Hydrology and Earth System Sciences Discussions

Interactive comment on "Improving evapotranspiration in land surface models by using biophysical parameters derived from MSG/SEVIRI satellite" *by* N. Ghilain et al.

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We acknowledge the anonymous Referee#2 for reading the paper and for his/her comments. Points raised are answered below.

- "(RF#2) It is unclear what contribution to the scientific literature this paper lends. The question seems to be how ET estimates in LSMs change with new LAI/fAPAR information "

The objective is indeed to answer to that question. Actually, this paper aims at answering the following questions: 1) how can we use LSA-SAF LAI data in a land surface

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model, 2) what is the impact of using those data on simulated ET compared to current operational practices (e.g. use of ECOCLIMAP). These questions are not answered today in the scientific literature.

- "(RF#2) Why ET? Why not look at the variety of LSM outputs that are impacted by new veg data? "

Indeed, we are especially interested in ET which has a lot of practical applications. We opted for a SVAT approach modeling that offers possibilities to model in a coherent way all surface energy fluxes components and open possibilities to a wider spectrum of applications than more simple ET models. ET is one of the components of the water cycle that is the most relevant output of this kind of land surface model (like H-TESSEL). Such SVAT model has been designed to generate output of surface energy fluxes (ET is one of them) for use in atmospheric models. In a general way, ET (or LE) and H are anti-correlated. ET is therefore one of the key output variable of the model, but also interesting and appropriate for a hydrological journal, like HESS. Other examples of ET focus can be found in the recent (and less recent) papers published in HESS, even using land surface models (McCabe et al. (2005)), and in particular H-TESSEL (Wipfler et al. (2011)). Here is a short list of HESS papers focusing on one component of the land surface models after assimilation/use/comparison of a new remote sensing product.

- McCabe et al. (2005), HESS, 9, 467-480, focus on ET from TOPUP - Hanasaki et al. (2008), HESS, 12, 1007-1025, focus on runoff - Sinclair and Pegram (2010), HESS, 14, 613-626, focus on soil moisture from TOPKAPI - Albergel et al. (2010), HESS, 14, 1109-1124, focus on soil moisture with ISBA-A-gs - Corbani et al. (2010), HESS, 14, 2141-2151, focus on land surface temp. from FEST-EWB - Wipfler et al. (2011), HESS, 15, 1257-1271, focus on LE from H-TESSEL - Nie et al. (2011), HESS, 15, 2437-2457, focus on soil moisture from AVIM

- " (RF#2) The ET focus also seems somewhat redundant with the other Ghilain et al.

HESS paper "

The ET focus is indeed the same, however the objective stated is completely different. While Ghilain et al., HESS, focuses on the applicability to derive ET in near-real time using LSA-SAF products and NWP using a simplified SVAT and its validation, the present paper focuses on the exploitation of vegetation indices, mainly, 1) a method to use LSA-SAF LAI in a land surface model, 2) the impact on ET produced by H-TESSEL, compared to the configuration with ECOCLIMAP-I. It is intended here to show the results of a SVAT model used off-line, which could be improved by using LSA-SAF LAI.

- "(RF#2) If the authors were more interested in what new LAI/fAPAR means, they should have constructed their analysis towards a LAI/fAPAR intercomparison across multiple products"

The present study focuses on the exploitation of MSG/SEVIRI derived biophysical variables in a land surface model. Indeed, this kind of comparison seems interesting, but it should be done in a separate study, as the paper is already long.

- "(RF#2) The ECOCLIMAP-I comparison is not very useful given that ECOCLIMAP-I is not actual direct measurements [. . .] so it's difficult for the reader to take anything meaningful from it."

We do agree that ECOCLIMAP-I does not represent direct measurement, but it can be seen as a synthetic climatology for vegetation derived from remote sensing. However, given the challenges of the Numerical Weather Prediction models, land surface models have evolved quite slowly from a fixed biome-dependent parameterization, to such kind of climatologies. These fixed database approaches are still used in operational set-ups in numerical weather prediction models, and in research (e.g. Wipfler et al. (2011), published in HESS; Boone et al. (2009); Hamdi (2010); Hamdi et al. (2011)). At least, it is useful to compare new products and their use with the actual practices.

- "(RF#2) The title is also misleading because of the plural designation on 'models'

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(only one LSM was 'improved' or analyzed)"

The title will be changed: ". . . in land surface models . . ." is replaced by ". . . in a land surface model . . .".

- "(RF#2) In general the paper is poorly organized in terms of layout, intention and thought process. A strong, coherent argument is lacking, [. . .]."

The paper will be adapted to follow a more classical structure, so the readers will be able to follow more easily the arguments (also following the suggestions of referee #1).