

## ***Interactive comment on “Evapotranspiration partition using the multiple energy balance version of the ISBA-A-g<sub>s</sub> land surface model over two irrigated crops in a semi-arid Mediterranean region (Marrakech, Morocco)” by Ghizlane Aouade et al.***

### **Anonymous Referee #1**

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This paper compares the behavior of several energy balance modelling schemes over two contrasting crops in Morocco. The study cases are well selected, as both represent major crops in the Mediterranean basin, with very different canopy structure and growth dynamics. Such comparisons, single vs. double-source approaches, or uncoupled vs. coupled double source models have been performed since the development of these models in the 90s. Therefore, even if the general approach is not new, it contributes to accumulate experience in energy balance modelling applications over different land-

C1

covers and climatic conditions. In addition, it can be of interest for users of the ISBA model and the recent multiple balance version (ISBA-MED) and it also provides some insight about the partition of the latent heat. However, the following aspects of the paper require further clarifications or discussion:

- The information provided about the meteorological, micrometeorological and soil validation data is insufficient to evaluate their quality and support the main results and conclusions of the study (the only reference of this section, Hoedjes et al. (2007), is not provided in the reference list). References to other papers, included in the descriptions of the sites, might be useful to access such information, but the minimum data necessary to evaluate the work should be included in the paper. In particular:
  - o It lacks general information about the quality of EB measurements at both sites (eg. closure values obtained during the different measurement periods).
  - o Soil net radiation observations are presented but it is not explained how it was measured.
  - o The same thing happened with the soil/vegetation temperatures, and the surface temperature. The latter variable is a primary boundary condition to estimate energy balance components, and it should be mentioned how it was obtained and how the separation into vegetation and soil temperatures was performed, which is a difficult task and one of the main limitations for the applicability of two-layer representations.
- Another difficulty for interpreting the results is the confusion of lines, with line types sometimes difficult to differentiate and markers (eg. Figure 4, 6, 8) creating linear features easy to be confused with real lines.
- A direct interpretation of the results indicates that ISBA-MED outperforms all other versions of the model for both canopies. However, the authors interpret that this is only clear for olive trees and that for wheat the 1P and MED versions perform similarly. It is striking that ISBA-MED accuracy is better for a discontinuous and more heterogeneous tree crop as an olive grove than for homogeneous wheat, also better than 1P for wheat. Do the authors have a plausible explanation?
- It is concluded that 1-P accuracy is “sufficient” for the wheat because both models perform similarly, but a measurement of percentage error or average LE values is not provided. Without this information, it is not possible to get an idea of the real utility of these estimations.
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C2

According to water inputs observed in 4, the wheat was barely irrigated during the first season. It should have suffered severe water stress, with a poor development. Could this issue have affected the calibration of the different models over wheat? It would be useful to interpret the results to add a brief description of crop conditions during the different seasons in the site description. - Were olive groves maintained free of grasses all year round? The appearance of a grass layer between olive trees during part of the growing season is quite often. It could be an intended management practice or occur naturally and not be properly removed. Either way, it would highly affect the balances of energy and water, and it should be mentioned. - A few sentences of the abstract are unclear (lines 31-40), with confusing and sometimes erroneous references to the different versions and crops. For example, in lines 31-33, it should be specified, within the sentence, that it makes reference only to the results on wheat, and 2P is not applied on wheat. On the next sentence, starting "By contrast" it is not clear if the contrast is because of the crop or due to the model, as 2P is only applied to olive trees. On the next "By contrast" (line 37), it is not clear to which contrast the authors are referring. - Line 102. Kustas and Norman, 1997 or 1996? Please correct the reference if it is really useful. The paper presents a review of many models not specifying a patch representation. The other two references: Norman et al. 1995 and Boulet et al. 2015 make reference to both, parallel and series, schemes. - Please check the wheat site coordinates. It probably should be 31°38' instead of 31°68'. - Line 187: What "Similarly to R3 site" means here? - Line 362. Did daily calculations include nighttime? - Conclusions. Line 567. -2P was not applied to wheat.

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