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Hydrology and Earth System Sciences Discussions

Interactive comment on "Uncertainties in using remote sensing for water use determination: a case study in a heterogeneous study area in South Africa" *by* L. A. Gibson et al.

Anonymous Referee #1

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Dear Author

I would like to thank you for writing a very interesting manuscript about a very interesting topic. I see that your study area provides some really nice opportunities for research, part of it due to the regulations in South Africa. The reported research is done very good however in reading the manuscript I found some questions that I recommend need to be solved before the manuscript is to be published

In the methodology section 1) Here you describe the methodology of SEBS. In the text you only deal with the input parameters needed by SEBS to calculate the latent heat. However how one calculates the daily evapotranspiration from that is not mentioned, and should be elaborated. Especially because the algorithms provide a high degree of uncertainty because most of the equations are not physically based.

In the land surface and air temperature gradient section 2a) You use daily evapotranspiration [mm] instead of latent heat [W/m2]. However in the calculation for the daily evapotranspiration also air temperature is used to calculate the incoming solar radiation. This is not made clear.

2b) You speak of a 10K retrieval difference between MODIS and MSG. This difference is later used as input for your sensitivity analysis. However the difference between retrievals of other land surface parameters (like emissivity and LAI) is not employed here. You therefore use the difference between 2 different satellite sensors to perform a 1 satellite sensor sensitivity analysis. Please elaborate on this here.

In the Fractional vegetation cover 3) I completely agree with your end result that it is better to use LAI instead of Fc. (mostly because fc saturates well before the ground heat flux comes to an equilibrium. Have you compared ground heat/net radiation measurements for different LAI/fc values?

Displacement height 4) In the second last paragraph (p6594) you speak of a maximum vegetation of 2.7 when one has a 2m reference height. However I could not deduct this from the text. I would find it strange in this light that this is concluded when your figure shows that for a displacement height higher than 1.8 you find an instability. Especially as the displacement height is always higher then the vegetation height. Also the effect of LAI in this calculation is not shown. Especially because the LAI has a great effect on the wind speed extinction coefficient and consequently the displacement height.

Heterogeneity of the study area. 5) Figure 7 and the corresponding text are not clear to me. Partly this is because you do not provide the land cover resolution in km for this

land cover map. Hence it is not clear to me if you have used multiple MODIS pixels per class, or multiple classes within a single MODIS pixel. Also please define what you mean by mixed pixel effect.

6) Also in the other sections you have provided the sensitivity of the uncertainty in the retrieval and the progression of this retrieval in the daily ET. This is what I miss from the last section.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 6581, 2010.