H. Ward et al. present a paper series called “Infrared and millimetre-wave scintillometry in the suburban environment” containing 2 parts. – Part 1 is about the different ways to obtain structure parameters for temperature and specific humidity from scintillometers at different wave lengths. The part 2 is about the way to derive average turbulent fluxes from these structure parameters. The first part evaluates the performance of 3 methods, namely the single wave length method, the bichromatic method and the 2 wave length method. The second part develops objectively advantages and limitations of the scintillometry techniques. Both parts analyse a 14 months data time series obtained from july 2011 to December 2012 above Swindon (UK).
Theoretical backgrounds are clearly exposed highlighting the assumptions and limitations of the techniques deployed during this experiment. Results give a complete and detailed panorama of what is to be done when using Infra Red and Microwave scintillometers. It is based on the longest time series ever obtained for such technique. This huge amount of results and remarks will be very useful for any one wants to apply scintillometry techniques in the futur. Urban surface bowen ratios are finally presented and compared to previous studies. This last part will certainly require further analysis, but it is clearly not the main objective of these papers
Finally, this matches very well with the AMT journal and have to be published after minor corrections.

Some comments on both parts are listed below.

Part I : Structure parameters

p6 - 11174 L-18 : Add a reference (Hill 1981) for example.

p7 - 11175 L-10 : recall what the Bowen ratio is (QH/QLE). It is well known from most of us except if you want to address other community

p12 - 11180 L 21 :Zd=0.7Zh is really not confirmed for open complex canopies. An estimation from EC data would be more appropriate. At least a remark on the reliability of this relation could be added given that this Zd parameter is recognize to be one of the most sensible for flux calculation from CT^2 values.

p12 - 11180 L 15 - 25 : Is this paragraph on equivalent height necessary to only compare Cn^2 values (what is done in this paper) ? For sure, you need to estimate Cn^2 values at compatible heights (EC and SC). As scintillometers provide good estimations of Cn^2 values, whereas EC Cn^2 are indirect estimations, I would prefer move the EC Cn^2 values from 12 to ....xx m (Explain in page 11184). In any case the difference in height from EC to scintillometer path should be discussed.

p15 - 11183 L15 : This is not a question of height but of weighting function. The diference in the equivalent height is a result of the integration of the weighting function. What it has to be accounted for is the difference in the way the Cn^2 values are averaged along the path. Don't forget that the sensor probe the same volume (more or less) at the same height.

p15 - 11183 L25 : '3 techniques' appear not so clear to me as you just discussed 3 Cn^2 calculations but I understand you turn to a single, two wavelength and bichromatic method ....

p16 - 11184 L11 : tau fixed at 1s . Does this can explain the weak correlation r_Tq found at night with EC data ? Please comment on that on page 11192 (if any answer !)

p19 - 11187 : line 19 and after please, use the same subscript code along the paper. you have define the substrict 1l, 2l and bc. just use it. If a SC is necessary to invite the reader considering all of the three techniques, define it. The BLS_MWS notation is quite long and "heavy".

p19 - 11187 : L19 -23 : Finally this paragraph say not so much. I would replace it with a clear invitation to the part II (1 sentence)

p22 - 11190 : L1 ... this discussion on Bowen ratio should better take place around line 8 in page 11188. However as you mentioned it, the analysis of Beta will be easier with the fluxes. I suggest suppressing this paragraph and replacing it by extended comments on the differences between Beta_EC and Beta_SC (footprint differences, height differences, Beta calculation from SC and EC, the latest is not précised. Is it w'T'/w'q' or is it calculated with Eq 9, statistical issues ?). At least the Beta curves show few Beta differences using the 2 wavelength or the bichromatic method …b ut is these estimates reliable? (Half the EC value!!)
More over the Beta estimates you mentioned in the text (Beta_2lambda < 1.3) doesn't match with what is plotted in figure 9 where these values are always under 0.5. Please clarify.
Finally, you conclude (in the conclusion) the differences came from footprint differences, but this has not been discussed here.

p23 -n11191 : The r_Tq plateau at 1 is a rough approximation. I would precise this (0.8?)

r_Tq for low wind speed (the same eddy can be probe several time which increase the correlation. Pb of the inversion for noisy data.

p27 11195 : The conclusion could be shorter. It is not necessary to recall equation (L 6 - 15). It could be re organized starting from the technical insights (appendix), the CT^2 Cq^2, ... consistency, r_Tq, Bowen ratio and method comparison.
Considering this conclusion, I would also reorganise the discussion to point out the different argumentations that lead to these conclusion (Like the one I have suggested for Beta).

fig 4 precise somewhere how the spectra has been calculated (windowing, ...) especially for the black line. I guess the grey line is a direct calculation (rectangular window) over the 30 min segment and I suspect the black line to be a bin average.

fig 8 : I suspect an error in the axes legend r_EC_bc in place or r_Tq ? More over the color line legend is missing in the figure and in the legend. It is also not clear to me on how these correlations have been calculated: 30min OK but with min data ?

Part II : Large-area sensible and latent heat fluxes

11222 : “”
This is a classical result. For a highlight, it would be better to announce “Energy partitioning land cover dependencies of urban areas”

11224 –L22 :MW scintillometer are now available at RPG in germany.

11227 L12 : u* was not introduced before. Define it and explain how you estimate it at scintillometer scale.

11233 - L 4 : " … whereas EC is usually capable of providing fairly continuous Q_H " I would not say that. If sonic anemometers are able to provide continuous measurements during rainfall it is not straight forward to interpret these covariance measurements to be related to surface fluxes.

11235 : L5 & L26 : Generalities on Q* are not welcomed ! First the footprint of Q* and Q_H_EC are not realy similar even above 10m turbulent fluxes are wind direction dependent but not radiative budget. Secondly, radiative budget is different from a land cover to an other. Compensation could occur but it's far from a general behaviour. You don't need to say that to convince the readers. Figure 5 is enough!
You'd better develop this idea considering this is still an issue to obtain radiative budget at scintillometer scale until we can't trust in remote sensing products.

11235 & 11236 L20: A scatter plot comparing Q* with QE + QH for the all observation period would be very helpful to follow the discussion.

11239 L 5 – 18 : This paragraph is much more a conclusion and should be displaced.

11239 L25 : Difficult to conclude on the relation between latent heat fluxes and rain as Q* is also much higher in 2012. Remarks on bowen ratio are much convincing.

11242 :L 6 – 13. This part of the conclusion doesn't refer completely to what has been developed in the paper. The control by available energy and water on flux partitioning is not a strong conclusion. Unfortunately I found it difficult to get a general conclusion on processes at this stage. Figure 9 gives a kind of tendency but with large scatter. Indeed this certainly depends on urban morphology at least. These data required certainly further investigation.
I suggest you insist more on the scintillometer techniques and again displaced in the conclusion the concluding paragraph from page 11239.

Fig 2 : footprint areas not shaded enough.
Limiting stabilities ? precise.