

Response to Anonymous Referee#1 (gmd-2016-28)

In addition to the impact of crop grow, a range of authors have shown that irrigation might have an important impact on the exchange of water and energy between land and atmosphere (it might be useful to add this in your introduction as a justification).
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You are exactly right. A range of studies have shown the impact of irrigation on the atmosphere.

We will add the explanation on the importance of irrigation in land-atmosphere simulations into the introduction of the revised manuscript, referring some studies, e.g., Boucher et al. (2004), Lobell et al. (2006), Snyder et al. (2006), and Kueppers et al. (2008).

The paper does not provide an evaluation, a parametrisation and, most important, a validation of the developed model: I know there is a paper part II on this, but I think that the paper cannot stand on its own without these (I suggest the combine part I and II into one paper).
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The journal guideline of GMD admits the separate submission of the model description and evaluation papers, if the evaluation is extensive. The revised version of the evaluation paper will become more extensive, because we will add the results of two types of simulations into the revised manuscript of the evaluation paper: the effects of model modifications and the validation of the model at the sites which are independent from the parameterization site. Considering the extent of the model evaluation paper, we think the separate submission is acceptable.

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It is not always very clear what was already part of MATSIRO and what you have developed.

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To make clear the difference between the original model and our model, we add a table, where all the modifications are listed.

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It seems to me that only minor adaptations have been implemented up to pg 15 "4.2 Crop development". In this paper you do not describe again all equations of MATSIRO, as this has already been published (you only have to refer to Takata, 2003). By consequence, you can significantly reduce the length of this paper (reduce section 3 to 1-2 pages and section 4.1 to max. 1pg) and add a section on model parametrisation, evaluation and validation.

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If we only refer to Takata et al. (2003) and do not show the equations, nobody can develop the model and reproduce the results, because Takata et al. (2003) did not describe all parts of MATSIRO. According to the journal guideline of GMD, the model reproducibility is emphasized. Hence, we showed all the equations, which are necessary for developing the model and reproducing the results. We also note that almost of the equations which we showed in the manuscript were not shown in Takata et al. (2003). We think that only referring to Takata et al. (2003) is not a good option for ensuring the model reproducibility.

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Some small modifications have been described in section 3 and section 4.1. The explicit reasons for these adaptations are not provided. The impacts of these modifications on the model simulations are missing. What are the added values of those adaptations? Do those modifications affect significantly your model simulations (compared to the original LSM set-up)? Are the modifications you implemented specific for rice or are they more generally applicable?

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We absolutely agree with you. Hence, we will show the effects of the modifications to the revised manuscript of the evaluation paper, by comparing the simulations between the original model and our model.

All the modifications except the consideration of water surface are applicable for other crops. We will add this point into the concluding remarks in the revised manuscript.

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You assume that your field is flooded (e.g. soil always at saturation level, etc,. . .): is this assumption correct for the whole year round or only valid during the growing season or parts of it? If this assumption is not valid for the whole year round, can you use this model to make climate simulations, as you suggest in your conclusion?

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The flooded field is valid only for the growing season of paddy rice. During the other seasons, bare soil is covered on the land surface if no crop is planted. The original model can simulate water and heat fluxes from bare soil. Hence MATCRO can also simulate the fluxes from bare soil. Therefore, MATCRO can be used for climate simulations for a whole year. To make clear this point, we will add the above explanation into the concluding remarks in the revised manuscript.

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As you do not do an evaluation of your model, you cannot write some of the statements in your abstract (e.g. l2: ". . .accurate simulation. . .": you don't show this in your paper), . . .and conclusion.

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The statement in the abstract means "accurate simulations in agricultural land are important for climate simulations". This is a general statement, but might be misleading. We will remove the words "accurate" and "accurately" from the abstract and the introduction. However, we could not find the statements you

pointed out in the conclusion. The conclusion just discusses the applicability and limitations of the model.

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Describe explicitly in your paper which variables (of your adapted model), are now exchanged between the LSM and the GCM, as you mention in introduction at l14.

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Table 2 shows the variables which are exchanged into the LSM and CGM.