

We appreciate Sam's critique of our manuscript and have considered all comments and suggestions. Our point-by-point response follows:

Comment: I see that Bill Sacks made a similar comment: The authors should point out the similarities and differences between this work and Levis et al. (2012). They should emphasize the aspects of this work chosen for the next version of the clm and slated for release this year. This way the authors explain the context of this work relative to ongoing clm development and relative to previously published work. Otherwise, I find this an easy paper to read, and I recommend it for publication after minor revisions.

Response: We agree with the suggestion to include detailed discussion of Levis et al. (2012) and additional information on the similarities and differences of the two studies. Therefore, we appended the text in various places:

- We added the following text to the introduction: "Recently, a more sophisticated crop model was incorporated into the Community Land Model (Sacks et al., 2012). This addition adds a separate growth scheme for crops to simulate maize, soybean and cereals in the mid-latitudes, using algorithms from the Agro-IBIS model (Kucharik and Brye, 2003). Levis et al. (2012) used the new development to evaluate CO₂ fluxes from the modified leaf area index (LAI). The model showed promising improvements in annual net ecosystem exchange and the impact agriculture has on climate, such as reduced precipitation. However, this model lacked some important features of nitrogen cycling (i.e. nitrogen retranslocation, soybean nitrogen fixation) and management practices (i.e. fertilizer, residue harvest) that may have an important impact on the carbon fluxes." In the last paragraph we added "Several features of this model will be included in the next release of CLM; we will point out those features throughout the model development section."
- We added to the end of section 2.1.1 (Growth scheme): "The grain fill features of this model differ from the Levis et al. (2012) crop model through the maintenance of a separate pool for organ carbon and nitrogen to keep track of yield whereas Levis et al. (2012) allocate grain carbon into the stem pool."
- We added to the end of section 2.1.2 (Nitrogen and retranslocation): "The retranslocation scheme is included in the next release of CLM4.5."
- We added in section 2.1.3 (Fertilization): "The fertilizer scheme is included for the release of CLM4.5."
- We added to the end of section 2.1.4 (Soybean nitrogen fixation): "The soybean fixation scheme will also be added to the CLM4.5 crop model."
- We added in the first paragraph of section 2.1.5 (Crop root structure): "In Levis et al (2012), root density for all vegetation decreases exponentially with depth, but for crops did not vary with growth."
- We altered the text at the beginning of section 2.1.6 (Harvest management) to read "Crops are harvested as soon as maturity is reached, as done by Levis et al. (2012). However, in CLM-Crop, harvest is partitioned between the atmosphere and litter pools."

Comment: Abstract: "validated against obs from two Ameriflux sites" is specific and makes sense, while "some regions" feels vague and awkward. Maybe just specifying whether these regions are in the US is enough, or maybe you could be even more specific.

Response: We have corrected the text to specify regions where yield agrees with observations, specifically, we changed "some regions" to "countries such as the U.S., Argentina, and China"

Comment: Abstract: "Crop yields and productivity ... precipitation." You do not say here how this compares to observations. I.e., is it a good result?

Response: We did not compare this result directly with observations, however, we did notice that other studies observed this correlation, which we noted in section 3.2. We have extended the sentence in the abstract to state: "Crop yields and productivity...precipitation that agrees with other studies".

Comment: Section 2.1.1: I would change "as shown by Levis et al." to "as also done by Levis et al." Maybe this becomes a non-issue after revisions. At the moment, as written, this statement makes Levis et al. seem like part of the same project and, yet, this is only the first mention of Levis et al.

Response: We have corrected the text to read "as also done by Levis et al."

Comment: Examples of model features chosen for the next version of the clm: Section 2.1.2 Section 2.1.3 Section 2.1.4

Response: We added statements at the end of the sections 2.1.2, 2.1.3 and 2.1.4 to reflect the inclusion of these features in the CLM4.5 release. Specific text is included in our response to general comments above.