Hydrology and Earth System Sciences Discussions

Interactive comment on "Evaluation of the Surface Energy Balance System (SEBS) applied to ASTER imagery with flux-measurements at the SPARC 2004 site (Barrax, Spain)" *by* J. van der Kwast et al.

J. van der Kwast et al.

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The authors would like to thank the referee for the minor revisions.

Comment 1: p. 1170, line 3: zero plane displacement height instead of displacement height

Author's response: This will be changed.

Comment 2: p. 1171, lines 17-18: it is not clear to me what is the difference between V-LAS and V-EC + these are not indicated in figure 1

Author's response: To p. 1171, line 20 will be added: The vineyard contains two different measurements. V-LAS corresponds with the Large Aperture Scintillometer

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measurement an V-EC corresponds with the Eddy Correlation measurement in the vineyard.

Comment 3: p. 1172, equation 5: the denumerator should be N-1 as one degree of freedom has been used to estimate the mean.

Author's response: This will be changed.

Comment 4: p. 1174, lines 1-7: please expand. this is now very short and vague ("slightly influenced", "little influenced": please explain why you can make these statements)

Author's response: These lines will be changed in: "Analysis of the locations of the modelled footprints revealed that only the footprints of the measurements over the sunflower field (S) and the forest nursery (F) have a homogeneous land cover. Therefore, the values obtained from these measurements are representative for footprint integrated fluxes from these land covers. The source area of the instrument situated at the edge of the corn (C) pivot contains vineyard pixels, while the measurement over wheat stubble (W) contains few corn pixels. Within the footprint of the eddy correlation measurement in the vineyard (V-EC) some wheat stubble pixels exist. The LAS over vineyard (V-LAS) measures a mix of different land covers and the footprint also contains wheat stubble pixels. This means that the comparison of flux measurements with modelled values is for most measurement locations related to a number of different land cover types. Since a weighted area average is used to calculate the fluxes from the footprint of the measurements, the magnitude of the influence of land covers within the footprint depends on their location within the footprint."

Comment 5: p. 1174, line 10: explain how you did the weighting

Author's response: The footprint weighting is explained on page 1172. The authors consider a more detailed description of the footprint modelling outside the scope of this paper. It is referred to the work of Hsieh et al. (2000). For the footprint modelling

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of LAS measurements it is referred to Timmermans, W. J., Su, Z., and Olioso, A.: Footprint issues in scintillometry over heterogeneous landscapes, Hydrol. Earth Syst. Sci. Discuss., 6, 2099-2127, 2009. This reference will be included on p. 1173, line 9.

Comment 6: p. 1175, line 9: typo, should read Obukhov

Author's response: The typo will be corrected.

Comment 7: p. 1175, line 10: sensible heat flux is underestimated: does this imply that latent heat flux then overestimated?

Author's response: Yes, this implies that the latent heat flux is overestimated. Sensible heat flux and latent heat flux are negatively correlated.

Comment 8: p. 1176, equation 6: H+-: not clear how this should be applied: once with H+ and another time with H-? Both (?) are called Si, but how does one know with what it was calculated (with H- or H+)?

Author's response: Eq. 6 should be rewritten in a mathematically more correct way. We meant that Si is calculated for a positive and a negative deviation. In the case of a positive deviation H+ is used, which means 1.25 * i0, in the case of a negative deviation H- = 0.75 * i0. So for each variable Si has 2 values representing the sensitivity of H using either a positive or a negative deviation of the input variable.

Comment 9: p. 1176, lines 4-6: there is a large difference between both deviations: one is 1%, the other 25%. Why such large difference? Could not the 25% be reduced to e.g. 5%?

Author's response: It is true that for some variables a smaller deviation would be enough. In order to choose a realistic deviation, the error in the input variable should be known. For meteorological properties this is probably $< 10\%$, but for the aerodynamic parameters this can be $> 50\%$. Therefore the effect of a relatively large error on the sensitivity of H has been evaluated for most variables.

Comment 10: p. 1178, line 11-12: due to these sudden changes in vegetation: does not this violate the Monin-Obukhov hypothesis? + how does the model deal with mixed pixels?

Author's response: On p. 1175, lines 8-9 we state that in these situations with sharp transitions the Monin-Obukhov hypothesis might be violated. In the case of mixed pixels effective values are parameterized for aerodynamic properties, which smoothes transitions between land covers, which is expected to not much violate the Monin-Obukhov hypothesis. Sharp transitions caused by using a discrete land-use map can violate the hypothesis.

Comment 11: Figure 3: add in caption the explanation of EC, LAS, SA

Author's response: In addition to the explanation below the figure, the abbrevations will be explained in the caption.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 1165, 2009.

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