

Response to RC2 by Rob Skelton.
Comments are labelled as R2#
All line numbers refer to the original version.

Italics: original comments by the reviewer

Normal font: response

Bold: changes in the manuscript.

General comments: The SAPFLUXNET database represents an excellent undertaking by Poyatos et al., and these authors should be congratulated for a fine achievement. The paper is well laid out and clear and I only have a few minor comments for the authors that I hope will improve the manuscript. It will be good to see this paper/dataset published and I look forward to being able to contribute to it and to make use of it in the future.

We would like to thank the reviewer for his positive views and his appreciation of our work.

One suggestion for an improvement is to highlight an example of where the dataset has been used to answer an experimental question. For example, is there a dataset that can demonstrate the impact of an abiotic stress on sap flow for different species?

We understand that by ‘the dataset’ the reviewer is referring to the entire database. We have a manuscript under revision and several other manuscripts in the pipeline that use the database to address questions regarding the environmental controls on tree water use. Preliminary contributions using different subsets of sapfluxnet have been cited in the manuscript:

De Cáceres, M., Mencuccini, M., Martin-StPaul, N., Limousin, J.-M., Coll, L., Poyatos, R., Cabon, A., Granda, V., Forner, A., Valladares, F. and Martínez-Vilalta, J.: Unravelling the effect of species mixing on water use and drought stress in Mediterranean forests: A modelling approach, *Agricultural and Forest Meteorology*, 296, 108233, <https://doi.org/10.1016/j.agrformet.2020.108233>, 2021.

Nelson, J. A., Pérez-Priego, O., Zhou, S., Poyatos, R., Zhang, Y., Blanken, P. D., Gimeno, T. E., Wohlfahrt, G., Desai, A. R., Gioli, B., Limousin, J.-M., Bonal, D., Paul-Limoges, E., Scott, R. L., Varlagin, A., Fuchs, K., Montagnani, L., Wolf, S., Delpierre, N., Berveiller, D., Gharun, M., Marchesini, L. B., Gianelle, D., Šigut, L., Mammarella, I., Siebicke, L., Black, T. A., Knohl, A., Hörtnagl, L., Magliulo, V., Besnard, S., Weber, U., Carvalhais, N., Migliavacca, M., Reichstein, M. and Jung, M.: Ecosystem transpiration and evaporation: Insights from three water flux partitioning methods across FLUXNET sites, *Global Change Biology*, 26(12), 6916–6930, <https://doi.org/10.1111/gcb.15314>, 2020.

Poyatos, R., Flo, V., Granda, V., Steppe, K., Mencuccini, M. and Martínez-Vilalta, J.: Using the SAPFLUXNET database to understand transpiration regulation of trees and forests, *Acta Hortic.*, (1300), 179–186, <https://doi.org/10.17660/ActaHortic.2020.1300.23>, 2020.

Specific comments:

Line 290: The main line of inquiry is not how plants regulate transpiration, but rather how transpiration varies with abiotic factors and along environmental gradients in different species. Perhaps the wording could be changed to something like “An improved understanding of transpiration and how variable this process is under different abiotic conditions, along environmental gradients and in different species is thus needed to. . .”

Thanks for the suggestion. We have included the reviewer's idea in the following sentence:

An improved understanding of transpiration and its regulation along environmental gradients and across species is thus needed to predict future trajectories of land evaporative fluxes and vegetation functioning under increased drought conditions driven by global change.

Line 312: Several studies have also quantified sap flow of graminoid species; see for example Skelton et al. 2012 (There are other papers).

Thanks for the suggestion, it's true that there are more recent examples following Baker and Van Bavel (1987). We have now cited Skelton et al. 2013.

Whole-plant measurements of water use using thermometric sap flow methods provide estimates of water flow through plants from sub-daily to interannual timescales, and have been mostly applied in woody plants, although several studies have measured sap flow on herbaceous species (Baker and Van Bavel, 1987; Skelton et al. 2013).

Line 313: See Clearwater et al. 2009 for a non-invasive approach using non-invasive external probes. Also cite Clearwater et al. 2009 on line 351.

Thanks for the suggestion. We have placed the suggested reference along with Sakuratani's pioneering work on external stem heat balance measurements and Helfter et al. (2007) study on a laser-based heating system, in the text where we comment on the differences between internally- and externally-heated systems.

Both heating and temperature sensing can be done either internally, by inserting needle-like probes containing electrical resistors (or electrodes for some methods) and temperature sensors into the sapwood (Vandegehuchte and Steppe, 2013), or externally; these latter systems being especially designed for small stems and non-lignified tissues (Clearwater et al. 2009; Helfter et al. 2007; Sakuratani 1981).

References

1. Skelton, R. P., West, A. G., Dawson, T. E. & Leonard, J. M. External heat-pulse method allows comparative sapflow measurements in diverse functional types in a Mediterranean-type shrubland in South Africa. *Funct. Plant Biol.* 40, 1076–1087 (2013).
2. Clearwater, M. J., Luo, Z., Mazzeo, M. & Dichio, B. An external heat pulse method for measurement of sap flow through fruit pedicels, leaf petioles and other small-diameter stems. *Plant. Cell Environ.* 32, 1652–1663 (2009).

Line 361: It would be best to avoid acronyms to make the sentence (and other sentences) easier to read. It is much easier to read "heat dissipation or compensation heat pulse" in this sentence than to keep referring to where the acronym was first mentioned.

We have replaced acronyms by the full name of each method in this sentence:

The suitability of a certain method in a given application largely depends on plant size and the flow range of interest (Flo et al., 2019), but heat dissipation and compensation heat pulse are the most widely used (Flo et al., 2019; Poyatos et al., 2016).

We have reviewed other parts of the text with a heavy use of acronyms (e.g. section 3.2), but we think that replacing acronyms by complete names would sometimes lead to unnecessarily long sentences and would hinder readability (see L.504-507).

Line 405: Are there plans for this site to be maintained? Can people continue to contribute? Perhaps state this up front.

We would like to keep SAPFLUXNET updated and receive more datasets, but this demands having some staff available to perform all the data ingestion process and to solve any arising issues with the help of data contributors. We will definitely search ways to make this possible in the near future.

In section 2.2 we state that the data contribution period was open in 2016-2017 (L.392) and we mention the possibility of opening new data contribution periods in section 5 (L. 759-761).