

## Response to Reviewers' Comments (second round)

In the following, we present our detailed responses to reviewers' suggestions with our replies in blue; the specific revisions that we performed are indicated by underlined text.

### Reviewer #1

Dear authors

Thanks for taking in consideration most of my comments. I still find the issue of the surface relative humidity (rhs) treated in a very shallow manner. Please consult the recent paper <https://doi.org/10.1007/s10546-020-00550-9>, where a review and a discussion on the meaning and computation of rhs is included.

We thank Reviewer #1 for constructive feedback on the manuscript. Following your suggestion, we have revised the paragraph as follow (L88-92).

*"... where  $rh_s$  is surface relative humidity, i.e., the ratio of  $e_s$  to  $e^*(T_s)$ . For a vegetated surface,  $rh_s$  as defined in this study represents relative humidity of the foliage surface and is conceptually equivalent to surface water availability in Li and Wang (2019). For a bare soil land surface,  $rh_s$  represents soil surface relative humidity which can be found using the "alpha" method that is parameterized using soil moisture content or soil water potential (Lee and Pielke, 1992; Wu et al., 2000; Cuxart and Boone, 2020)."*

### Reviewer #2

I have read the authors' response as well as the revision to the manuscript. Even though I do not agree with some of the interpretations, I think that this version is suitable for acceptance after minor revisions.

We thank Reviewer #2 for the constructive feedback on the manuscript.

L49: "changes in relative humidity is roughly steady" - that does not make sense. I think you mean that relative humidity reaches roughly a steady state value.

We agree your point. We revised the sentence as "relative humidity reaches a steady state value" in L46 in the revised version.

L90: "where the source and sink ... are identical" - I think you mean that they are in balance, not that they are identical.

In this sentence, we intend to describe identical sources of water vapour and heat. Sorry for the confusion caused. We have revised the sentence as "the sources of water vapour and heat are identical" in L81 in the revised version.

L92: Buoyancy is not driven by temperature gradients. It is driven by surface heating by absorption of solar radiation, which in turn results in temperature gradients and buoyancy.

Thank you for pointing out the erroneous description. We have revised the sentence as "buoyancy driven by surface heating" in L83 in the revised version.

L100: Please explain why you derive two equations for LE, and not just one. It is unclear what the benefit of having two equations is.

We agree with your concern. In order to clarify the benefit, we have revised the sentence as “*The two equations (4) and (5) are complementary to each other in that they represent distinct thermodynamic paths, each of which will be discussed in the next section.*” in L111 in the revised version.

L190: "VPD budget" - VPD is not a conserved quantity, so there is no VPD budget.

Thank you for pointing out the erroneous term. We have revised the sentence as “*Unlike many previous studies which focused on the steady state of VPD*” in L176-177 in the revised version.

L230: You should be able to make a rough estimate from the canopy height about the significance of the heat storage term. This would support your argument.

Thank you for your suggestion. We added the following sentences in L217-219 in the revised version.

*“For instance, Meyers and Hollinger (2004) showed that storage term comprised 14 % of net radiation for a maize field with a 3-m canopy height, and 8% of net radiation for a soybean field with a 0.9-m canopy height, implying larger heat storage capacities for taller crop canopies.*