Response to comment of Tom Van Niel

We thank Thomas Van Niel for his encouraging comments on our paper. In the following, we provide an item-by-item response to the comments. Reviewer's comments are written in italic; authors' responses are shown in upright font.

Comment on:
J. Peng, M. Borsche, Y. Liu, and A. Loew (2013) How representative are instantaneous evaporative fraction measurements for daytime fluxes? Hydrol. Earth Syst. Sci. Discuss., 10, 2015-2028,www.hydrol-earth-syst-sci-discuss.net/10/2015/2013/, oi:10.5194/hessd-10-2015-2013

The manuscript addresses temporal upscaling specific time-of-daytime evaporative fraction (EF) to daytime EF. This is an important topic for making use of remote sensing in hydrological science. However, there are two points that Peng et al. (2013) should consider to improve their manuscript.

1) Peng et al. (2013) have overlooked some related papers on the topic. It would be useful to incorporate the relevant context of these other papers into both the back- ground / scene-setting section and also the discussion / interpretation of Peng et al. (2013); see the full list provided below.
Response：Thank you, the papers "Brutsaert and Sugita (1992), Crago, R.D., (1996), Van Niel et al., (2012)," have been added to our manuscript.

a. While Brutsaert and Sugita (1992) draw attention to the impact of cloud fraction on the stability of the EF, this is more thoroughly investigated and modelled in Van Niel et al., (2012). It is important that Peng et al. (2013) relate their results regarding the impact of cloudiness on the EF to the previous findings made in these two papers.
Response： Thank you for providing references to these two papers. In our study, the main finding about the impact of cloud fraction on EF is that the variability in EF increases with an increase in cloud fraction. Brutsaert and Sugita (1992) and Van Niel et al. (2012) emphasize the importance of cloudiness in upscaling energy fluxes through inspecting the ability of could amount to correct for upscaling with energy fluxes. In our manuscript, the following sentence has been added.

"It is necessary to consider the effects of cloudiness, when the EF self preservation assumption is used to upscale instantaneous estimates to continuous longer time periods (Brutsaert and Sugita, 1992; Van Niel et al., 2012)."

b. Cammalleri et al., (2012) study the impact of ignoring ground heat-flux changes when upscaling actual evaporation when using the EF method. This is likely a worth- while discussion point in the Peng et al. (2013) manuscript.
Response：Yes, the discussion about the impact of ground heat flux on upscaling latent heat flux is very interesting. The commonly used temporal upscaling approach includes two main assumptions. The first one is to ignore ground heat flux on the daily scale. The second is that the instantaneous EF can be assumed equal to average daytime values. The objective of our study is

to systematically test the EF self preservation assumption. The ground heat flux is not ignored in our study (equation 1). But we agree that ignoring the ground heat flux would introduce a bias. Accurate assessment of its contribution to the estimation of latent heat flux at the daily scale is very important and interesting.

c. Peng et al. (2013) seemingly only concern themselves with scaling from specific time-of-day to daytime EF, there is no consideration of nocturnal actual evaporation (see Van Niel et al., 2011 and the references therein, specifically Dawson et al 2007 and Tolk et al 2006). To be useful for hydrology, estimates of actual evaporation should represent both daytime and nightime flux under all-sky conditions, not just clear-sky conditions during the daytime. A discussion of this issue would be beneficial to Peng et al. (2013).

Response：Thank you for the comment. If the EF self preservation is used for daily evapotranspiration estimation, the implicit hypothesis is that nighttime latent heat fluxes are small and thus negligible. Van Niel et al. (2011) examined the validity of this assumption through comparison between 24 h and daytime estimates. In our study, the nighttime fluxes are neglected, because the EF assumption is assumed to be valid only during daytime. At nighttime, the energy fluxes are small and may not be measured accurately by eddy covariance techniques due to a lack of turbulence, leading to strong variation in EF. Besides, there is still no agreement on the EF self preservation assumption during daytime. Thus, we limit our study period to daytime to examine the validity of the EF constant assumption. In addition, we agree that estimates of latent heat flux under all sky conditions are very important and useful for hydrology. That is why we examine the EF assumption under partly and fully cloudy conditions to provide information for relevant microwave satellites sensors (e.g. AMSR-E) based applications. In our manuscript, the following sentence has been added.

"It is necessary to consider the effects of cloudiness, when the EF self preservation assumption is used to upscale instantaneous estimates to continuous longer time periods (Brutsaert and Sugita, 1992; Van Niel et al., 2012). The above results provide additional information on the uncertainty resulting from cloudy sky conditions for the EF daytime estimates."

2) Peng et al. (2013) relies heavily on FluxNet data that are collected and made freely available by the FluxNet community. It would be constructive for the authors to formally acknowledge the FluxNet data and community in their acknowledgements section.

Response：Thank you for the suggestion. The following part has been added in the Acknowledgement Section.

"Many thanks are given to the FLUXNET community for making the data publicly available (http://www.fluxdata.org/) as well as to the principal investigators and collaborators of each FLUXNET site."

References:

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