

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.

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Masutomi and co-authors present a paper on the validation of a new coupling of an existing land-surface model MATSIRO and a crop growth model for rice, which seems to be a new development based on existing modeling approaches. With this model development, the authors aim to support model studies on the effects of agricultural land use on climate as well as hydrology. Masutomi and co-authors are right in their assessment of the need and applicability of agricultural modules in climate and hydrology studies and a new modeling approach with a focus on rice systems is thus highly welcome.

I have, however, substantial concerns with respect to the validity of this “validation pa-
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per”. First of all, I’m expecting that the MATCRO-Rice model is going to be applied at river catchment or continental to global scale. Even though the envisioned scale of future application is not explicitly mentioned, I’m assuming so, as the model development is motivated by the wish to better study the effects of agricultural production systems (here: rice production) on hydrology and climate. Yet, the validation only provides a comparison to a single site, which even lacks a central data element (crop yield) that had to be deduced by trend extrapolation. The model validation presented then turns out to be a demonstration of model calibration to a single site and then can reproduce much of the observed dynamics at this site. Yet, it remains unclear how the model would perform at sites where such intensive calibration is not possible for the lack of data. The authors seem to constrain their “validation” to this one site as it seems to be the only eddy flux measurement site for rice production systems, but clearly that is no proof of model skill. As suggested by the other reviewer, I would much appreciate if the improvements of the MATCRO-Rice model could be evaluated against the original MATSIRO simulations and if there was an evaluation of model skill apart from the calibration site. Authors are advised to consult e.g. Luo et al. (2012) for possible data sets and metrics and Iizumi et al. (2014) for yield data.

There seems to be a misconception on the net carbon flux between land and atmosphere. The authors claim that the model’s ability to reproduce the biomass accumulation is an indicator for its applicability to simulate the net carbon flux: “As indicated by the figure, the simulated total biomass was in good agreement with the observations. Hence, we conclude that the model has high accuracy for simulating net carbon flux during growing period” (page 5, similar on page 6). Yet, the net carbon flux is composed of net carbon uptake by plants (NPP) and the mineralization of soil organic matter as well as other disturbances such as fire, pest outbreaks etc. which may not be too relevant here. But the soil respiration flux is a central aspect in this and cannot be ignored.

Minor remark: Page 10: DVS is likely “development stage” not “dynamic vegetation

model”?

The paper as presented here addresses an important in land surface and agricultural modeling but fails to validate the model or to evaluate the model performance. Model performance needs to be evaluated against independent data sources, the improvement compared to the original model should be quantified (and eventually assessed against possible shortcomings) and the validation/evaluation should be performed at the scale of envisioned application, not just at a single point. Also, the model evaluation should address the ability to reproduce spatial and/or temporal patterns.

Unless substantially extended to justify a publication on its own, this paper could well be merged into the model description paper at <http://www.geosci-model-dev-discuss.net/gmd-2016-28/>, as also suggested by a reviewer there.

References

* Iizumi T, Yokozawa M, Sakurai G, Travasso M I, Romanenkov V, Oettli P, Newby T, Ishigooka Y and Furuya J 2014 Historical changes in global yields: major cereal and legume crops from 1982 to 2006 *Global Ecology and Biogeography* 23 346-57

* Luo Y Q, Randerson J T, Abramowitz G, Bacour C, Blyth E, Carvalhais N, Ciais P, Dalmonech D, Fisher J B, Fisher R, et al. 2012 A framework for benchmarking land models *Biogeosciences* 9 3857-74

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