Review for Vila-Guerau de Arellano

The authors proposed a concept of CloudRoots to investigate CO2 and H2O transfers from a leaf scale to the regional scale, connecting results from various techniques of different spatial scales. Te authors' intention to bridge researches from multiple disciplines at different scales together is novel because doing so is essential for further understanding land-atmosphere interaction. Many interesting results and insights are introduced across the manuscript, and I suppose the work will give a great contribution to land-atmosphere interaction research. Let me provide some comments that hopefully improve the manuscript.

Page 1

L20 (and related to photosynthesis parameters)

I suppose the necessity of accurate leaf parameters to describe photosynthesis and stomatal conductance is such an obvious fact, and I am afraid if it can be any interesting finding. Instead, can the authors provide any insights with respect to how accurate leaf parameters are important for ABL? Leaf parameters greatly vary even among C3 plants (e.g., Miner et al., 2017), and it is quite common to see a global-scale terrestrial ecosystem model using different leaf parameters by different vegetation types (e.g., Sun et al., 2014). One of most widely used sun/shade photosynthesis model by de Pury and Farquhar (1997) already manifests the importance of N effects on a photosynthetic capacity, and that may explain a large part of the differences in Am and alpha0 between the campaigns listed in Table 3.

If the authors discuss how tuned leaf parameters affects ABL, I tempt to suggest looking at a parameter that determines stomatal conductance in the A-gs model in addition to two parameters already introduced. I suppose f0 is the one (P247 in Vilà-Guerau de Arellano et al., 2015), and it can be determined by the outputs of LI6400. For example, Ikawa et al., (2018) reports a leaf parameter for stomatal conductance (m_l in their paper in Table 4) of rice considerably affects ABL temperature.

L25 resolution of?

L26 non-linear behavior to what?

L28 please spell out ET when introduced for the first time

L29 inferred

Page 2

L2 evapotranspiration of total ET?

L9 Isn't "stomatal responses" a part of "surface and boundary-layer dynamics"?

L17 Similarly, "wind" is a part of boundary-layer dynamics? It may be better to replace "BL dynamics"

with other specific terms.

L22 first is redundant

L24 How large is a grid of weather and climate models?

Page 3

L10 diurnal variability of CO2-H2O flux partition

L17 first is redundant

L24 evapotranspiration or ET? Are they different?

Page 6

L5 mm instead of mm m-2, assuming 1 gram of H2O is 1 cubic centimeter.

[0.1g]/[(0.2^2*pi/4)m2] = [0.1cm3] /[(0.2^2*pi/4)m2] = 0.1/ (0.2^2*pi/4)/1000 mm

L21 were

L23 which leaf? Fully expanded? Or totally random in a canopy?

L28 Please use the SI unit instead of ppm for CO2 concentration.

Page 7

L1 Parameterization based on a rapid A-Q curve depends on stomatal conductance. I advise to include an average gsw value during the measurement of PAR = 0 – 200 umol m-2s-1.

https://www.licor.com/env/support/LI-6800/topics/rapid-light-curve.html

L14 superscript -2

Page 8

L15 Considering the expertise of the authors, I will leave it to them whether to call it MO length or O length.

http://glossary.ametsoc.org/wiki/Obukhov_length

L15-16 Please check the sentence.

L22 Please check the sentence.

Page 9

L11 2.105 may be too precise.

Page 10

L22 were

L5 what surface? Plant-canopy?

L19 Fig. 5

L24 Table 3 and it is already mentioned in L20.

Page 12

L27 Without knowing local time (or solar time), it is difficult to catch up discussion.

Page 13

L6 Fig. 3

L10 How was latent heat flux from EC? Was it also high in IOP3 despite small gsw?

L18 internal CO2 concentration

L25 Fig. 5

Page 14

L10 subscript 2

L20-21 The presence (and not absence) of the local maxima increases thermal stability?

Page 15

L7 Please check the unit

L16-17 Please note that detail profile does not necessarily provides accurate values of gross primary production at least given our limited knowledge of plant canopy micrometeorology, though the profile approach is still useful for understanding mechanisms (e.g., Drewry et al., 2014).

L19 soil respiration or Rs?

L26-27 Ep?

L27 What is the sub-optimal performance?

Page 16

L25 It is a quite interesting topic that LE and CO2 flux behave differently under diffuse and direct radiations. Can CO2 flux also be included in Fig 10 to ensure the opposite pattern? It may be worth looking at a bulk stomatal conductance estimated from latent heat flux to delineate the effects of conductance and VPD (e.g., Dolman et al., 1991).

Page 17

L6 reaches

L7 I prefer to know this information of time earlier.

Page 20

I am afraid 3.4.2 needs a substantial improvement in the clarification. I was totally lost in the latter part of 3.4.2 and not able to understand how ET was estimated from SIF in Fig 16. I was not also able to understand what information authors want to convey by Fig 15. What is the correlation? It does not look like a correlation coefficient (0-1), and I do not see any relationships between x and y-axis either.

Page 21

L4 delete "it"

L23 H or SH? Also some are italic and some are not.

L27 Can it be simply because that the greater the net heat received by both horizontal and vertical fluxes (surface flux and advection), the faster the ABL height grows?

Page 22

L26 I apologize in advance for the lack of knowledge in the operational theory of scintillometer, but is the scintillometer measurement free from the concern of low frequency component? The spatial scale of 86.8 m over 60 secs by the Eulerian measurements may be still smaller than the low-frequency scales that would not be captured by EC measurements (greater than a spatial scale that would be inferred by the scale of tower height, wind speeds and time periods of 30 mins)?

Page 24

P24L16 those for the

Page 25

L1 It sounds contradicting to the importance of using accurate leaf parameters. Maybe the variations of crop coefficients (K) are so small among different vegetation covers (0.7-1.1) compared to the difference between vegetative and non-vegetative (0 – 0.2) areas (Table 4)?

Figs and Tables

Fig 4 Check the number of the fig.

Fig. 7 I assume the dashed lines are canopy heights.

Fig. 16 Was this ET estimated by SIF? I still did not understand how it was estimated.

Table 1 Height of wind measurements?

Table 2 Please check units.

Table 3 Which was determined by A-PAR and which was by A-Ci?

Reference

de Pury, D.G.G., Farquhar, G.D., 1997. Simple scaling of photosynthesis from leaves to canopies without the errors of big-leaf models. Plant Cell Environ. 20, 537–557. https://doi.org/10.1111/j.1365-3040.1997.00094.x

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