

## General comments

- “Temporal interpolation of land surface fluxes derived from remote sensing – results with an Unmanned Aerial System” describes the use of a suite of simple models to interpolate surface fluxes and surface state variables between sporadically available land surface measurements. A model dubbed the SVEN was created by augmenting a Priestly Taylor model with new components to enable its use at timescales as short as 30-min. Instantaneous remotely sensed variables recorded mainly using a UAS were used to calibrate the model, and the model was then used to fill in the extensive gaps between measurements. This work introduces and demonstrates of the technique, which was designed to be used with both satellite and UAS remote sensing measurements. It is a solid manuscript, with room for some improvement.
- Because one of the primary stated goals of the paper is the development of an application to satellite remote sensing, the omission of actual satellite measurements is conspicuous. I suggest that more attention be given to the topic of using satellite data. For example, what might be the shortcomings of applying the model to satellite-based measurements? Were UAS measurements relied upon for this paper rather than space-based measurements due to the inadequate spatial resolution of satellite measurements? At this site in-situ and UAS measurements are available (and used), but how well will the model work for the rest of the Earth’s surface? Clarify the purpose of the model (including the parameter fitting) in the broadest sense, and develop, test, and describe the results accordingly.

- In addition, more care needs to be taken with the way remotely sensed measurements are handled. They are misleadingly referred to as “ground truth” or direct measurements throughout the manuscript, when most of the variables derived from remote sensing data were modeled or inferred, rather than measured directly. Uncertainties due to this also require more attention.

The writing should be reviewed carefully by a native English speaker. Some examples are included in the specific comments below, but the manuscript includes many errors in writing and sentence structure.

## Specific comments

- P 1, In 7-8. With the exception of  $T_s$ , all of these variables are determined using remote sensing products based on a suite of different models and assumptions. For example, different vegetation indices can be measured remotely, but GPP cannot. The same applies to ET, SM, and  $R_n$  – none of these variables are measured directly using remote sensing, but the first sentence misleadingly indicates otherwise. Without detracting from main point of this sentence, a word such as “inferred” or “derived” could easily be included for more accuracy.
- P 1, In 20. Delete the word, “well” from, “...SVEN can *well* estimate...”. Awkward as written.
- P 2, In 2-3. “Minimum parameterization” is awkward as written.
- P 2, In 7. “Mostly needed” is awkward as written. Also, replace “high frequency” with “prevalence.”
- P 2, In 11. Replace “flexibly” and “favorable” with more precise descriptors.
- P 2, In 14. Replace “still *just* provide” with “still *only* provide.”
- P 2, In 16. Replace “uncovered” with “unknown.”
- P 2, In 25. “using statistical interpolation could be challenging...” is awkward as written.

- P 2, In 28-29. "can be better" is awkward as written.
- P 2, In 30. Delete "a" in, "in a variable climate conditions."
- P 3, In 6. "as for example the turbulent fluxes are typically..." is awkward as written.
- P 3, In 7. "simpler but operational models based interpolation" is awkward as written.
- 5 P 3, In 11. Delete "the" at the beginning of this line.
- P 3, In 15. Rewrite as, "limited meteorological inputs, and parameters that...".
- P3, In 21-22. "now becomes" is awkward as written.
- P4, In 4. Add the word, "it" after "forcing".
- P4, In 17. Change, "onboard have been conducted" to, "onboard were conducted." And "Details refer..." to, "For  
10 more details refer..."
- Figure 1. This is exactly the same as Figure 1 from Wang et al. (2018b). I don't know HESS's rules regarding this type of thing, so I will refer to the Editor for guidance. I would never reuse a figure like this myself, but if this is actually acceptable, the original usage should certainly be referenced. In addition, a small wind rose would be a nice addition to the figure; at a measurement height of 10 m (Wang et al., 2018b), the flux footprint will extend well  
15 beyond the edges of the figure in some conditions. As an aside to be passed onto the site manager, if the eddy covariance instrumentation were closer to the top of the canopy, it would help alleviate this problem."
- P5, In 24. "Data of few UAS flight campaigns" is awkward as written.
- P5, In 26. Replace the word, "resemble" with more appropriate verbiage.
- P5, In 27. Clarify that the "ground truth" SM measurements were not actual SM measurements, and describe the  
20 uncertainty and shortcomings of the remotely sensed SM product in detail.
- P5, In 29. "which corresponded to the willow emerging period with a high growth rate" is awkward as written.
- P7, In3. "and can facilitates to temporally interpolate" is awkward as written.
- P8, In 24-26. Clarify that this includes the existence of a canopy. As written, it reads like a simple soil diffusion-based approach, that neglects the existence of vegetation. There is a transfer coefficient for the canopy (Cveg)  
25 described on P9, along with LE etc., so I assume this all adds up correctly (I am not a modeler), but a more complete initial description is wanted on P8.
- P9, In 24-25. Change to, "k is *the* von Karman constant."
- P12, In 20. "The rest of constraints," is awkward as written.
- P12, In 21. "are the same modifying," is awkward as written.
- 30 P13, In 6. Change to, "UAS-derived observations," or otherwise clarify that many of these UAS variables were not measured directly.
- P14, In 1. Change, "facilitate," to, "facilitates."

Eq 34 description. Clarify what time period (e.g. 30 min or 24 h) was used for this EC measurement adjustment, and how missing data were handled.

P14, ln 25. "well represent" is awkward as written.

5 Validation at the daily time scale Section. Augment the discussion of uncertainty in the UAS-derived measurements (as compared to direct measurements).

P16, ln 24. "that the better UAS based snapshot estimates of SM..." is awkward as written. Perhaps, "that improving the UAS-based estimates of SM..."

P16, ln 34. "has a large coverage" is awkward as written. More accurately, it could be replaced with something like: "extended well-beyond the edges of the Willow forest of interest".

10 P18, ln 1. "are be good" is awkward as written.

P18, ln 3. "do not show difference" is awkward as written.

P18, ln 5. "do to that the model" is awkward as written.

P18, ln 6. "enhancement diffuse radiation effects" is awkward as written.

P18, ln 19. Perhaps change, "R2 for Ts..." to, "R2 for *monthly* Ts..."

15 P20, ln 10. Change, "understanding on the" to, "understand of the".

Conclusions. What would the effects of using space-based remote sensing measurements be, rather than UAS measurements? Also discuss how well this method will work in areas where in-situ measurements are unavailable to better parameterize the UAS and SVEN measurements.

20 Equation and variable abbreviations. I cheated and read the other Reviewer Comments. I disagree with Referee #2 regarding their objection to the use of multiple letter abbreviations; I am already familiar with LUE, PAR, GPP, ET, etc., so their usage made it easier for me to follow the manuscript. In addition (this may have more to do with my background than what is most suitable for HESS), I am more accustomed to  $\Theta$  than SM for soil moisture, and R (surface runoff) could easily be confused for respiration (although honestly I am not sure if there is a more widely used abbreviation for runoff).