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Hydrology and Earth System Sciences Discussions

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

Anonymous Referee #1

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This paper is really interesting to remote sensing based ET estimation. The authors reported that EF remains nearly constant during daytime based on a statistics analysis using a global fluxnet measurements. They also divided the weather into clear sky, cloudy sky and partly cloudy sky. These work are encouraged to publication. The writing is clear.

However, I still have several major comments and encourage them to do more analysis. They are using energy balance measurement over grassland, savannas, broadleaf forest, needleleaf forest, shrubland etc. Why don't they plot similar fig. 3 by using land cover classification like weather classified into clear, cloudy sky? The land surface partition between sensible heat and latent heat flux can be influenced by the land surface. Certainly EF is also influenced by the canopy type or land cover. So I suggest them

to check whether land surface or biome types classification does help us understand the EF constant assumption. Whether it is valid over different land surface or whether the daytime constant EF is feasible for all kinds of canopy or not. This will help the ET satellite application community pay attention to daytime constant EF applied to specific land surface.

Another major comments is about the equation 1 and 2. I am also using the FLUXNET dataset. I am not sure whether all the sites have calibrated the heat flux plate measurement to ground heat flux. The authors need to address this clear. Please also notice that the heat storage in the canopy is not considered in their equation 1 and 2. I need them provide us reference or their results to say how much percent of surface net radiation does the heat storage in the canopy (especially over forest) take? Or why this part of energy is not considered in the energy partition when they use bowen ration correction method.

Another question is about their conclusion that 'It is found that the EF during daytime from 11:00 to 14:00 LT is nearly constant under clear sky conditions (R2>0.75, RMSD<0.087).' As I understand that this is a conclusion, which should be based on the results. However, from the paper, I only see the coefficient of determination is high during 11:00- 14:00. A high coefficient of determination says two variables corresponds well or have similar variation, not saying they are same values. If they insist this, it's better to plot the observational result like their fig. 1. Conversely, they provide us with a conceptual framework for the diurnal variations of surface energy components and EF. I am wondering why they doesn't using the measurement to plot this figure? Below are some minor comments.

ON page 2020, 'And the midday overpass satellites (e.g. MODIS and AVHRR) would provide better results than other 5 overpass time platforms (e.g. Landsat).' needs to be specified, like due to EF at former satellite passover time does represent daytime EF than later. . ...

On page 2020,' cloudiness could induce a decrease in the available energy and the latent heat flux, which further causes the increase in both instantaneous EF and daytime EF.' I can understand that the cloudiness can cause decrease in the available energy and latent heat flux. However, doesn't it influence sensible heat flux? Why cloudiness can further increase instantaneous EF according to equation 1?

On page 2020, 'Nevertheless, the above results have no substantial influence on the remote sensing applications, since optical satellites only provide useful data under clear sky conditions.' Do you consider about the microwave sensors (LST from AMSR_E) when used to derive land surface temperature and ET estimates?

On page 2020, 'It is found that the EF during daytime from 11:00 to 14:00 LT is nearly constant under clear sky conditions ($R2 > 0.75$, $RMSD < 0.087$), and the EF in 12:00–13:00 LT is almost equal to daytime EF.' as I said, high R2 does not say 'the EF during daytime from 11:00 to 14:00 LT is nearly constant'.

ON page 2021, 'The important conclusion from the present study is that the EF constant assumption is valid over a wide range of ecosystems and climates.' I suggest to divide the result into different land cover and make this conclusion more solid.

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