Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2015-552-RC2, 2016

Hydrology and Earth System Sciences
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Interactive comment on "Canopy-scale biophysical controls of transpiration and evaporation in the Amazon Basin" *by* K. Mallick et al.

Anonymous Referee #2

Received and published: 12 April 2016

This manuscript describes a study that infers stomatal and aerodynamic conductances from eddy flux observations. I think in general, this study is innovative and presents novel material, so that in principle it should be published. I hesitate recommendation for publication mostly because I am not entirely convinced by the approach and I feel that this needs revision. Hence, I recommend major revisions, although I do not think that it necessarily involves a lot of work to address the points below.

Major points:

My major problem with the manuscript is that I do not understand the approach, so that it is difficult to assess its plausibility. While the main equations are provided in the manuscript (eqn. 2-5), there is no more description on where these equations come

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from, except for references to prior papers by the authors. I think it is necessary to at least provide a description at a qualitative level where these equations come from. The point where I really got confused is that eqn. 5 uses the Priestley-Taylor coefficient, which is an empirical coefficient in an evaporation equation that is rather different from the Penman Monteith equation. Where does this coefficient suddenly come from? I find this quite confusing, and it needs at least a minimum of explanation as it is not obvious.

What I also do not understand is why an iterative scheme is needed. Can't one simply use the observations and use a simple partitioning based on the Bowen ratio? It would be good to describe what the differences and similarities are to previous approaches. As the authors propose a new approach, they should provide a better description that is easier to follow of what is being done.

Minor points:

- The authors refer to λE as evaporation, which, technically speaking, is the latent heat flux, not evaporation.

- Abstract: dry and wet conditions âĂŤ do you mean conditions in which water is not limiting vs. limiting, or precipitation vs. radiation driven conditions?

- Biophysical control âĂŤ should be briefly explained by what this means.

- Line 145: I wonder why approaches hat directly link stomatal conductance to photosynthesis are not mentioned, such as Ball-Berry?

- Line 194: Where do these "state equations" come from? Referring to previously published work is fine for derivations, but the description should still mention what the concepts are that are behind these equations.

- A table of variables would help.

- Line 238: I think the authors assume that the conductances to momentum, sensible

and latent heat are identical. If this is the case, it should be mentioned, as there are also approaches to surface exchange that do not treat them as being identical.

- Line 331: As the typical readers of HESS are not micrometeorologists, it would be useful to explain the decoupling coefficient in some more detail. This will help to interpret the following results.

- Line 422: To what extent could these discrepancies between how conductances are derived also relate to actual differences in the conductances for momentum vs. heat?

- Line 498: The authors should stick to the same ratio gA/gC for easier interpretation.

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