The authors have made significant improvements to the manuscript. I have a few minor concerns and suggestions for improvements.

General comments

I would like to suggest defining concertation (c) as mole fraction multiplied by density once at the start of subsection 3.2 (in the paragraph where u, v and w are defined) and then referring to concentration throughout the rest of the section. Explain here that concentration can be derived by multiplying raw mole fraction measurements with M_R and mass density. This combines the mole fraction and density into a single term in equations 3.2, 3.2, 3.4 and 3.5, making these equations consistent with the rest of the equations (and easier to read). It seems strange that half of the equations use concentration while the other half use mole fraction. There is then no need to explain this again in subsection 3.2.2. c' can also be defined here. Then c(tilde) can be defined when it is used (as is already the case), without the need to redefine c (with a different case). Make sure that the c(tilde) uses the same case (lower or upper case) as defined previously.

There may be some confusion regarding the use of acronyms and abbreviations in the abstract. All terms must be defined at their first point of use in the abstract. They should also be defined again at their first point of use in the main text. However, many authors prefer to avoid abbreviations in the abstract and conclusion all together, though this is down to author preference.

Specific comments

Line 31: “UAV”

- Please define this term.

Line 42: “EC”

- Please define this term.

Line 48: “pronounced”

- What does this mean? Can the level of diurnal variations be quantified? Perhaps it is better to omit this word, as it is quite strong.

Line 115: “Horizontal fluxes are therefore commonly neglected or assumed to be negligible in EC flux measurements”

- I do not understand the point here.
- Earlier in this paragraph, it states that EC fluxes produce vertical fluxes. So, it is not possible to neglect horizontal fluxes if they cannot be measured in the first place.
- Consider rewording this.

Line 118: “In addition, although stationary towers can support measurements at multiple levels, conventional EC flux observations are typically obtained at one or a limited number of fixed heights.”

- This sentence seems to directly contradict itself. It says that although EC measurements can be made at multiple levels, they can be obtained at a number of fixed heights, which is the same thing.
- I think the point being made here is that towers conventionally provide fluxes at discrete heights, while contentious measurements with height are difficult.
- But the UAV method presented in this work does not solve this, as UAV fluxes are only derived at fixed heights.

Line 126: “accuracy”

- What sort of accuracy does this refer to? Perhaps this is spatial accuracy or mole fraction measurement accuracy.

Line 201: “all of which satisfy the requirements for atmospheric wind and CO_2 measurements in the lower boundary layer”

- This is not necessarily the case. It depends where sampling is conducted. Perhaps this resistance is adequate in this study but in very windy boundary layer conditions, this may not be sufficient wind resistance.

Line 361: “emission”

- Should this be “flux” instead of “emission”? Emissions imply a net outward positive flux, while forest ecosystems can be net carbon dioxide sinks.
- The use of various terms for mass concentration seems to cause unnecessary over-complication in this section. Some equations are given in terms of concentration and some use mole fraction. It would be better to use a consistent term in all equations.
- See other comments on this.

Line 391: “mean components”

- Over how many data points and what time duration is this mean derived?

Line 393: “CO_2 quantity”

- Quantity is not a good word. This should be defined as either a concentration or a mole fraction. Quantity could mean anything. In fact, upper-case *C* is defined nicely later on so it seems like it is defined twice. It would be better to define it nicely here instead.
- As far as I can see, there is no need to define a separate upper-case *C* later in the manuscript.
- It may be best to define a single lower-case c here (properly, as a concentration).
- See other comments on this.

Line 395: “fluctuation”

- What is the meaning of this word here? What is the fluctuation with respect to? Is it a fluctuation compared to a running average? This word is not well defined here.

Line 401: “turbulent fluctuation”

- It is important to explain how this turbulent fluctuation was derived from two-dimensional wind measurements. Was the average subtracted from a running mean?

Line 430: “emission”

- Flux may be a better word. I would advise the authors to consider all instances of the word “emission” in this manuscript.

Line 474: “The CO_2 mass concentration C”

- Is this upper-case *C* the same as the lower-case *c* in the previous subsections? It would be better to define it once at the start of subsection 3.2, as it seems to be the same thing.
- See other comments regarding this.

Line 509: “$\tilde{S}$ is the smoothed horizontal wind-speed magnitude; $\tilde{T}$ is the smoothed air temperature”

- Do these terms need to be defined again? They are already defined earlier in this subsection.

Line 540: “The horizontal component $E_{C,H}$ is calculated from the box-pattern observations along the lateral boundaries of each UAV-defined control volume.”

- This sentence and the next do not seem to belong in this subsection, which is dedicated to the vertical turbulent flux component.

Line 588: “the uncertainty propagation method”

- Which uncertainty propagation method? There is no standard method. Does this mean that that the uncertainties were combined in quadrature?

Line 666: “turbulent fluctuations”

- How is the turbulence derived? Is this the difference from a running average?

Line 887: “Net CO_2 emission results”

- The title of this subsection should be reworded. This does not provide all net emission flux results, but only flux results from a single UAV flight. The plural “results” should certainly not be used for a single example.
- This is a single example, demonstrating the nature of fluxes from a single flight. This is certainly useful, but it is not clear here what this section is about. Was this eluded to earlier in the manuscript?
- I would recommend adding a few sentences at this start of this subsection describing what this is about. It is not entirely clear why a single UAV flight is being evaluated here.
- I would like to reiterate that all of this work is useful and should not be removed. It just needs to be clearer why this subsection is here, with a better subsection title and better motivation leading up to this in the introduction and methods sections.
- Perhaps this subsection can be swapped with the following subsection. This subsection is a specific example with a fixed box size. But this is just a suggestion for the authors to decide.

Line 935: “Spatial heterogeneity of net CO_2 emission”

- This subsection is excellent.

Line 1011: “All emission estimates are expressed in kg h^{-1}”

- Is this necessary?