Thank you for your valuable feedback on our manuscript. We appreciate your thorough review and the insightful comments provided. We have tried to answer all your concerns, and some issues have been added to the main manuscript.

General remaks:

This paper investigates the temporal upscaling from snapshot (airborne or satellite overpass) to daily transpiration using both sap flow observations and the dual source TSEB model, over an almond orchard. This scaling, which might be very different for woody and herbaceous species, has to my knowledge not been looked at previously, and this paper casts some light on how the stomatal and ecophysiological regulation might affect this temporal extrapolation. The analysis is based on 2 summer UAV flights over a field with contrasted structural (3) and water treatment (3) levels.

Main concern is that the outcomes are only based on those 2 dates, therefore on a very limited meteorological forcing conditions. I wonder why in-situ TIR radiometers or cheap TIR imaging cameras have not been used to continuously monitor the 3*3 conditions at representative places to complement the study and offer a longer timeseries.

Unfortunately, we lacked the logistics and TIR radiometers required to cover the entire trial. Given that we assessed the TSEB contextual approach (TSEB-2T), it would have been necessary to monitor the canopy temperature and two soil temperatures (on both sides of the row). Consequently, we would have been needed at least 27 sensors to monitor each treatment.

Second concern is that the upscaling using the measured and simulated reference transpiration rates are treated differently just based on a performance, I think it would be useful to see how the performance degradation at other times of the day impact the reconstruction (and not only using 2PM, line 490). If the ref. T is at 10AM for instance, does the TSEB-based extrapolated diurnal transpiration show the same pattern as when using the observed T as a ref ?

The analysis in Figures 6 and 7 already covers the performance degradation resulting from measurement time for each scaling method. Hence, conducting additional analysis on the estimation of daily transpiration's performance degradation due to measurement time would be redundant. Nevertheless, we consider it essential to examine the error linked to the timing of measurements in energy balance models, specifically in the case of TSEB-2T. To address this, we have conducted an estimation of transpiration at five different time points using TSEB. Our primary aim with the overflights is to assess how the timing of flights influences the precision of hourly transpiration estimates, taking into

account varying degrees of water stress and diverse canopy architectures, and to investigate its implications for daily scaling methods.

Minor comments:

Line 50: this is partially true for evapotranspiration ET, not for evaporation E and transpiration T, because the system is often underdetermined (one constraint brought by Land Surface Temperature, whereas there are 2 unknowns, E and T, cf Boulet et al., 2018) except when using TSEB_2T; please comment.

Lines 49-58: We fully agree with your comment, especially when considering TSEB models in general. As you pointed out, the system becomes underdetermined when using radiometric temperature to derive both soil and canopy temperatures. TSEB-2T emerges as a promising option to address this issue by directly deriving energy fluxes separately using both temperatures (soil and canopy), provided that high enough resolution imagery (Nieto., 2019). However, while there are studies evaluating the TSEB-2T for estimating evapotranspiration, the retrieval of transpiration from TSEB-2T has only been validated in a previous work within the same context as this project (Quintanilla et al., 2013).

In summary, I agree with your observation because there is not enough research to indicate the accuracy of transpiration estimation by TSEB-2T in various landscapes. We have reorganized these sentences in the introduction for better coherence. Thank you for your valuable input.

Line 70: add both Van Niel et al. (2011) paper on the topic and take their outcomes into consideration (convex/concave up shapes of EF for instance)

Line 73: Thank you, we will consider this work.

Line 129: “two laterals” what does that mean ? Please explain the technical terms on irrigation and horticultural practices, not everyone is familiar with “open vase” etc.

Line 116: The production system is defined by the combination of the planting distance (distance between trees and rows) in the orchard and the pruning technique employed. For additional clarity, photographs illustrating each of the production systems have been included in Figure 1

Let us know if further clarification is needed.

Line 131: It refers to "two lateral pipes". I have added "two lateral pipes" to the text.

From an agronomic perspective, irrigation systems depend on the spacing between trees and rows. Given that the open vase (MP) system has greater spacing between trees and rows, it is common to install two lateral pipes for irrigation. Conversely, the central axis and the hedgerow systems have narrower spacing between trees and rows, allowing them to be irrigated with just one lateral pipe.

Line 230 and Line 540: how did you take into account the shadows for the soil and canopy temperatures ? (cf. Mwangi et al., 2023). What is the impact of the shadows actually ? (needs more analysis and comment than what is written in line 535 to 539)

Shaded pixels were not excluded from the calculation of soil and canopy temperature. The total canopy and soil temperature (all pixels) should be considered to estimate ET fluxes in TSEB-2T models. Therefore, the TSEB model does not account for shadow effects and could be sensitive to Sun position and shadow. We add more analysis to that point between lines 545 and 553.

Line 285: how did you choose the minimum surface resistance for the PM equation ?

Line 288: The minimum surface resistance was estimated using a formulation proposed by Monteith (1995) and Leuning (1995). This formulation takes into account the effect of VPD in stomatal resistance.

The minimum bulk canopy resistance (r_C) for the ETp model was determined through a method that parameterizes the relationship between g_s and VPD, as describe by Kustas et al., (2022)

Table 1 and 2: review the column heads which are not self understandable; there is an error in the header of the fourth col. Of Table 2 (twice fc)

Thanks for the comment, the titles were changed for:

Table 1. Analysis of variance (three-way ANOVA) testing the effect of Date, production system (PS) and irrigation treatment (TRT) and their interaction on fractional canopy cover (fc), canopy height (hc) and leaf area index (LAI), stem water potential (Ψs), and hourly (Th-SF) and daily transpiration (Td-SF) measured by sap flow sensors. P values less than 0.05 were considered statistically significant.

Table 2: Comparison of the on fractional canopy cover (fc), canopy height (hc) and leaf area index (LAI), and daily transpiration (Td-SF) measured during the flight campaign. Different letters mean significant differences at $p < 0.05$ using

Tukey's honest significant difference test considering the interaction between production system and irrigation treatment.

I find the ANOVA analysis not very conclusive and little insightful, maybe worth trying to gain info from a temporal analysis for modelled reference as suggested above, not only 2PM ?

As previously mentioned, we are confident that the analysis presented in figures 6 and 7 adequately addresses the performance degradation associated with measurement time for each scaling method.

Line 599 "hinting at a potential enhancement to address the observed underestimation": this is simply impossible to understand, please rephrase and clarify !

Lines 611: The sentence was modified.

Refs:

Boulet, G., Delogu, E., Saadi, S., Chebbi, W., Olioso, A., Mougenot, B., Fanise, P., Lili-Chabaane, Z., and Lagouarde, J. P.: Evapotranspiration and evaporation/transpiration partitioning with dual source energy balance models in agricultural lands, Proc. IAHS, 380, 17-22, https://www.proc-iahs.net/380/17/2018/

Samuel Mwangi, Gilles Boulet, Michel Le Page, Jean Philippe Gastellu-Etchegorry, Joaquim Bellvert, et al.. Observation and Assessment of Model Retrievals of Surface Exchange Components Over a Row Canopy Using Directional Thermal Data. IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, 2023, 16, pp.7343-7356. 10.1109/JSTARS.2023.3297709.

Van Niel, T.G.; McVicar, T.R.; Roderick, M.L.; van Dijk, A.I.J.M.; Renzullo, L.J.; van Gorsel, E. Correcting for systematic error in satellite-derived latent heat flux due to assumptions in temporal scaling: Assessment from flux tower observations. J. Hydrol. 2011, 409, 140–148.