

Interactive comment on “A land surface model combined with a crop growth model for paddy rice (MATCRO-Rice Ver. 1) – Part II: Model validation” by Y. Masutomi et al.

Anonymous Referee #1

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Masutomi et al. have evaluated 1) part of the water and energy flux terms, 2) net carbon flux and 3) the yield of rice crop at a flux observational site during 2003-2006 using a Crop Growth Model incorporated into a Land Surface Model. As the authors point out representation of interactive crop growth in Land Surface and Earth System Modelling is increasingly important to understand the water, energy, and carbon cycle interactions of climate, especially on regional to local scales.

Overall the article demonstrates that the new model (whose description submitted as a separate article) can reproduce the latent and sensible heat fluxes, biomass growth and rice yield on daily time scale for the 4-yr time period. The coupled Land Surface - Crop Growth model can interactively simulate LAI, crop height and root depth. The

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authors imply that the tool can potentially be used to study climate change impact on rice production and crop-climate interactions.

However, I think the authors need to discuss 1) their results in relation to which aspects of the improvements in the new design may be resulting in the better model-observation comparison of each model output, and 2) the validity of the parameters in both wet and dry climatic conditions. The article as such is short and possibly benefit from expanding the evaluation of some of the model output using other available observations. I also feel a comparison to the original MATSIRO simulations wherever possible would certainly help to quantify the improvement in the newly proposed model version.

The article requires revision but the findings would be a step towards advances in land-surface crop modelling if discussed sufficiently.

Specific Comments

1. If the authors mean to validate the new model, the paper should include comparison of LHF and SHF (Fig. 7 & 8) to the original simulations of the parent LSM (without the present modifications or interactive crop growth and development). How different are the stomatal conductance and the moisture and temperature of the soil column in the parent LSM when uncoupled to the CGM?

2. I wonder whether the authors have compared the water and energy flux terms on shorter time scales than daily, say, to look at the diurnal variations of LHF and SHF in both obs and simulations during the various stages of the crop growth. It would be useful to understand the impact of crop-climate interactions on the water balance on sub-daily timescales, which is an ongoing challenge in climate modelling.

Section 1, L19: Expand MATCRO.

Section 2, L16-L17: Why only 2003-2006 was chosen instead of 2001-2006 (when the observations seem to be available according to the given website)? Justify here.

Section 2.2, L1-10: Equations to calculate the soil state are missing here.

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Section 3, L25-L26 & Section 4, L29: Either remove the last sentences or explain shortly how.

Section 5, L22: Add here a couple of sentences on what changes in parameters/processes in the model may have resulted in the important feature of the model using a schematic of the processes represented in each module of the coupled model.

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-29, 2016.