help guide the discussion of the relative complexity of the model parameterizations, which has been addressed in **section 5 (lines 837-866)** of the manuscript. We believe we have corrected the grammatical issues mentioned by the reviewer.

RC: The authors should avoid referencing to dry particle deposition, instead they should just mention 'dry deposition'.

AR: In the revised manuscript, after its first use in **line 38** as 'dry particle deposition', we referred to it as 'dry deposition' in following texts when it appeared.

RC: Ambient particle density due to heterogeneity of particulate matter cannot be determined and used in these equations properly, so the authors should indicate such uncertainties.

AR: We understand your concern here. We addressed this issue by adding the following sentences (**lines 394-397**) in the revised manuscript.

"It is noted that a constant dry particle density of 1500 kg/m^3 (Petroff and Zhang, 2010) was used in all Monte Carlo simulations. Because of the inhomogeneous nature of ambient particles, accurate quantification of particle density is challenging. In their work, Oskouie et al. (2003) developed methods using a time-of-flight instrument to minimize the effect of uncertainties in density estimation to particle size characterization."

RC: The authors should reference to Noll and Oskouie's pioneering work in the field of dry deposition to enrich their work with significant studies made in this field.

AR: Thank you for this reference. We have included the following sentence (lines 51-53) in the revised manuscript.

“Significant advances in understanding the governing mechanisms of dry deposition were made through use of experimental deposition data on walls of vertical pipes to develop size-resolved parameterizations for atmospheric particle deposition on ground surface (Muyshondt et al., 1998; Noll et al., 2001; Feng et al., 2008).”

RC: The uncertainties for ambient particulate density is addressed in Oskouie’s work with unique calibration curves developed for determination of density of the ambient particles using supersonic TOF device which is used as the only calibration curves available for such characterization.

AR: Thanks for pointing out to the references.

References

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- Noll, K. E., Jackson, M. M., and Oskouie, A. K.: Development of an atmospheric particle dry deposition model, *Aerosol Science & Technology*, 35, 627-636, 2001.
- Oskouie, A. K., Noll, K. E., and Wang, H.-C.: Minimizing the effect of density in determination of particle aerodynamic diameter using a time of flight instrument, *Journal of aerosol science*, 34, 501-506, 2003.
- Petroff, A. and Zhang, L.: Development and validation of a size-resolved particle dry deposition scheme for application in aerosol transport models, *Geoscientific Model Development*, 3, 753-769, 2010.