Dear reviewer,

We would like to thank you greatly for the review and feedback on our manuscript. Below, you can find our responses to your specific comments:

Line 86-87: As written, this equation does not account for any time dependence of K_i and $t_{L_{u_i}}$; either the first part of the sentence is incorrect or the equation is incorrect.

Thank you for pointing this out. We have updated the sentence in the revised manuscript.

Equation (8): Is a sharp change in concentration at the top of the boundary layer desirable? Do you account for leakage of material from the boundary layer to free troposphere? Granted, it takes place on a slow time scale which may render it unnecessary for some applications.

The sharp change in concentration upwards is desirable in certain situations, when a capping inversion is present, which may "capture" particles inside a well-mixed boundary layer. In other situations, of course, it may not be the optimal solution. This approach is the same as in the original DERMA model, and we did not see strong arguments for changing it.

We do account for leakage to the free troposphere in two different ways: (1) if there is a sufficient lift due to a positive mean wind, a puff center may be lifted above the boundary layer, and (2) when the boundary layer shrinks, any puff center that are now above the "new" boundary layer height will remain there (until it potentially manages to re-enter by the same two but opposite processes).

We have elaborated on the above in the revised manuscript.

Figure (2): Could you say how the error lines are defined or calculated?

The three black lines in the plots are indicating a perfect linear fit as well as deviations that are a factor of 5 and 1/5 away from the observation. This is specified in the revised manuscript.