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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The role of vegetation in the CO_2 flux from a tropical urban neighbourhood" *by* E. Velasco et al.

Anonymous Referee #1

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Eddy covariance methodology, as described, leads to many questions about the deployment and computations. A continuous record is cited but no mention made of gap filling, sensor orientation to North (based on instruments used, there will be gaps), and no mention of low Ustar criteria- tropical EC measurements are typically plagued with lots of data loss due to low Ustar and condensation on the sonic and open path IRGA windows. No mention is made of storage flux or influence of the point of maximum influence in the footprint since the instrument ht. is so low. It calls into question the representativeness of the flux measurement to the entire section of the city. Also, since the tower is so low (just 13m above a solid surface) some evaluation of the deployment is needed beyond that given in the manuscript. In particular, the authors mention a tower height of 20 m and a average building ht. of about 10m

but as they question, the instruments are in a questionable zone - in the roughness sublayer or not? At what point is the displacement height concept (developed over a porous surface, such as vegetation) no longer valid- thereby becoming the effective height? So, some turbulent statistics are needed to show whether Similarity Theory holds. Otherwise, how do we know if eddy covariance represents the surface flux under investigation? Further, given that traffic is the main source of CO2, given the potential for CO2 vegetative sinks within the city, there should be considerable surface heterogeneity despite that authors claims for homogeneity (pg 23, lns 1-2). Unless winds are very steady, stationarity would be hard to maintain. So, the statistics must show more than whether Similarity holds for momentum due to roughness elements but must also hold for CO2. Perhaps using integral stats., scaling the standard dev. of CO2 (similar to sigma T/T star in Busch 1972 Workshop on Micrometeorology) vs. a range of stabilities would clear this up. Values should be near 2-3 in magnitude, given previous work and T and Q (water vapor) should have similar values (except for T which goes to infinite near neutral stability).

Traffic speed is used as an index of fossil fuel emission from vehicles. Since traffic is the largest emission for the area, a much clearer explanation as to how just this one statistic can be used to arrive at emissions is needed. What would seem to be the best index would be the number of vehicle kilometers traveled in the footprint, with data on type as well, per unit time.

There is impressive review and effort made to model tree growth. This reviewer has little knowledge in this area.

I also did not follow the calculation for human respiration. The derivation was not clear to me- in particular- that does 7ml/kg mean in this regard? 7ml of what?

There is also a bit of confusion in handling Rv and Pv. In eqn 1, Pv is called

net photosynthesis, Rv as above ground respiration. Later its called dark resp. Above ground resp. is continuous but the ms. says otherwise- ie. 0 during the day. If its just occurring at night, why would it not be highest near sunset when 'night time' temps are highest and sugars are most abundant?

Well laid out, nice graphics.

Pg 7276, Ln 5. Why are ranges given (eg. 33-44%) for missing data during the day and for night?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 7267, 2013.