

Interactive comment on “Disentangling the response of forest and grassland energy exchange to heatwaves under idealized land–atmosphere coupling” by C. C. van Heerwaarden and A. J. Teuling

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Hereby, I would like to reply to the points raised by the second reviewer. Similar as the first reviewer, the reviewer mentions that he/she does not agree with the treatment of the vegetation in our paper.

1. The reviewer mentions that our parameters for grass are incorrect. We would like to state here that the parameters that we are using are the common practice for many atmospheric models, and that they are heavily tuned together in order to achieve an

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optimal match between model results and measurement data.

The problem for stomatal resistance models such as Jarvis' model, which we are using, is that they are purely empirical and that their parameters are not purely independent. The fact that we use no VPD correction for grass does not mean that it does not respond at all. The fourth parameter in our Jarvis model, the temperature sensitivity, leads to an enhanced resistance under conditions in which the 2~m temperature exceeds 298 K. This parameter could as well be removed and instead a sensitivity to VPD could be introduced for grass leading to the same results.

We propose to this reviewer and the previous one, to rewrite our manuscript and taking the entire stomatal resistance dynamics as one phenomenon. Judging from the statements of both reviewers, we agree that might have been too ambitious in stating the VPD response as the one-and-only relevant biological factor. Instead, we shall consider the biological responses as a whole.

2. The roughness length of scalars is largely an unresolved issue in turbulent flows over rough surfaces, and its determination is again a purely empirical one. The values that we have chosen are solely the results of extensive tuning against measurement data.

3. The sensitivity study contains a wide range and the difference between grass and forest in the lower left area of the graph is only marginal. The exact difference in the cold, low-radiation state depends on the chosen values of the minimal resistance. As we state in the paper, our focus was not on making an exact prediction of the behavior of the system over the entire parameter range, but instead to show that we can reproduce and explain the behavior of the coupled system that Teuling (2010) has found in the measurement data.

4. Here, the reviewer makes an incorrect statement. Even though the real temperature decreases with height, the potential temperature increases with height in the free atmosphere. This means that air from above the atmospheric boundary layer that is

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being entrained into the boundary layer under all conditions warms the boundary layer.

Interactive comment on Biogeosciences Discuss., 11, 5969, 2014.

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