Hydrol. Earth Syst. Sci. Discuss., 7, C4504–C4507, 2011
www.hydrol-earth-syst-sci-discuss.net/7/C4504/2011/


Hydrology and Earth System Sciences Discussions



# *Interactive comment on* "Integration of vegetation indices into a water balance model to estimate evapotranspiration of wheat and corn" *by* F. L. M. Padilla et al.

**Anonymous Referee #2**

Received and published: 2 January 2011

General comment:

This is a well structured and well written paper. It describes the performance of a model that assimilates the reflectance-based basal crop coefficient inside a well-known water balance procedure (FAO56) to estimate evapotranspiration, soil water content in the root zone and, this way, a water stress coefficient.

Several growing cycles of corn and wheat are studied in it, representing a huge amount of experimental data. The described equipment and its measurement procedures provide trust about the necessary high quality of experimental data. The analysis proce-



Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

dure to compare modelled and measured data is, in general, adequate.

This paper is a good piece of research with valuable contributions, suitable to be published after some minor revisions and clarifications.

Some specific comments

Spectral data

In the 2009 campaign, the spectral data on wheat canopy have been acquired by ground field radiometry, simultaneously to those acquired in the same canopy by multispectral satellite data. No comparison is provided in the text between vegetation index derived from satellite and from field radiometry data. This comparison is relevant because it could provide valuable indications about the quality of the spectral satellite and field radiometry data.

If the spectral data, as it could be expected, were inter-comparable, I would suggest presenting figures 3(b) and 5(b) in only one figure, because both are describing the 2009 wheat campaign,

About the utilization of Landsat7-ETM+ imagery, it could be useful to specify in the text the procedure used to avoid the gaps from the scan-line corrector failure, in the areas of the study plots.

The relationship between Vegetation Index and reflectance-based basal crop coefficient

Some comparison or comment about the relationship used here with other similar relationships referenced in the literature would be convenient, because it is needed to assess the reproducibility of the procedure.

Is Eq. 4 crop dependent ? Is it needed to know the value for SAVImax for each crop to apply the Eq. 4? Please, clarify

About the water balance procedure



HESSD

7, C4504–C4507, 2011

The integration of vegetation indices in the water balance approach enables to estimate soil water content and water stress, which is one of the most valuable contributions of this paper. Nevertheless, it is well known that there is uncertainty associated to the value of parameters such as REW, TEW, root depth (maximum and minimum), ..., which are shown in Table 1 and 2. Perhaps some comments about the weight in the results of the assumed values for these parameters could be expected by simulating with a range of values.

Starting point of water balance (soil water content, starting date) must be described

For corn, some discrepancies are shown for root zone water deficit between measured and estimated in both campaigns, mainly at the end of the growing cycle, see Fig. 3a and 5a. Nevertheless, the wheat campaign exhibits good agreement between measured and modelled, as seen in figure 5b. Could you explain it?

Page 8644, line 1. I do not understand the sentence: "... However the model's estimation ability is better under non irrigated conditions,..." Please, rewrite this sentence.

About the estimation of water stress

The period of water stress on wheat is very interesting, and perhaps its description could be broadened. What is the relationship like between ET measured an modelled in this period? It could be interesting to introduce some comments about it. The used threshold value for p , eq. 9, must be mentioned, because the appearance of water stress is determined by this p value.

Page 8646, line 8. I do not understand the sentence "The 200 mm of water applied ... (is it no rainfed wheat?), please rewrite it.

About "Figure 6".

The units in the x-axis are "DAS". I suppose it is "Days After Seed", but no explanation is provide about it. In my opinion, it would be more convenient to use, in this figure 6, the units "DOY", i.e. Day of the Year, instead of DAS, because DOY units are coherent



HESSD

7, C4504–C4507, 2011



with those used in previous table 3 and figures 3 and 5.

Some more specific comments

No data about harvest date is provided in either crop.

Number of days with available measurements of ET for each campaign is not provided

Pag 8638, line 2, add “as a consequence of water deficit”

(Kustas and Norman, 1999) is not in the Reference list

Table 1.- Please, could you explain the parameter “Maximum effective root coefficient”. I think could be a mistake.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/7/C4504/2011/hessd-7-C4504-2011-supplement.pdf

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 8631, 2010.