This manuscript outlines an interesting and well executed wind tunnel experiment examining the transport of airborne microplastic particles (MPP) in vertical profile. The results are expected to be useful in the parameterization existing models of aerosol dispersion for use with microplastic particles, particularly since there has been very little experimental work on atmospheric transport.

As outlined below, I have several comments that will likely require minor editing of the manuscript.

Comments

Section 2.1. Description of the wind tunnel.

1. Line 48. I would suggest that you insert "Suction-type" wind tunnel. I am not sure what the total length of 7.3 encompasses. Is this the length from the honeycomb inlet to the fan chamber, or is it the length of the actual test or working section from the spires to the CTA traverse? If it is total length, then you should consider specifying the length of the test section. Although not to scale, you could add this information to the schematic in Fig. 1 for clarification.
2. Line 53. Please provide more detail in regard to the 'pattern of cones and roughness elements' as these are highly pertinent to the aerodynamic roughness length established for the experiment, as well as the turbulence intensity. Such information would also be needed for experimental replication.

Section 2.2 *Aerosol generation*

3. Line 72. How do you know that the droplets "quickly dried" ? How quickly? Over what distance? Is this an assumption, a model projection or a direct observation of a reduction in droplet diameter with the distance of travel from the nozzle of the nebulizer? What was the initial water droplet diameter, as compared to the 52 micron MPP?
4. What natural processes in the atmosphere are simulated by this experimental method of MPP delivery? Can you add several references to make the linkage more direct (natural versus experimental processes)?

Sections 2.3 and 2.4 *Particle measurement; Injection height and flow conditions*

5. Given that the Alphasense and GRIMM OPCs intercalibrate very well as shown in Fig. A1, why did you elect to mount all six sensors at the same downwind location at the end of your test section. Would it not have been more instructive to separate them to examine the fetch effect and locate one at the site of the nebulizer delivery as a quality control check? Maybe I missed it, but it would be further useful to list the distance between the nebulizer and the OPCs directly on your schematic in Fig. 1.

Section 2.5 *Particle flux estimation*

6. Line 101. Are you describing the constant stress region in the lower 20% of the boundary layer?

Section 3.*1 Flow condition*

7. Please add details concerning the thickness (depth) of the boundary layer flow and the reference velocity in the freestream flow in the core of the tunnel working section.
8. I really appreciate the value of drawing a comparison between laminar and turbulent boundary layer flow in regard to suspension of the MPPs. Nice test design. It would be further useful to quantify the reference turbulence level by including in Table 1 the turbulence intensity (rms U/mean U) and the velocity components (horizontal and particularly the vertical) for mean total velocity U.

Section 3.2 *Vertical particle concentration*

9. Line. 135-136. The control concentrations are small but not negligible (i.e., 0.49/0.254 ~2). Consider subtracting them from concentrations with MPPs as a correction, rather than ignoring them.
10. Line 153. "initial assumptions" is too vague. Please consider being more specific here.
11. Figure 4 is very useful in supporting the text with a graphic explanation. You might also consider tying this directly back to Equation 6 (i.e., when c2 >c1 Fis negative and deposition dominates and vice versa).
12. Fig. 5 Do you have a possible explanation for why the Alpha OPC value is consistently greater than the value from the GRIMM at the highest elevation?
13. Define "accumulation mode" which is used here and elsewhere.
14. Line 165. Please provide the Reynolds numbers associated with these terminal velocities.
15. Consider adding a plot (terminal velocity versus particle diameter) in which you compare your MPP data with measurement data obtained for mineral particles of varied size and density (i.e., expand on the context). In relation to this I think several statements on p. 9, which emphasize the similarity between the terminal velocities of the MPPs and mineral particles, are overgeneralized and not well substantiated by only three measurements. Maybe tone them down a little …. 'Our results would suggest that ……., but further experimental work over a greater range of MP particle size and shape is needed.' Also the density of the Polystryene beads is not mentioned in the manuscript but it is about 40% of that for silica, so that in the least, the MPPs in this study should have a <u>lower</u> mass and thus terminal velocity.

<u>Typos and style elements</u>

1. Line 83. Bend rather than "bent"?
2. Fig. 2 Consider removing the point symbols for the zo (roughness length) values as this suggests a direct velocity measurement. Intersection of the dotted line at u m s^{-1} and the profile extrapolation is sufficient.
3. Fig. 3 and legend. Please consider replacing labels FC-A etc with values for the actual friction velocity, which will be far more meaningful for the reader. Be consistent with the axis label format and consider using exponent notation throughout. Replace "Facets" with 'plots'. Report n values (number of test replicates) with standard error. Data 'are'….
4. Line 144. Replace "settle down" with 'descend'.
5. Line 151. "Concentration" should be plural.