Supplement of

L-band vegetation optical depth as an indicator of plant water potential in a temperate deciduous forest stand

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**Allocation of water between vegetation components**

The exact amount of water in each of the leaves, branches, and stems of the oak trees is not known, and is modulated by both the differing water content values of these different components, as well as plant allometry (e.g. biomass of leaves relative to branches relative to trunk). We used data from the TRY database (Kattge et al., 2011), the Biomass and Allometry Database (BAAD) (Falster et al., 2015), and individual studies of oak species to estimate several of these quantities, as detailed in the table below:

| Quantity | Definition | Value | Source |
|----------|------------|-------|--------|
| LM:SM    | dry leaf mass per total dry stem and branch mass | 0.022 | BAAD (average of 9 adult *Quercus rubra*) |
| BM:SM    | dry branch mass per total dry stem and branch mass | 0.17 | BAAD (average from 12 temperate oak species) |
| LDMC     | leaf dry matter content, or leaf dry mass per total leaf mass | 0.31 | TRY (average of 315 *Quercus rubra* values) |
| BDMC     | branch dry matter content, or branch dry mass per total branch mass | 0.51 | (Palacio et al., 2008) (1 to 2-year-old branches, average from *Q. ilex* and *Q. faginea*) |
| SDMC     | stem dry matter content, or stem dry mass per total stem mass | 0.51 | Assumed equal to BDMC |

These quantities were combined to calculate the average units of leaf water content (2.2 units), branch water content (7.4), and stem water content (36) per unit of dry leaf mass, respectively These numbers also determine the relative fractions of the total aboveground water content in the leaves, branches, and stems, respectively - approximately 5% of an oak tree’s water is expected to be in its leaves, 16% in its branches, and 79% in its trunk.

Thus approximately 21% of the total tree water is in the leaves and branches.
Figure S1. Scatter plots comparing the soil and air temperature at the radiometer site with infrared canopy temperatures from the nearby NEON site, over June through September 2019.
Figure S2. Time series of VOD, stem xylem dielectric constant at 70 MHz, stem xylem water potential, soil moisture, and precipitation at Harvard Forest.
Figure S3. Pressure-volume curve from 3 leaves and 3 small branches collected from Harvard Forest site.
Table S1. Pearson correlations (R) and Spearman rank correlations (ρ) for the three pairs of variables shown as scatter plots in Figure 7, for all data and individually for each of the three periods that the stem psychrometers were installed (corresponding to three months).
Supplemental References

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