Supplement S2: Alternate versions of trait synthesis figures

Fig. S2.1 Version of Fig. 3 of main text, but without applying correction factor to PV curves conducted on trunk cores and showing the residual fraction ($r_f = RWC_r$) instead of relative water deficit at turgor loss ($R_{tlp,x} = 1 - RWC_{tlp,x}$). Symbols and asterisk codes as in Fig. 2 of main text.

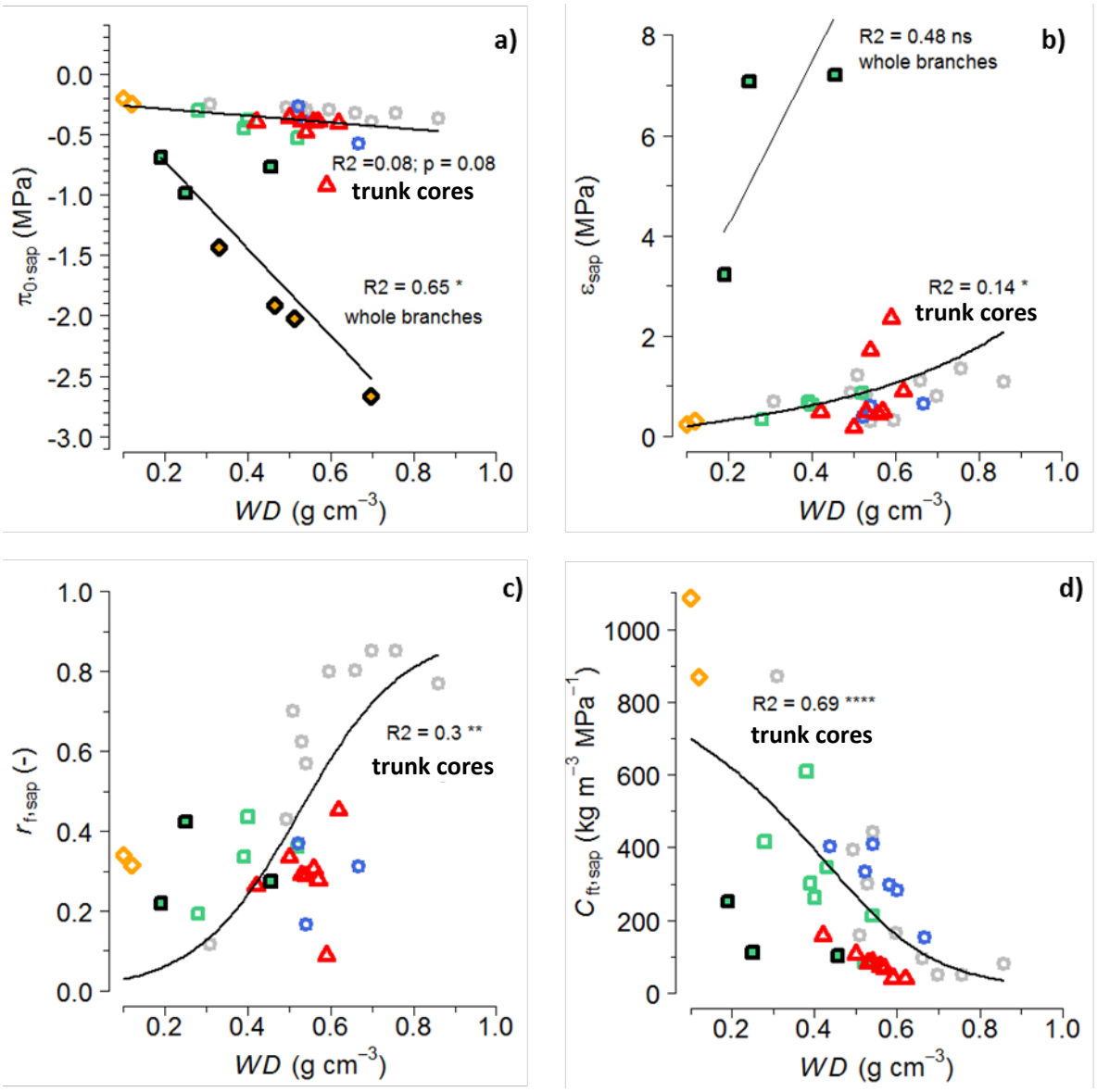


Fig. S2.2 Version of Fig. 5 a) – c) of the main text, but instead of maximum xylem conductivity per unit leaf area ($k_{l,max}$), maximum xylem conductivity per unit *cross-sectional sapwood area* ($k_{s,max}$) Symbols and asterisk codes as in Fig 2 of main text.

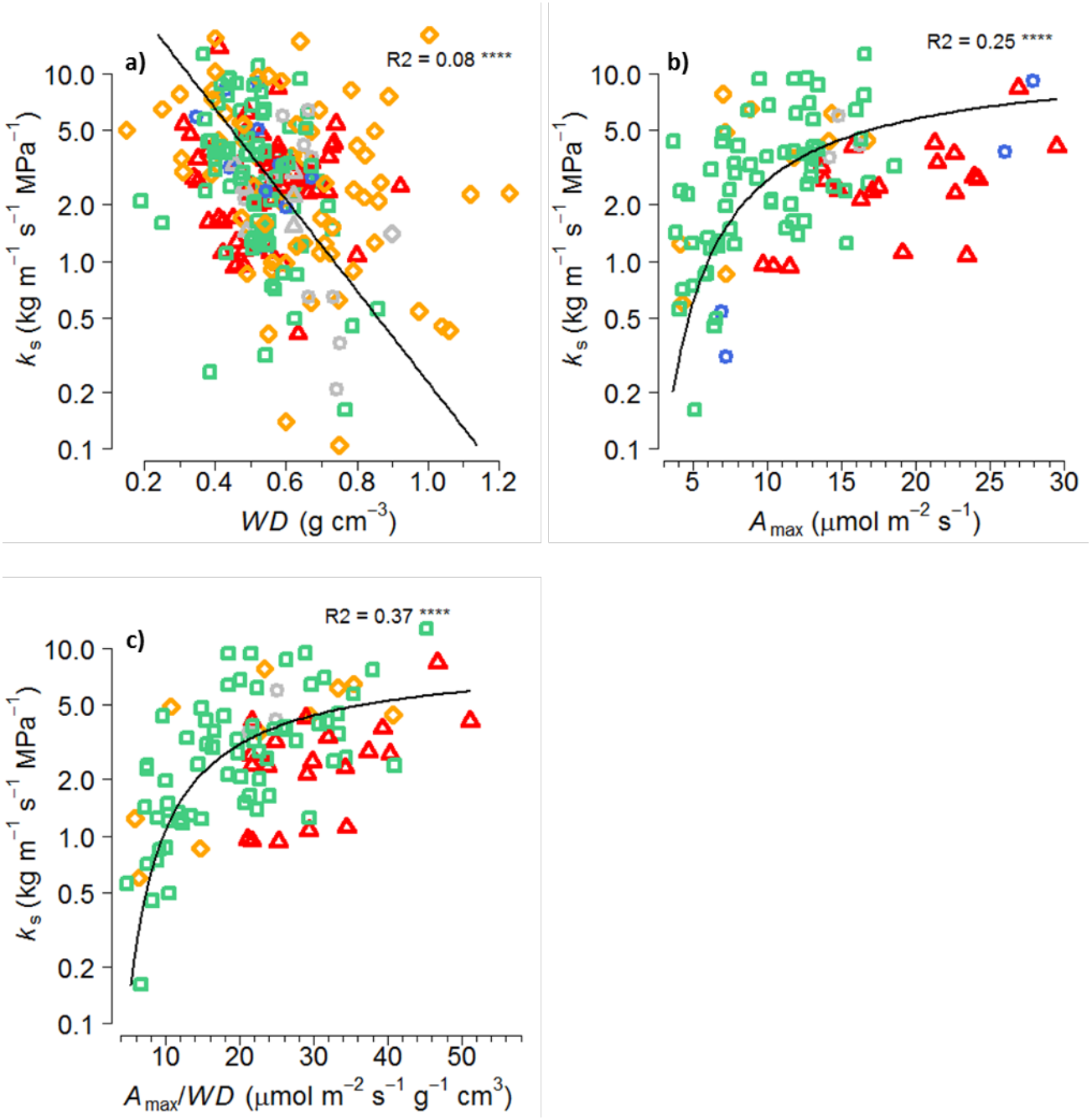
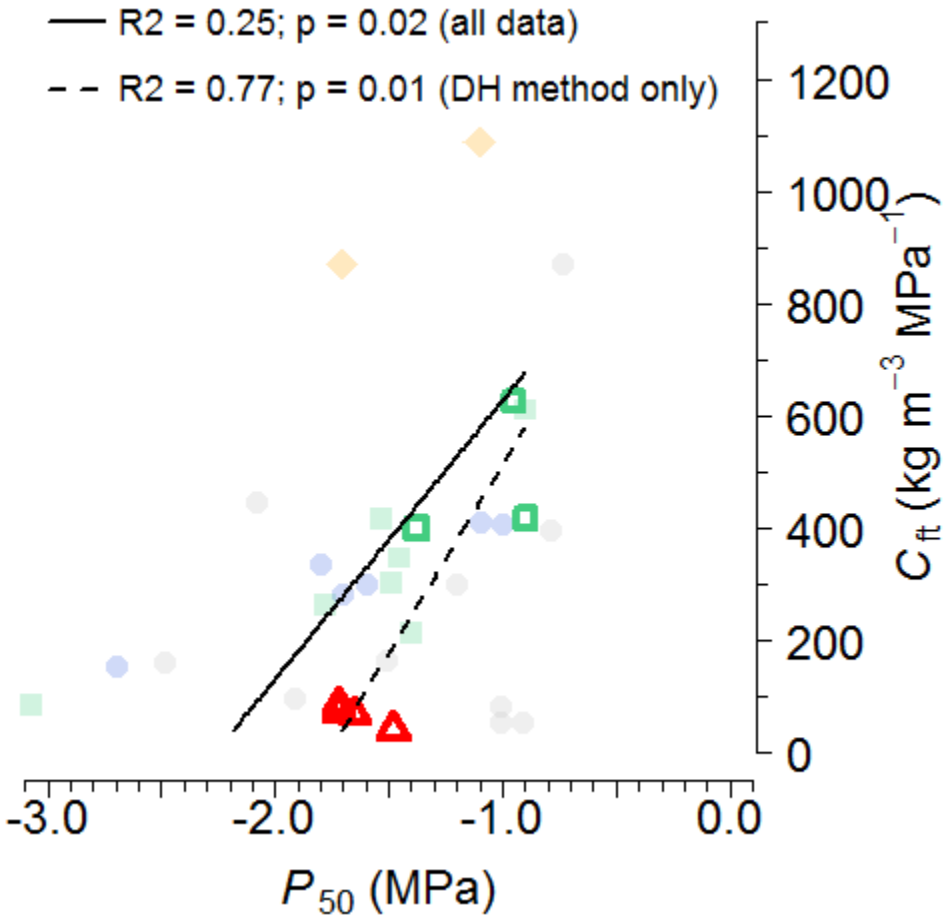


Fig. S2.3 Version of Fig. 8b of the main text without applying correction factor to sapwood PV curves, taking published capacitance at face value. Symbols as in Fig. 8 of main text.



Supplement S3: Additional model output

Fig. S3.1 Modeled diurnal profiles of integrated (across all individual trees) total community transpiration rate (black), sap flow rate (blue), and root uptake rate (red) for a single day during the wet season at Caxiuana.

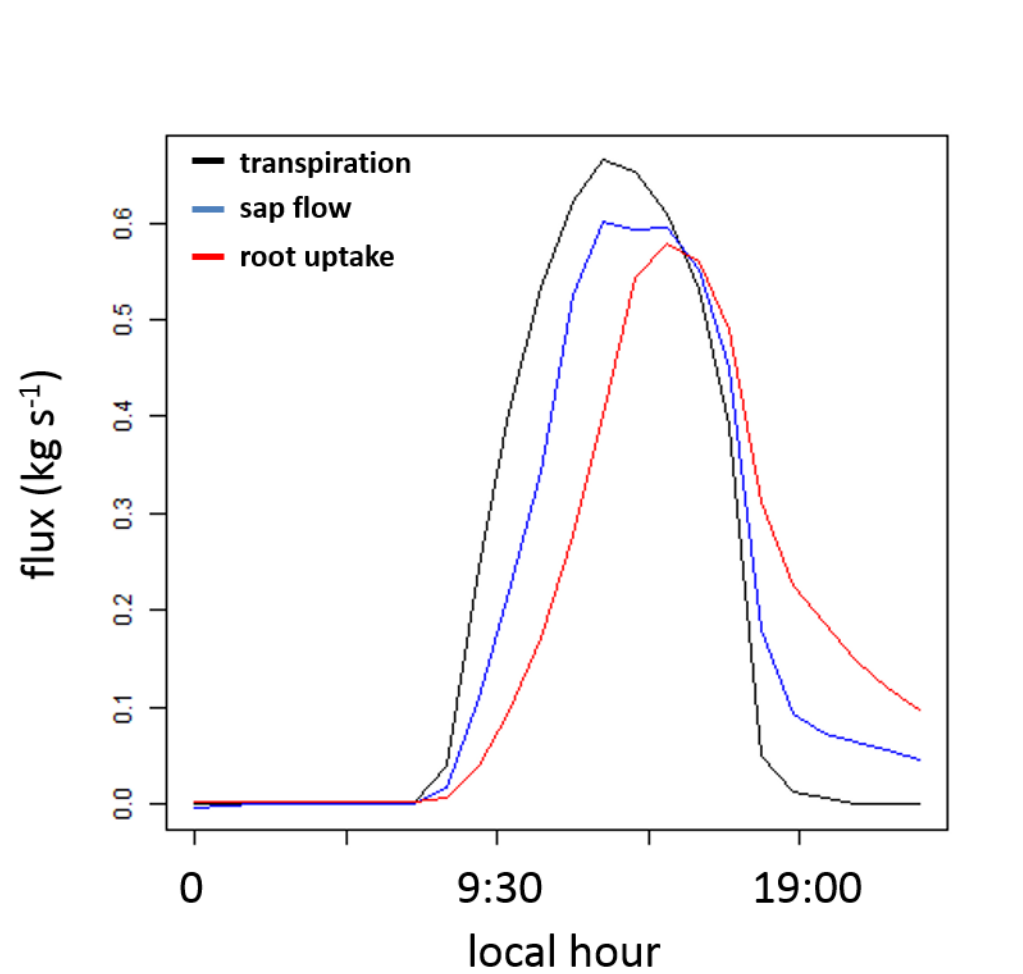


Fig. S3.2 Change in volumetric water content (relative to previous timestep) in the rhizosphere for each of 11 rhizosphere nodes. Warmer colors indicate rhizosphere shells closer to absorbing roots and cooler colors indicate shells further from absorbing roots.

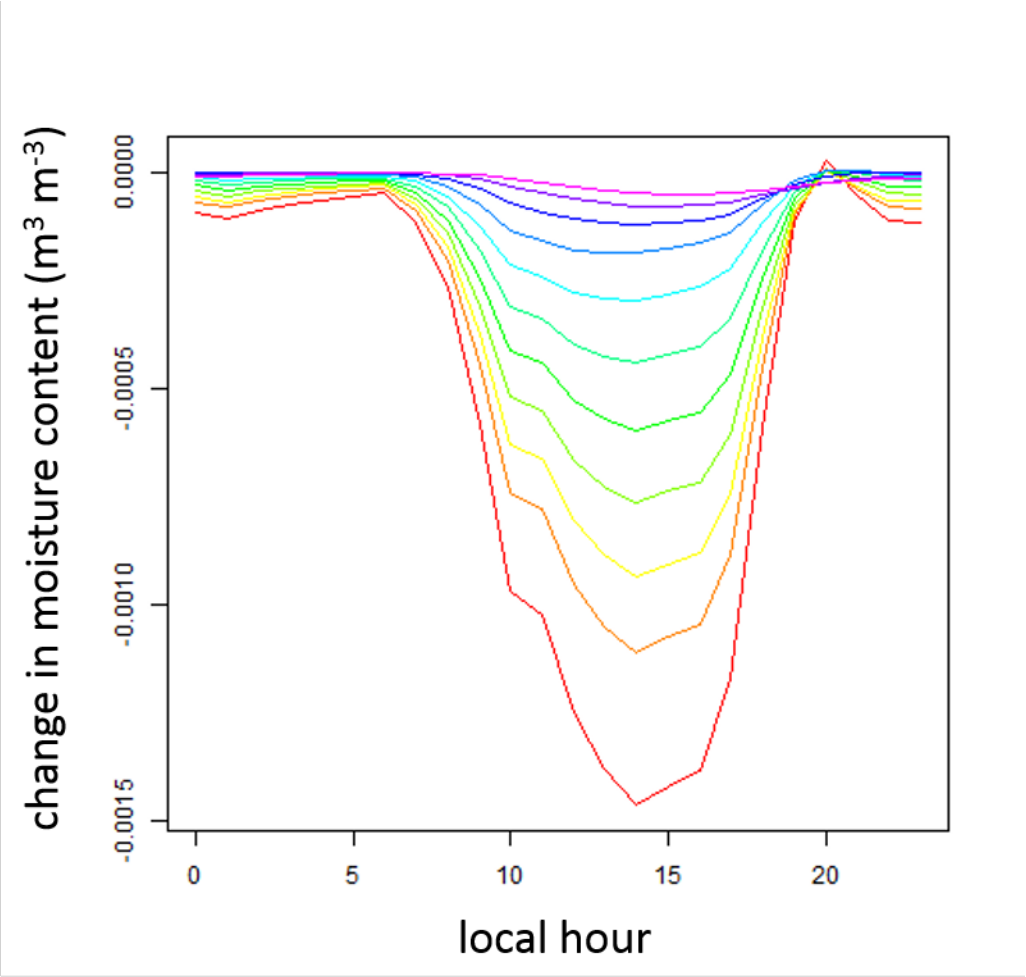


Fig. S3.3 Cumulative transpiration flux (community-level; negative means loss of water from ecosystem) with and without accounting for the "tendency term" $\frac{\partial Q_{top}}{\partial \theta_0}$ (change of transpiration with changes in leaf water content; see Section 5.3 of Supplement S1).

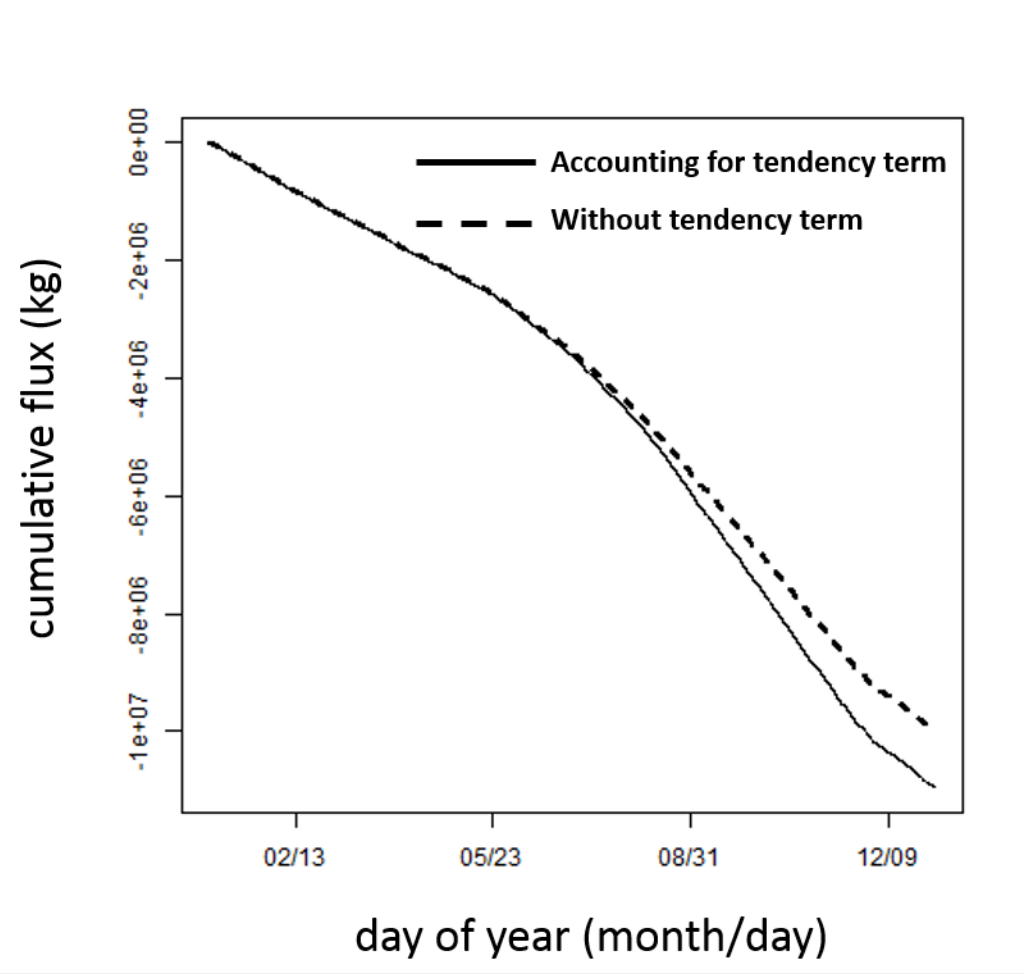
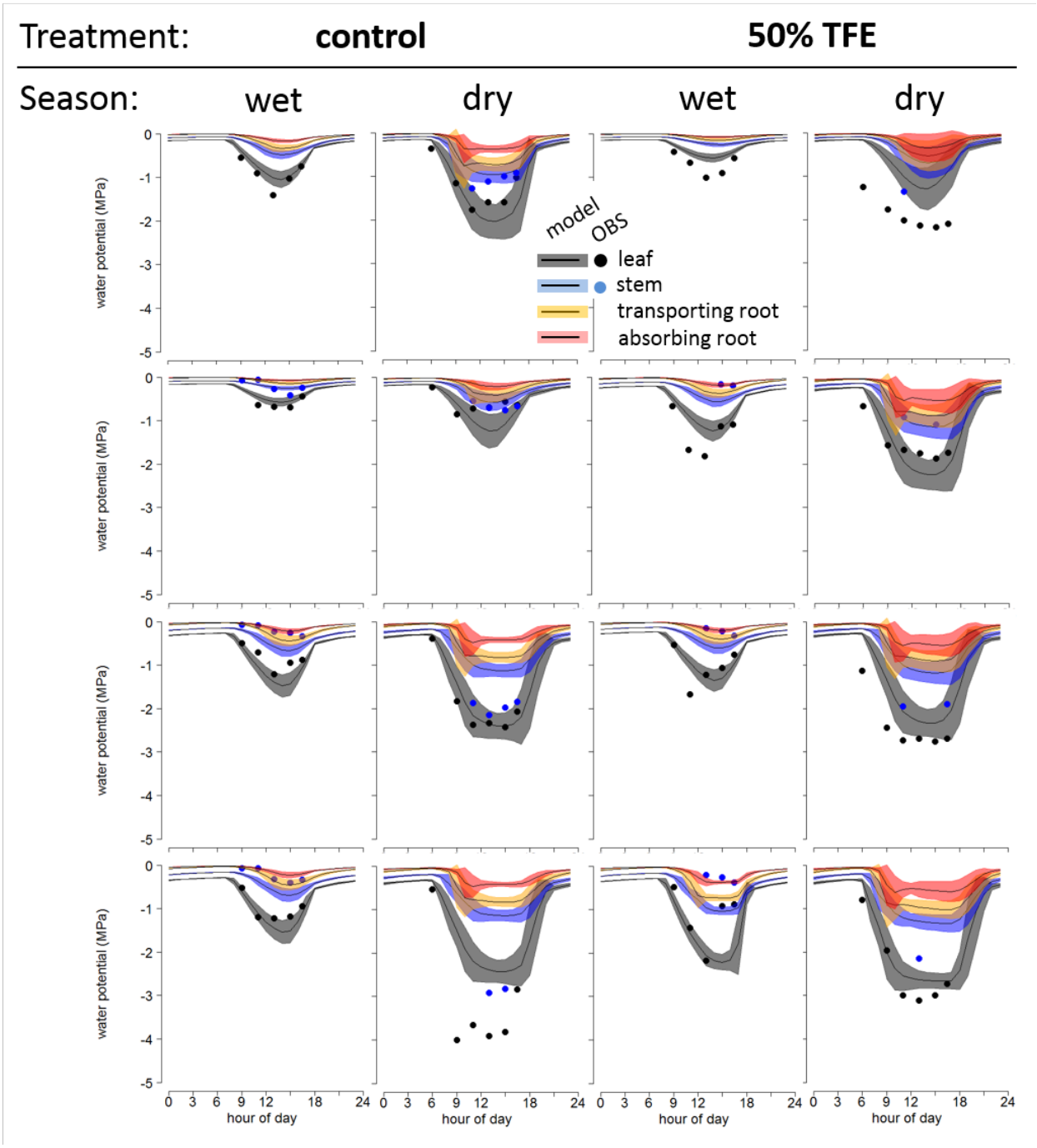


Fig. S3.4 Same as Fig. 11 of main text except with transporting and absorbing root water potentials given.



Supplement S4: Published references and data for hydraulic trait synthesis

Leaf PV database:

Additional data (not in published datasets; see below) which were extracted from published references and used in analyses are given in the following files:

leaf_PV_headers.csv: description of the variables in leaf_PV_new.csv
leaf_PV_new.csv: new extracted data not already in Bartlett et al. (2012), Bartlett et al. (2014), and Maréchaux et al. (2015).
leaf_PV_newreferences.xlsx: citation, bibliographic reference, and DOI for the published references from which data were extracted

Published datasets used in analyses (available as supplemental files to the original publications):

Bartlett, M. K., Zhang, Y., Kreidler, N., Sun, S., Ardy, R., Cao, K., and Sack, L.: Global analysis of plasticity in turgor loss point, a key drought tolerance trait, Ecol Lett, 17, 1580-1590, 2014.

Bartlett, M. K., Scoffoni, C., and Sack, L.: The determinants of leaf turgor loss point and prediction of drought tolerance of species and biomes: a global meta-analysis, Ecology Letters, 15, 393-405, 2012.

Maréchaux, I., Bartlett, M. K., Sack, L., Baraloto, C., Engel, J., Joetzjer, E., Chave, J., and Kitajima, K.: Drought tolerance as predicted by leaf water potential at turgor loss point varies strongly across species within an Amazonian forest, Functional Ecology, 29, 1268-1277, 2015.

Sapwood PV database (see also doi: 10.15486/NGT/1256473):

Data extracted from published references and used in analyses are given in the following files:
sapwood_PV_recal_headers.csv: description of variables in the two files below
sapwood_PV_recal_corrected.csv: bias-corrected sapwood PV data presented in Fig. 3
sapwood_PV_recal_uncorrected.csv: uncorrected sapwood PV data presented in Fig. S2.1 and S2.3
sapwood_PV_references.xlsx: citation, bibliographic reference, and DOI for the published references from which data were extracted

Sapwood area database (see also doi: 10.15486/NGT/1256474):

Data extracted from published references and used in analyses are given in the following files:
SA_headers.csv: description of variables in the two files below
SA.csv: tree size (DBH or height) sapwood area
SA_references.xlsx: citation, bibliographic reference, and DOI for the published references from which data were extracted

Xylem functional traits database:

Additional data (not in published datasets; see below) which were extracted from published references and used in analyses are given in the following files:
XFT_headers.csv: description of the variables in XFT_new.csv
XFT_new.csv: new extracted data not already in the TRY XFT database (see below).
XFT_newreferences.xlsx: citation, bibliographic reference, and DOI for the published references from which data were extracted.

All other data are available under the title "Xylem Functional Traits Database" (Choat et al., 2012; Gleason et al., 2016) in the TRY archive (www.try-db.org).

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Gleason, S. M., Westoby, M., Jansen, S., Choat, B., Hacke, U. G., Pratt, R. B., Bhaskar, R., Brodribb, T. J., Bucci, S. J., Cao, K.-F., Cochard, H., Delzon, S., Domec, J.-C., Fan, Z.-X., Feild, T. S., Jacobsen, A. L., Johnson, D. M., Lens, F., Maherali, H., Martínez-Vilalta, J., Mayr, S., McCulloh, K. A., Mencuccini, M., Mitchell, P. J., Morris, H., Nardini, A., Pittermann, J., Plavcová, L., Schreiber, S. G., Sperry, J. S., Wright, I. J., and Zanne, A. E.: Weak tradeoff between xylem safety and xylem-specific hydraulic efficiency across the world's woody plant species, New Phytologist, 209, 123-136, 2016.

Published references from which data were compiled or extracted for analyses from the "Xylem Functional Traits Database:"

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Brodribb, T.J., N.M. Holbrook, E.J. Edwards and M.V. Gutierrez. 2003. Relations between stomatal closure, leaf turgor and xylem vulnerability in eight tropical dry forest trees. Plant Cell and Environment 26: 443-450.

Bucci S.J., Goldstein G., Meinzer F.C., Scholz F.G., Franco A.C. and Bustamante M. 2004.. Functional convergence in hydraulic architecture and water relations of savanna trees: from leaf to whole plant. Tree Physiology 24: 891-899.

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Chen J-W, Zhang Q, Li X-S, Cao K-F. 2009b. Independence of leaf and stem hydraulic traits in six Euphorbiaceae species with contrasting leaf phenology. *Planta* **230:** 459–468.

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