

Review for Revealing Seasonal Plasticity of Whole-Plant Hydraulic Properties Using Sap-Flow and Stem Water-Potential Monitoring

Summary

Zhang and colleagues present an innovative study that generated novel data and interpreted them within an effective modeling framework, demonstrating substantial seasonal variation in plant hydraulic properties that are often assumed to be static. I appreciate the clear writing and consider this manuscript an important addition to literature. However, I believe that additional care in comparing standard vs. new approaches and embedding the ecophysiological literature will help this work reach a wider audience.

Major comments

Given that this is a new approach, one inevitable question is how K_{max} and P_{50} derived from this method compares to existing, branch-harvest approaches. Are there any published literature values that speak to the range of values found in this study?

Another inevitable question is how confident can we be in values derived from short periods of data, which cannot encompass the entire range of dry downs found in branch-harvest approaches? Using 3D plots in Fig. 5a beautifully demonstrates seasonal variation within Tree 2 but does not reassure readers on this concern. I recommend presenting representative curves, say from the wet and dry seasons, in 2D to show both the raw data and the fitted values, so that readers can judge for themselves whether this approach yields parameters that mimic our conventional understanding of K_{max} and P_{50} .

I appreciate the careful field and modeling work to demonstrate time-variant hydraulic properties, especially their correlation with seasonality and hydrometeorological properties. However, the plant's biological responses can be more greatly emphasized. Consider expanding Ln 348-350 by discussing possible direction of relationships and adding citations.

I am excited to see that K_{max} and P_{50} correlate with root zone water potential, suggesting that traits are far more dynamic than typically accounted for in models. But, given that predawns are used to represent root zone water potential and utilized to derive K_{max} and P_{50} , is this correlation independent? Also consider characterizing the duration of the lag and speculating on the biological processes that could account for it.

Why were these three climate variables selected? It is well-established that soil moisture/soil water potential and vapor pressure deficit are endmembers of the SPAC and directly impact plant hydraulic transport, and by extension plant hydraulic properties. Consider re-running the regression analyses with more proximal predictor variables that are indicative of moisture conditions. Specifically, in Ln 405-406, these climate variables are referred to collectively as moisture conditions, which does not seem accurate.

Plant phenology often refers to the timing of leaves and flowers, but in this case the timing of vessel development might strongly impact hydraulic properties. Consider further discussion of the kinds of phenological data that will influence plant hydraulics, including vessel development and distribution, leaf area to sapwood area to root area ratios, etc.

It appears P50 was derived from the curve fitting parameters of the Weibull model. Was P50 calculated within the model for each iteration, and then summarized as the posterior mean? If so, what about the measure of spread, such as a central 95% credible interval? I'd like to see these presented as error bars in the figures, which will allow readers to interpret the magnitude of the seasonal variation. Such error bars in both x- and y- directions would be especially helpful in Fig. 8, which can have different meanings for the small (credible intervals) and large symbols (sample standard deviations).

Minor comments

Ln 50. Change to “which is likely due to”

Ln 55. Change to “informing the”

Ln 335. Remove the duplicated period.

Ln 366. Subscript the 50.

Ln 451. Change to positive/negative effect, rather than coefficient

Fig. 8 caption. The color axis is not explained – is it simply time of year?

Suggested reference

Ogle K, Barber JJ, Willson C, Thompson B. Hierarchical statistical modeling of xylem vulnerability to cavitation. *New Phytologist*. 2009. 182(2):541-554.