Reviewer comments to Gordon et al. "Aerosol flux measurements above a mixed forest at Borden, Ontario"

While the number of aerosol flux measurements by micrometeorological techniques is still very limited, the situation is even worse for size-resolved fluxes and deposition rates. The paper brings important new data and insight to the problem applying a fast mobility particle sizer combined with the eddy covariance technique (EC). The new results are also utilized in the interpretation of earlier observations at the same location by a quadrupole aerosol mass spectrometer providing chemically speciated information.

Major:

1. p. 22481, lines 1-8: Why is it especially the incoming solar shortwave radiation. which has adopted as a explaining factor? The role of SW is explained and discussed very superfluously.
2. Section 5.2, Effect of precipitation: What does the leaf wetness exactly mean and what are the values the sensor is providing? What does mean the leaf wetness of 10%? 10% of what? Namely, some/many leaf wetness sensors provide values which are mainly on/off, depending whether the surfaces are dry (although possibly having very thin water film) or wet and not really anything between. I raised up this issue also since it is speculated that the aerosol deposition could be larger on wet surfaces, but no convincing physical explanation is given for that. I am surprised on the statement "there are a small number of flux measurements during rain". I do not believe that anyone can measure reliably fluxes by EC during the (heavy) rain.
3. p. 22483, lines 15-16: I do not understand the meaning of "..that either the positive flux is balanced by a negative flux..."
4. Section 5.5. Decoupling of the canopy space: Instead of using the friction velocity as a criterion for the decoupling, the more appropriate factor could be the canopy Richardson number (see Mammarella et al., Determining the contribution of vertical advection to the net ecosystem exchange at Hyytiälä forest (Finland). Tellus 59B, 900-909, 2007). More importantly, I am very surprised that the time lag during low friction velocity conditions is order of hours. This is very slow and normally the mixing even under low-mixing conditions occurs on the time scales of the order of 100 seconds. If the time lag is real, the explanation must be something else that the low mixing, but I am also wondering how so long time lag can exist if the friction velocities are 0.1 m/s or larger, since although they are low they should induce some mixing and thus the conditions are not very stable. There is something strange in the decoupling result and/or its interpretation.
5. I am not sure that the sections 5.6 Speciated results and 5.7 Amonnium-nitrate evaporation are needed in this paper. They are related to the earlier measurements and does not bring very much insight to the actual topic of this paper. Instead, the section 5.8 has deserved its place. If 5.6 and 5.7 are omitted, it must be checked that 5.8 is still understandable as such.

Minor:

1. Eq. 1: there is a mistake, the advection term should be $u_i \frac{\partial C}{\partial x_i}$

   Similarly to the term including V_g. Explain what is x_i and u_i and the summation notation over i indices. I would not call C as a scalar concentration but as aerosol particle concentration since it is implicitly assumed that the scalar relates aerosols since the equation includes the gravitational settling velocity, although it is assumed to be negligible later. Similarly, replace the concept of "molecular diffusion coefficient" to "particle diffusion coefficient" or "to diffusion coefficient due to Brownian motion".
2. Eq. 4: define D and D_0. Units of RH is %, but now it seems that RH has values between 0 and 1, and it is rather the saturation ratio and not the relative humidity.
3. p. 22476, line 17: related to the comment above, RH is the saturation ratio. I guess q is not the specific humidity ratio but specific humidity.
4. p. 22477, lines 1-2: I do not understand the sentence, what is the average increase over all size ranges and what is a total decrease, and how you have ended up to the results (26% and 5.8%)?
5. p. 22494, line 32: replace "Lilavainen" by "Lihavainen"
6. p. 22495, lines 15-16: replace "Launianinen" by "Launiainen"
7. p. 22495, line 31: replace "Vesela" by "Vesala"
8. Fig. 1: I cannot read what is the scale.
9. Title fonts are much too small in Figs. 2, 3, 7, 11 and 13.
10. Fig. 3: Is the data averaged over the whole measurement period? If yes, it is so called averaged daily course. The caption does not mention plot a).
11. Fig. 11: explain in the caption what is the light blue curve.