Earth System Dynamics Discussions

Interactive comment on "Implications of accounting for land use in simulations of ecosystem services and carbon cycling in Africa" *by* M. Lindeskog et al.

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Hi,

I was asked to review this paper but it appears that in my delay in responding to the request two further reviewers were appointed. Anyway, I have read the manuscript and have a few comments which I will submit as a member of the relevant community.

Regards, Tom

General comments:

1. The choice to focus on Africa seems a little odd given that LULCC has been relatively

minor compared to other regions, and that cropland density is not very high. Which makes it hard to justify as a good region for validating the model.

2. A few more details on the model setup would be nice. What is the time-step of the model? Monthly, daily? If daily, how is the CRU climate data down-scaled? Does the model simulate dynamic or static roots? I appreciate they might be found in the references, but to aid interpretation of the results I think they should be included in this paper.

3. CRU data. In my experience of using the CRU data I have noticed that for some regions there is no inter-annual information on climate. Have the authors checked that this is not the case for much of Africa? It might be impacting upon their simulations.

4. Validation of maximum PHU values. Their methodology essentially fits the crop growing heat requirements to climatology. This leads to a wide rang of PHU for crops in Table 1. The minimum is set to 900. Is there any way of verifying that the maximum values are reasonable (i.e. by comparing to know HU for crop cultivars)? My concern is that they are too large particularly in the semi-arid regions where I would expect crop choice to be based not just on temperature but also rainfall. i.e. cultivars would be grown that would reach maturity during the rainy season.

5. Early "green-up" in the model. This seems quite a consistent bias of the model and is not discussed in great detail. I could think of a few potential causes. If the model uses monthly climate data (see point 2 above) then the "smoothness" of rainfall at the onset of the monsoon, when in reality it can be quite erratic, may lead the model to simulate growth prematurely. Related to this, if the model has static roots then plants may have access to water prematurely leading to early green-up. Some discussion on these points in the paper is required.

6. Wheat. Figure 8 shows that for quite a few countries the model does not simulate wheat when in reality it is grown. Table 3, footnote 4 implies this is due to a temperature restriction. Could the authors provide further explanation for what the temperature

restriction is for.

Minor comments:

1. Page 243 line 15. The sentence "The recent local ..." seems incomplete.

2. Figure 9. Why were these particular countries selected? Were they the ones with the greatest skill in simulating inter-annual crop yield variability.

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