

Interactive comment on “Consistency between hydrological model, large aperture scintillometer and remote sensing based evapotranspiration estimates for a heterogeneous catchment” by B. Samain et al.

Anonymous Referee #2

Received and published: 12 March 2012

The paper presents a very interesting comparison of three different methods to estimate catchment scale evapotranspiration. The manuscript is easy to read and clearly structured. All results seem to be obtained with a lot of care and are at a high scientific level, which clearly merits a publication. Some improvements are necessary, to ensure that all conclusions are completely justified and to fully document all three methods.

Major comments:

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i) None of the three data sets is superior by construction. They are all just estimates with unknown accuracy! Thus it is not possible to consider one of the data sets as a valid reference, which can be used to VALIDATE another data set. In this situation, please avoid the term “validation” and focus the discussion on a “consistency” analysis, as indicated by the title, and on an intercomparison. This will avoid in addition some strange reasoning, like e.g. at 10882, line 18: Toplats is used to validate ETLook, which is then claimed to be a good validation tool to check LAS and Toplats?! In essence, it is impossible to validate the LAS method or ETLook by this study and such statements should be avoided in the paper. Refocusing on a comparison of three equal estimates requires in particular an adaption of the two last paragraphs of the abstract and of the final summary.

ii) All statements about the consistency of the three estimates in the abstract and the summary are only qualitatively (“consistency is shown”, “are in good agreement”, ...). Please provide quantitative arguments: What are the criteria for a good agreement? Which level of the RMSE is still acceptable? The statements in the summary and abstract should additionally be supported by some quantitative results - they are readily available in section 5.

iii) TOPLATS and ETLook (maybe also the LAS method?) require some tuning of parameters. Is this calibration / tuning / optimization based on an training data set which is independent from the evaluation data set, i.e. AE, H and LE? Line 15 on page 10873 makes me worry that training data and evaluation data are mixed. This should be avoided or at least be mentioned explicitly in the abstract and summary.

iv) ETLook is very poorly documented. The reference “Pelgrum et al., 2010” referring to a conference talk is useless for any reader and should be skipped! If there is no other reference, the scheme needs to be explained in much more detail! In particular: How is the incoming solar radiation distributed between canopy and soil? How are the resistances r_{c} ? in equation (1) and (2) calculated? Section 4 needs a revision to avoid that ETLook is just a magical black box for the readers.

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Just a suggestion (which does not be considered for a revised version!): Looking at Figure 4, it is obvious that a lot of variability in LE can be explained by AE. How important are then sophisticated methods, like a LAS, to estimate H? I wonder whether it is worthwhile to analyze additionally a LE-estimate similar to the LAS methods but assuming a constant (or monthly changing) Bowen ratio? Or taking the local EC measurements as estimate for the whole catchment. I am curious to see whether these poor man estimates are in the same “good agreement” to the other three data sets! Such poor man references might be used as reference to establish skill scores and to demonstrate the added value of a LAS?!

Minor comments

Abstract, Line 10: please replace "inverting" by "converting"

Page 10873, line 7: Please add a reference for TOPLATS

Page 10875, line 20: Please explain “WaterWatch”

Below equations (1) and (2): units after the explanation of the variables are not necessary (and please use SI units – not mbar).

Figure 4: Units at the right axes are wrong. Please use J/m² rather than W/m² for “accumulated power”.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 10863, 2011.