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Geoscientific Model Development Discussions

Interactive comment on "Evaluation of JULES-crop performance against site observations of irrigated maize from Mead, Nebraska" *by* Karina Williams et al.

Anonymous Referee #2

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The manuscript by Williams et al. describes and evaluates the performance of the JULES model with a new set of parameterizations for maize at the irrigated Mead, NE AmeriFlux site. The paper includes a detailed description of how site observations were used to optimize variables in JULES-crop, an evaluation of the model without crops, and an evaluation of the model with the new maize parameters. However, the manuscript requires some major revisions before it is ready for publication.

The central component of the paper is well written with a thorough description of the model and the parameter calibration, but the remainder of the manuscript lacks strong detail. For example, the introduction doesn't include much of a motivation for the study. What are the goals of the JULES crop model – yield, carbon, productivity and why is

parameterizing for the Mead site a valuable exercise? The results and conclusion are also fairly brief.

The authors mention in the abstract and introduction that they used observations from three MEAD FLUXNET sites, but they only use irrigated sites for model comparison? Why didn't they include the rainfed site in the analysis – especially when most cropland relies on rain to meet water demands?

In Section 2 and 3, some attention to the equations to define the parameters is needed to understand how the model works without reading other papers. The tables do not provide the necessary information to a non-user of JULES. See Technical Comments.

In Section 3, I would like some additional discussion on how the authors chose the parameters calibrated in this study. Was a sensitivity experiment done that indicated these parameters were important or were the parameters chosen in Tables 1-4 because they were convenient given the available observational data? If there was not a sensitivity study, perhaps the authors could highlight which parameters showed the most importance for the model results.

The authors compared the default JULES model without crops with the revised JULES crop model with updated parameters. This seems strange, what is the purpose of calibrating the LAI and height of JULES (without crops) with the newly parameterized JULES crop when a JULES-crop model already exists. I think it might also be more useful to compare the default JULES crop model from Osborne et al. (2015) with the newly revised site-specific parameterization. I also think it might be useful to look at the model performance at other sites.

It would also be useful to perform an uncertainty analysis of the parameters. This would be a valuable not only for the current model analysis, but also for extrapolating to other sites or globally. I'm not asking the authors to do this for this publication, but parameter uncertainty should be included in the discussion.

Technical Comments:

1. Eq. 1 has several parameters for temperature that aren't clearly defined (Table 3?). Relatedly, the second column in Tables 1-4 is not particularly useful to the reader; perhaps more appropriate would be a description for the variable rather than the model assigned parameter name.

2. Eq. 3: What is the difference between j and i? Again, it's not clear to a non-user of the model what those parameters are since they are not defined in the text or in the table.

3. P 35, L 19-20: Figure 27 should be referenced here.

4. Figure 26 & Figure 27: Why does US-Ne2 2010 have no observations?

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