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Hydrology and Earth System Sciences
Discussions

# *Interactive comment on* "Mapping evapotranspiration with high resolution aircraft imagery over vineyards using one and two source modeling schemes" *by* T. Xia et al.

**Anonymous Referee #2**

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This paper evaluates two energy balance models forced by very high resolution airborne thermal data over 2 vine fields. The simpler model (DATTUTDUT, or "rectangular" approach) only requires temperature data, while TSEB uses full climate forcing.

Main comments:

The originality of the paper lies in the use of very high resolution data obtained during 5 airborned overpasses, but this is not properly put forward in the paper: for TSEB, meter resolution data are used only to evaluate the component temperature retrieval, and for the rectangular approach running the model at both resolutions is only carried out in a sensitivity test. Model performances obtained when the rectangular approach



is applied at the highest resolution could be brought forward or at least added to Table 4. Therefore, it's hard to grasp the added value of this intercomparison with respect to, say, Timmermans et al. 2015.

Also, the interest of either approaches in the context of precision agriculture should be further commented: why testing for precision agriculture a model that requires only temperature data ? The cost of a met station is much smaller than that of acquiring airborne data, therefore I doubt that the low data requirement of the rectangular approach is a strong advantage for an application at local scale. Moreover, the rectangular approach provides total ET while TSEB targets E and T separately, which brings some added value in terms of water management and precision farming. Can't you evaluate E and T with the rectangular approach using two rectangles instead of one ? (i.e. min/max values for soil and vegetated pixel groups separately ?)

The choice of the contextual model used in the study should be better commented: contextual models take advantage of the various land surface elements within a given landscape. Contextual models are meant to be applied for heterogeneous sites, here the area of interest is small, it is thus expected that contextual models won't perform very well (cf. your comment p11911L20). Here, there are essentially 2 fields, the full triangle or trapezoid method is therefore not necessary, and the rectangular model is preferred, with extreme values being mostly related to the irrigated vegetation and the dry inter-row bare soil. This could be expanded in the introduction to legitimate the methodology. One wonders what causes water status heterogeneity within the vineyards. Some indications about the irrigation system and scheduling are missing here.

The sensitivity tests are interesting and should be better presented (at least explicitly) in the text and not only in Table 4.

Minor comments:

- P11907L28: the "rectangular" model (DATTUTDUT) is only insensitive to systematic

errors, please correct. - P11910L18: it seems that the applicability of contextual methods for submeter data is more related to the size of the images analyses( I.e. where the extrememe pixels are identified) rather than the resolution itself. Please precise. - P11916L24: why didn't you use solar radiation as the main scaling factor ? - P11923L3: you could mention more recent work by Colaizzi et al. - P11924L13: It's probable that using the true solar radiation instead of the DATTUTDUT estimate is the prime source of error, please investigate or comment - Table 4: provide at least one performance meter (e.g. RMSD) for each case - P119129L10: provide an a priori estimate from the FAO56 method to show the added value of the thermal data compared to a classical crop coefficient method. - P11932-33: many typos errors, please review carefully - P11932L26: in the rectangular approach, the max. LE corresponds to H=0 or LE=Rn-G so LE is different from a potential rate classically computed with a Penman-Monteith equation

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 11905, 2015.