

## ***Interactive comment on “How representative are instantaneous evaporative fraction measurements for daytime fluxes?” by J. Peng et al.***

### **Anonymous Referee #3**

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The submitted manuscript sets out to address an important subject matter in the quantitative estimation of actual evapotranspiration using a satellite remote sensing based modeling approach. In this modeling approach, the evaporative fraction (EF) plays a crucial role in extrapolating from an instantaneous moment in time to a daily ET flux for example as used in the SEBS algorithm (Su, 2002) and as further elaborated by Jia et al. (2009) and Rwasoka et al. (2011). However, the self-preservation of the EF is a subject of debate and research, thus this paper attempts to address an important subject area, which is also relevant for the HESS journal. The use of multiple FLUXNET sites is also commendable. However, there are number of caveats inherent in the submitted manuscript as outlined below;

Title and content 1. The title of the manuscript makes it seem as if the authors will  
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present a comprehensive assessment of the subject and yet the contents focus on just but one of the factors that influence the self-preservation of the EF. There is thus need to adjust the title such that it shows the focus on the effect of cloud cover on the EF. Suggestions would be to add, “. . .under varying cloud cover conditions” or changing it to bring out the issue of FLUXNET sites and the statistical analysis approach taken.

2. In any case, the satellite remote sensing approach should not be applied on cloudy images. The authors need to justify their focus on cloudiness. One might argue that since cloud free images are used, is it necessary to look at EF behaviour under cloudy conditions? By not explaining this aspect, it might appear to some that the sole focus on cloudiness of the manuscript undermines its own purported usefulness to satellite remote sensing based actual evapotranspiration modeling.

3. Of more concern is that whilst the authors tried to be concise, which is commendable, it seems that the content of the manuscript is too thin to warrant publication on its own. Adding other aspects that influence the EF (e.g. land use and land cover etc.) would improve the quality and richness of the manuscript.

Uniqueness/Niche The authors should have also taken time to better explain the uniqueness or niche of their work in relation to other studies done before on the subject of the self preservation of the EF. Is there anything new? Are they just adding more evidence on a seemingly contentious issue? Is the use of FLUXNET data the catch? What is the selling point?

Methods Any processing of the flux datasets? Data quality checks? Gap-filling? What was the data time step used?

Results and Discussion 1. It appears that the limited findings in the manuscript were not well discussed. A few statements/reasons were probably stated, but overall authors seem to have rushed through this important component of the manuscript. Addressing in detail, questions such as what do the findings mean for quantitative actual ET estimation? How do their findings relate to the findings of other studies that have also

used long-term measurements, modeling and spectral analysis? Any EF responses to radiative fluxes? Did the results show anything that was or was not expected - would one have expected better self-preservation of the EF around solar noon? Could the R2 or RMSD indicators be misinformative – as in do they have limitations that could affect the interpretation of the results? Could the flux data time-step have influenced the results? The duration of cloudiness in intermittently-cloudy conditions will have an influence on the result. The averaging time-step of the flux data thus becomes very critical in that case.

2. In the presentation and discussion of Fig 3(a) [pg 2019], it would have been good to highlight that results are for clear sky conditions.

3. Whilst I appreciate that cross-comparison of Fig 3 a, b & c is used or should be used in the analysis and to draw some of the conclusions in section 4 of the manuscript, this however seems counter-intuitive. In addition, 3 or 4 representative scatter graphs that show R2 values across the different cloudiness conditions on one graph for a few different sites would have aided the presentation as they would be more intuitive

4. Wouldn't it have been more informative to also group the sites according to the Land Use and Land Cover (LULC) in the footprint or fetch distance and do a similar box plot analysis? Or to even better communicate your message of cloud cover, wouldn't it have been more interesting to at least, based on your data, discuss some factors the influence the self-preservation of the EF such as incoming solar radiation, friction velocity and LULC (and even attempt to take out the effect of different LULC types if necessary)

5. There were also some loose or incomplete or hanging statements used, e.g

Pg 2019, Line 21-25, "Since the analysis was based... to 1400 LT", and what about discussing the results outside the time window you mentioned? The box plots show a much wider range outside the time window you mentioned. Pg 2020, Line 2: "In summary, the above results have strong implications for..." what are these strong im-

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plications? Pg 2020, Line 14: "But these increases are probably in different degrees". Why probably? What degrees? Instead of being so speculative, what is the data saying about this or provide a much better explanation.

#### Conclusions

1. Pg 2020, Line 24-25, "It is found... 0.087)," – I cannot quite get how the conclusion of the constancy of the EF is arrived at basing on R2 and the RMSD. I am of the impression that these performance metrics were used to compare instantaneous and day-time EF. R2 would thus, for example, show the strength of the linear association between instantaneous and day-time EF, and so how does constancy of the EF come in? Is it possible to measure or infer the constancy of the EF based on R2 or the RMSD? Please explain!! The same line of argument also applies to the use of the RMSD. The reasoning leading to this conclusion should have been clearly discussed earlier by the authors, as it is seemingly contentious

2. Pg 2020, Line 25, "...and the EF... daytime EF" – Is it almost equal across all three cloud cover conditions? Be specific! Quantify the "almost equal" element. Also add the range of R2 and RMSD in brackets.

References 1. Some of the references are not the most appropriate. 2. The following key references should have been reviewed and included: Rowntree (1991) , Sugita and Brutsaert (1991) , Brutsaert and Sugita (1992) , Crago (1996) and Farahet al. (2004) . 3. The discussion should have been done taking into consideration some of these key papers.

Abbreviations Abbreviations should be written in full when used for the first time. LT on page 2016, line 11.

Grammar The manuscript needs serious revision to correct; sentence construction errors, missing conjunctions, a mix of tenses and poor grammar used.

Technical corrections: Generally make your references follow some chronological order

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– either from oldest to the most recent or the most recent to oldest.

Throughout the manuscript “. . .of EF. . .” should be changed to “. . .of the EF. . .”

Pg 2016, Line 13: “The increase in cloud cover. . . .during daytime” – I suggest that it be changed to, “Furthermore the results showed that an increase in cloud cover resulted in an increase in the variability of the EF during daytime”. Pg 2016, Line 14: The sentence that begins, “Future works will. . .” is unnecessary. Delete! Pg 2016, Line 19 -12: mention some of the models and their references rather than just citing those review papers. Pg 2016, Line 25: Surely the self-preservation of the EF was well studied and pioneered way earlier than Delogu et al. (2012) . Please cite the appropriate citations in addition. The work of; Sugita and Brutsaert (1991) , Brutsaert and Sugita Brutsaert and Sugita (1992) and Crago and Brutsaert (1996) seem to be more natural options. Pg 2019, line 3: You cannot say the widely used clearness index and you only put two citations. Two citations fall short of being wide use. Add more citations or rephrase! Pg 2019, line 14: what do you mean by the word “best”? Revise! Pg 2019, line 15: add “a” between “. . .for such” and “result is that. . .” Pg 2020, line 6: “displayed” – keep to one tense in the whole manuscript. Revise Pg 2020, line 8: revise the sentence, “The EF exhibited. . . . clear skies.” Pg 2020, line 20: revise this part of the sentence, “. . .and the EF in 12:00-1300 LT..”

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 2015, 2013.

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