

Second round of reviews for the manuscript (*bg-2014-123*): TWO PERSPECTIVES ON THE COUPLED CARBON, WATER, AND ENERGY EXCHANGE IN THE PLANETARY BOUNDARY LAYER.

We would like to thank Reviewer 1 for his opinion to accept our paper as is, and Reviewer 2 for his/her new comments. We also would like to thank the Editor for his guidance on this second round of reviews. We have introduced important improvements to the manuscript, which are highlighted in yellow in the attached version. Below, we repeat the Reviewer's comments in normal font and our replies are in bold-face. Changes in the manuscript are quoted in italic.

General comments:

The authors have responded in detail to my review, but only met some of my concerns. The authors avoid addressing the more effortful suggestions for change put forward, arguing that this would be a new study. Unfortunately, this means that the criticisms remain largely unaddressed. For instance, the addition of hypotheses would have helped structure the scientific outcomes.

**Response:** We regret that our substantial efforts from the previous round of reviews did not address all the Reviewer's concerns. However, we believe the new changes introduced here (see highlighted text in yellow) finish to bridge that gap. For instance, we have added hypotheses for each of our research questions in the introduction section of our manuscript. These are highlighted in yellow on page 6. We now come back to these hypotheses in the discussion section (pp. 23–26), which helped us restructure our discussion points.

(Continued general comments) A more complete sensitivity analysis would add value, as only a single day of data are available for comparison.

**Response:** We have extended our sensitivity analysis (new figure 8 on p. 50, see analysis on pp. 21–22), which explores larger ranges of variation for our drivers, soil moisture and subsidence, representing a drought situation (much dryer soil with high subsidence). With this, we are able to comment on the behavior of the crop-atmosphere system under more extreme conditions. This is a substantial new result as asked for.

(Continued general comments) The authors have reformulated their two science questions. However, the discussion does not answer these questions.

**Response:** We have thoroughly restructured our discussion section (pp. 23–26) in order that it clearly addresses and answers each research question, as suggested by the Reviewer. First, we have created one subsection per research question, hence dividing the discussion in two parts. In each subsection, (1) we evaluate our hypothesis using the relevant findings of our paper, (2) we compare our study to others, stressing the novelty of our research, and (3) we answer our research question. This structure helps us to clarify our discussion section.

(Continued general comments) Only in the Conclusions are the questions referred to again, and then only in broad terms one might find in a textbook.

**Response:** As mentioned above, we now answer our research questions directly in the discussion section. We have entirely rewritten the conclusion section (p. 27) so that it repeats in sharp terms the major conclusions and the novel aspects of our research. We believe this strengthens our final messages.

(Continued general comments) The discussion includes interesting text connecting to linked research, but really needs extra paragraphs that summarise the critical outcomes of the Results, answer the science questions in detail, and emphasise the novelty of the research.

**Response:** As mentioned above, we have done an extensive restructuring of our discussion section, with added paragraphs, in which we summarize outcomes, discuss our work in comparison to other studies, and answer all research questions. In the conclusion section, we moreover state:

*Our framework strength lies in the relative simplicity of the model that still represents the essential processes of the system. For example, the sensitivity analysis of Fig. 8 and the CO<sub>2</sub> budget of Fig. 9 could not easily have been produced using a full meso-scale land-atmosphere model. Using it, we are able to study the relevant interactions of the ABL with the surface, and to allow a direct comparison to observed ABL and surface variables.*

**We believe we thus managed to emphasize the novelty of our research, as suggested by the Reviewer.**

(Continued general comments) We are left only with the idea that the two models should be combined to reduce their weaknesses, which seems a weak outcome.

**Response: We agree with the Reviewer that this message is too weak for a conclusion. We have thus moved this statement to the discussion section, and have reformulated our conclusions (p. 27), in order to strengthen the take-home messages. We thank the Reviewer for this remark.**