

Interactive comment on “Size-dependent aerosol deposition velocities during BEARPEX’07” by R. J. Vong et al.

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Response to interactive comment by Anonymous Referee #2 on “Size-dependent aerosol deposition velocities during BEARPEX’07” by R.J. Vong et al. ACPD 10, 4649–4672, 2010.

Referee 2 concludes that the paper is “probably the most careful experimental study yet of aerosol deposition velocities” using (eddy correlation) and is “consistent with previous studies which are referenced in full.”

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p. C648, all are found under “Minor comments” (labeled below by the referee’s numbering):

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2. “It would be useful to provide parameterizations for V_d (r , U^*). Other reviewers also requested more on this so we are planning to add a table showing regression results for V_d vs U^* for each of the four best-determined diameters of the form $-V_d = a (U^*)^b$. We found that $(1.1 > b > 0.7)$ and $(1.6 > a > 0.3)$. We also will add mean concentrations and mean values of V_d for all six diameters.

3. “It would be useful to show the variation of V_d with stability...”. There were not enough nighttime (stable) data to develop a stability dependence during BEARPEX 2007. This is already stated on p.4661, line22-24 of the text as posted on ACPD.

4. “it would be useful to ...put a statement in the final section... as to the typical size of the (hygroscopic growth) correction...”. We agree and will add a sentence to section 3.6 (current posted version) and make it analogous to that for WPL corrections as now located on p.4660, lines 6-7.

5. “It would be useful to ...” compare V_d with those predicted from models. We intend to add additional comparisons between these BEARPEX results and the Slinn model but prefer to do this within the text since we are summarizing rather than running the models ourselves (also see Rev.3, p.C775 -f). See response to (2) above, as well.

6. “Why are the measured V_d significantly greater than those predicted using model parameterizations”? We will add a brief statement on this important question but cannot claim to have the entire answer here. Wind tunnel data and model parameterizations cannot fully represent the wind velocity at, and near, the point of particle collection on canopy elements and the canopy geometry. Particle velocities just prior to impaction, for example, are assumed to be those of the fluid but these are not well known at the needle boundary layer. The needles themselves often are not totally motionless in the wind; this swaying might result in a breakdown of the needle boundary layer and increase removal compared to modeling results (Wesely et al., BLM 27, 237, 1983; JGR 90, 2132, 1985).

7. “What effect would this humidity correction have on PM1 mass fluxes?” The humid-

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ity correction for hygroscopic growth results when in situ measurements are made at ambient RH, as with the OSU FAST. PM1 mass fluxes would be affected to the extent they are based on similar measurements and instrumentation but often this is not the case. Sedimentation fluxes for larger diameters will be affected by RH gradients but this has been covered elsewhere (e.g., Hanel, Atmos. Environ. 16, 2703, 1982) .

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 4649, 2010.

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