Hydrology and Earth System Sciences Discussions

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Comment on hess-2021-73

Miriam Coenders-Gerrits (Referee)

Referee comment on "The accuracy of temporal upscaling of instantaneous evapotranspiration to daily values with seven upscaling methods" by Zhaofei Liu, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-73-RC2, 2021

The author studied 7 different methods to upscale instantanuous remotely sensed evaporation to the daily scale under different weather conditions. The manuscript is well structured, easy to read, and in good English. The paper is relevant and suitable for the HESS-audience and provides new insights. Most of my comments are minor (see below), but two points may need further explanation:

1) In the introduction it is stated that there already exist many (review) studies which focussed on this topic. Hence my question: how does this paper differ from those? What is the problem statement of this study? Is it that you investigate the topic also under non-clear sky conditions, plus the fact that you investigate the effect of 'time of satellite overpass'? If so, please elaborate on this and maybe refocus your study.

2) Did you check the energy balance closure of the FLUXNET data? And if it did not close, did you use the raw data or some kind of corrected data (e.g., assigning the gap in the SEB via the bowen ratio to H or LE?). Please explain and discuss how and if this affect your results.

Other comments:

- P2L51: I am not that happy with the acronym LE in case L is not equal to λ. In my opinion it is most clear if you define the latent heat flux as ρλE in W/m2, where λ= the latent heat of vaporization in kg/J, ρ density of water in kg/m3, and E the evaporation in m/s.

- Eq2+3: What is the unit of LE_t? If this is a scaling factor (and thus dimensionless), I

would recommend to change its name. Earlier you defined LE as the latent heat flux (in W/m2), so better to redefine it. Furthermore, 't' is not defined.

-Eq7: I would add ρ (density of water) to the LHS of eq7. Also I don't like the term ET for evaporation. It can be confused with E*T. Better call it E.

- P10 L255-262: Other cause can be that remote sensing products only sense the top of the canopy and thus ignore the energy storage with in the canopy. Especially for forest this can be significant. See e.g. Coenders-Gerrits et al./ Jiménez-Rodríguez et al plus references herein.

- P11 L293: Personally, I found an error of 36,7-25% not really 'satisfactory'.

- Fig 3: Should the difference between S and M not be mentioned in the method section? Addtionally, it is logical that the error of M is lower than S if you follow the theory of error propagation. In M you have n=3 and thus the error reduces with a factor 1/√n.

- Fig 6: you interpolated the RE and RMSE over the entire world. But is this not visually biassing your graph, since the global coverage of the FLUXNET data is not equally distributed over the world?

References:

Miriam Coenders-Gerrit**s**, Bart Schilperoort, César Jiménez-Rodríguez "Evaporative processes on vegetation: an inside look" (2020). pp 35-48. Book chapter in "Precipitation Partitioning by Vegetation: A Global Synthesis", editors John T. Van Stan, II; Ethan D. Gutmann; Jan Friesen; Springer.

Jiménez-Rodríguez, C. D., Coenders-Gerrits, M**.**, Wenninger, J., Gonzalez-Angarita, A., and Savenije, H.: Contribution of understory evaporation in a tropical wet forest during the dry season, Hydrol. Earth Syst. Sci., 24,
2179–2206, https://doi.org/10.5194/hess-24-2179-2020, 2020