Hydrol. Earth Syst. Sci. Discuss., 12, C4121–C4123, 2015
www.hydrol-earth-syst-sci-discuss.net/12/C4121/2015/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "The SPARSE model for the prediction of water stress and evapotranspiration components from thermal infra-red data and its evaluation over irrigated and rainfed wheat" *by* G. Boulet et al.

G. Boulet

gilles.boulet@ird.fr

Received and published: 6 October 2015

We thank Reviewer 1 for its clarification. His/her detailed review and discussion is a major contribution to improve the paper and prepare a revised version.

Comment:

P7141 L15-18: What I was referring to is the difference between equation 26 from "parallel" version of SPARSE and equation 7 from "parallel" version of TSEB (Norman

et al. 1995) and the need to elaborate on this difference in the manuscript as it can have quite significant impact on the results presented in section 4.

Reply:

The differences between the translations of the "patch approach" into the parallel algorithm of TSEB and other formalisms have been detailed in Lhomme and Chehbouni (1999) and re-assessed in Lhomme et al. (2012) who refer to the latter earlier comment. The way the total turbulent heat fluxes are computed from the soil and vegetation components is not very different in fine between both models: in TSEB, each component flux (Hs or Hv) is directly expressed for the whole surface once the available energy has been partitioned into a soil and a vegetation patch according to fc, therefore the total flux is the simple arithmetic sum of both (Equation 7 of Norman et al. 1995). In SPARSE, we describe each flux density of each patch, i.e. one for the soil and one for the vegetation. Therefore the partitioning is computed once the individual flux is computed after solving the surface energy balance for each patch, and the total is therefore computed as a weighted sum and no longer a simple sum. It seems to us that this choice is more consistent with the "patch approach" defined by Lhomme et al. (2012) and schematized in Figure 1. We'll point this difference in the manuscript.

Comment:

P7149 L18-19: It is interesting that f_g=1 provided the best results for TSEB as in the previous studies it was shown that accurate estimation of f_g is quite important in senescent crops (e.g. French et al., 2007 and Guzinski et al. 2013). Was green or total LAI used as input to TSEB and SPARSE? It should be total LAI but from figure 5 it appears that green LAI could have been used.

Reply:

Total LAI was used for the fraction cover for both models, while green LAI was used for the stomatal resistance in SPARSE. We agree with Reviewer 1 that it is important

and it will be specified in the text, and the total LAI evolution will be provided along the green LAI in Figure 5.

Comment:

Table 1 and Table 2: In addition to bias it would be good if correlation was also shown in those tables.

Reply:

We can provide correlation also.

Comment:

Figures 7 and 9: I meant that in figures 6 and 8 the legend says “Series model” and “Parallel model” while in figures 7 and 9 it says “series” and “parallel”.

Reply:

Yes, legends will be modified accordingly.

References:

Lhomme, J.P., Chehbouni, A., 1999. Comments on dual-source vegetation–atmosphere transfer models. Agricultural and Forest Meteorology, 94(3–4): 269-273.

Lhomme, J.P., Montes, C., Jacob, F., Prevot, L., 2012. Evaporation from Heterogeneous and Sparse Canopies: On the Formulations Related to Multi-Source Representations. Bound.-Layer Meteor., 144(2): 243-262.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7127, 2015.