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Interactive comment on "L-band vegetation optical depth as an indicator of plant water potential in a temperate deciduous forest stand" *by* Nataniel Holtzman et al.

Anonymous Referee #2

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In this manuscript, the relationship between VOD and plant water potential is analysed using an L-band radiometer and in situ measurements of stem xylem and leaf water potential and dielectric constants. In addition to the relationship in general, the authors investigate diurnal changes of VOD and the sensitivity of VOD to the stem and leaf water potential, respectively. The authors provide a comprehensive overview of basic plant hydraulics, the applied VOD retrieval and all conducted measurements. A weakness of the study is the limited number of in situ samples especially from leaves, but the authors are aware of that and describe the associated uncertainties. Despite the low number of samples, the findings presented in the manuscript are interesting and contribute to a better understand the variables which affect VOD over temperate forest.

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Some detailed comments:

#266f: In the second half of September, VOD, stem dielectric constant and potential drop significantly. I saw that you refer to this later but consider mentioning it already here.

Figure 3c: Do you have an idea why one of the stem water potential curves is very close to leaf water potential on July 10?

Figure 4: The VOD curve presents the average from April-October. You show in the supplement Fig. 3 that the VOD from July 9-12 does not differ much from the April-October average apart from the absolute values. Have you considered showing both figures in the main part of the manuscript, or adding the July-VOD to Fig. 4? In my opinion this would add information, as April-October is almost the entire growing season, whereas in mid-July not many LAI/biomass-related dynamics occur in temperate forest.

#296f/Figure 5a: The VOD-leaf water potential relationship also seems to break down, but during morning and evening hours and at a leaf potential around -0.5 MPa. Can you elaborate on this?

Figure 5/6: You obtain a much better relationship in Fig. 6c than in 5a, just by leaving out the measurements during which you did not measure the leaf dielectric constant (R=89 vs. R=76, no “break down”/vertical linear relationship at -0.5 MPa in Fig. 6c). Can you explain if there is any reason for this? When did you measure the leaf dielectric constant, when not - just randomly?

#324f/Figure 7: I agree that there is a linear relationship over the entire growing season. But when looking at the individual months, there is a clear difference in the slope and distinctiveness of the relationship. You address this in the discussion, but maybe briefly address it already here. E.g., add the R values for each month. Are the monthly differences due to weather, e.g. soil moisture? Or rather due to the gaps between the

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three installations (but then you would only have it in the leaf water potential). Or due to phenological processes in the trees? You could also show the scatterplots using symbols for the three months and colours for soil moisture values.

Can you include e.g. SMAP VOD over the area (morning and evening overpasses if available) and (briefly) show main differences/similarities to your in situ VOD?

Formulation/spelling:

#71-72: check sentence structure

#152: they/the, parentheses

#322: consider turning around “Fig. 5” and “Fig. 6”, or use a different wording than “. . . because the former” - it’s a bit confusing to the reader which figure the second half of the sentence refers to

#451: Fig. 3 and 4 instead of 5 and 6?

#461: sensitivity

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