

## Publication

## Daily stem diameter variations can predict the canopy water status of mature temperate trees

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Direct evidence for the link between stem diameter variations (SDV) and the daily canopy water status, i.e., daily water potentials ( $\Psi$ ), is rare, particularly for tall trees. It thus remains unclear up to what degree SDV readings are useful to estimate daily canopy  $\Psi$ . We measured SDV with point dendrometers at the stem base of tall, mature individuals of six European forest tree species in a near-natural temperate forest and compared them with daily canopy  $\Psi$  during the growing seasons of 2014 (wet) and 2015 (dry). Stem diameter variations were de-trended for growth with two different approaches leading to the so-called tree water deficit (TWD). We found that midday  $\Psi$  can be predicted from TWD, independent of the growth-de-trending procedure to obtain TWD from SDV. Further, daily TWD was a better indicator for daily midday  $\Psi$ , particularly under dry conditions, than maximum daily shrinkage, another common quantity derived from SDV. Based on data from six temperate tree species, we conclude that TWD measured at the stem base is a consistent proxy for daily canopy midday  $\Psi$  of tall trees over the entire range of measured conditions.

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