

Interactive comment on “An original interpretation of the surface temperature-albedo space to estimate crop evapotranspiration (SEB-1S)” by O. Merlin

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General comments

The paper presents a new interpretation of the surface temperature-albedo space to estimate crop evapotranspiration (ET). I am not a specialist in this high-resolution (space) but low-sampling (time) methods to derive evapotranspiration, but the methodology seems well sounding and should be praised for attempting to estimate ET solely based on satellite-based observations. The evaluation with eddy covariance measurements is comprehensive, but limited to a very specific agricultural site (e.g. irrigated),

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so confirming the potential of this methodology would require further evaluation in different agricultural sites. In general the paper is well written, their contents are well presented, figures and table are clear, and the subject is of interest for HESSD readers. A few more specific comments are given below.

Specific comments

P6280-L18. It will help defining EF and EE. EE does not seem to be so well known.

P6282-L16. Out of curiosity, wondering about the “1S” in “SEB-1S” comes from.

P6282-L28. Given that all the “machinery” seems to be in place and that SEB-1S is a T-albedo method made consistent with the T-fvc space, wondering if also reporting ET estimates from the T-fvc method and how they compare with the eddy covariance fluxes (instead of just comparing SEB-1S and T-albedo) would have been of interest.

P6283-L10. Only 7 ASTER images were collected because those were the only cloud-free ones, or because there were considered sufficient for the study? Why a much larger number of Formosat-2 images are collected? Can the nearest Formosat-2 image be far in time from the ASTER image? Out of curiosity, such a number of images (maximum of one each 16 days if we are lucky with the clouds) are considered useful by the agriculture community for a potential practical application of these techniques at these latitudes?

P6284-L4. If all ASTER images are cloud-free, why not all stations have data for the 7 images? Data gaps in the eddy covariance measurements? Could something be said about the spatial fetch of the tower flux (wondering about how it compares with the fine ASTER pixel) and the uncertainty of the flux measurements?

P6285-L10. The fact that not all the observational data comes from ASTER complicates the observational part of the study (e.g. not same collection date, resolution, etc). It may be worth explaining a bit more the reason why only 4 of 7 ASTER short-wave infrared images were usable, even if a reference is given for the reader interested

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in the details.

P6296-L10. As ET is estimated as $EF \times Rn-G$, and assuming that observed Rn-G is a good approximation of the “true” available energy, given that simulated Rn-G has an RMSD of 40-50 W/m², can we say that ET uncertainty is at least the EF at each pixel times this 40-50 W/m²? Looking later at Table 3 the RMSD for ET between eddy covariance and simulated ET is clearly larger when using the simulated Rn-G, compared with using the station Rn-G (65-67 versus 74-84), pointing out in that direction (more uncertain Rn-G resulting in more uncertain ET).

P6298-L16. Very interesting to look at such detailed maps of ET. For instance, I noticed that a “blue” patch covering half of a field (3rd-3rd field counting from top-right corner) that remains “blueish” for most of the growing season (no crops planted so we just see limited soil evaporation, I guess) but that start to transpires at the end of the growing season for most of the other crops (crops planted now, climate conditions, irrigation, and crop type allowing so, I guess).

P6299-L22. Could part of this bias be related to the accuracy of the eddy covariance measurements (e.g., wondering how these specific measurements are closing the energy balance)?

P6300-L26. Although I fully understand that the chosen site may be ideal for model development, due to the eddy covariance measurements and local knowledge of the area, it may be worth including in the list of short term actions to apply the method somewhere else to have an evaluation under other conditions (e.g., different soil, crops, climate conditions, no irrigation, and so on).

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