

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.

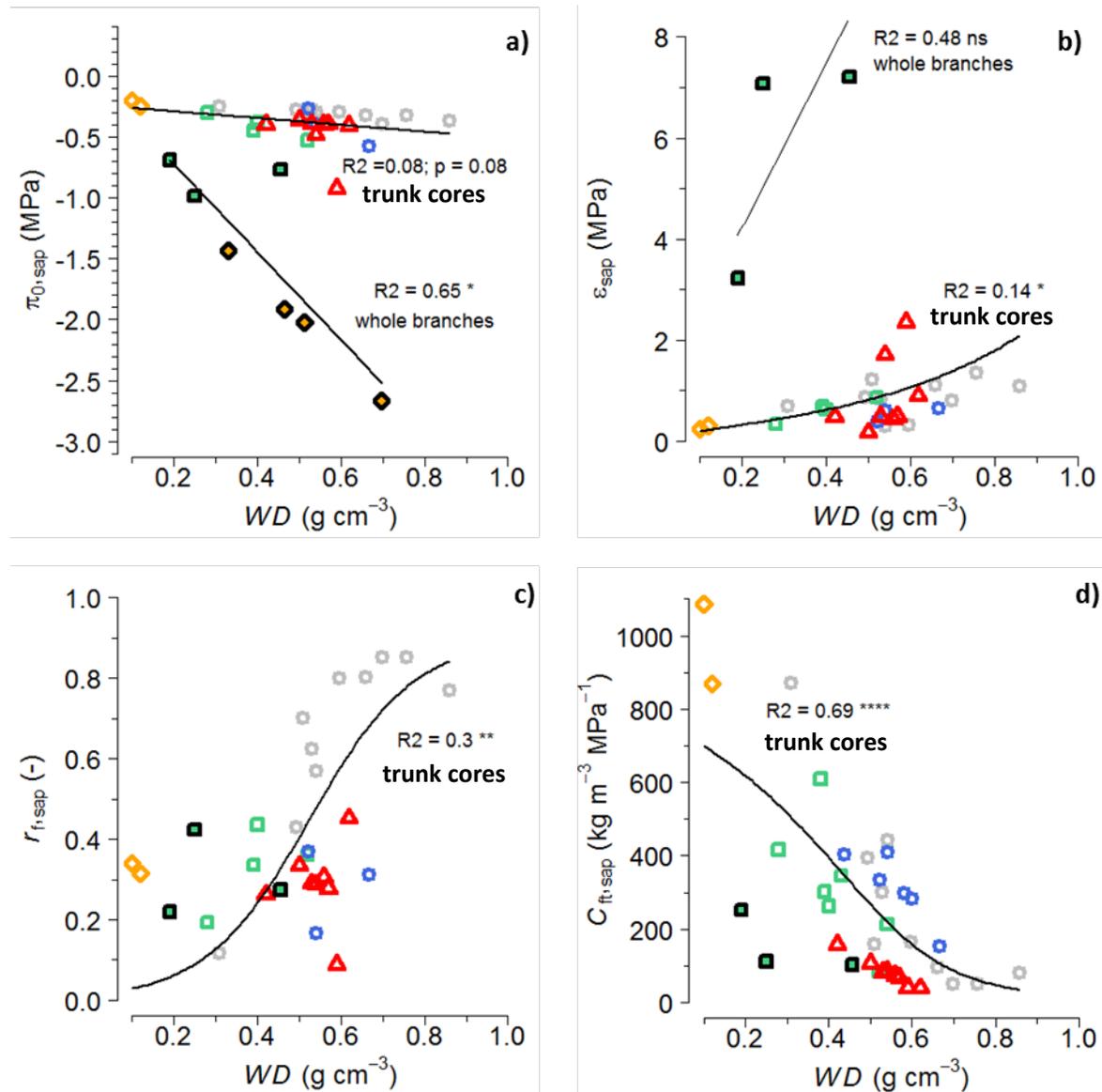


Fig. S2.2 Version of Fig. 5 a) – c) of the main text, but instead of maximum xylem conductivity per unit leaf area ($k_{l,max}$), maximum xylem conductivity per unit *cross-sectional sapwood area* ($k_{s,max}$) Symbols and asterisk codes as in Fig 2 of main text.

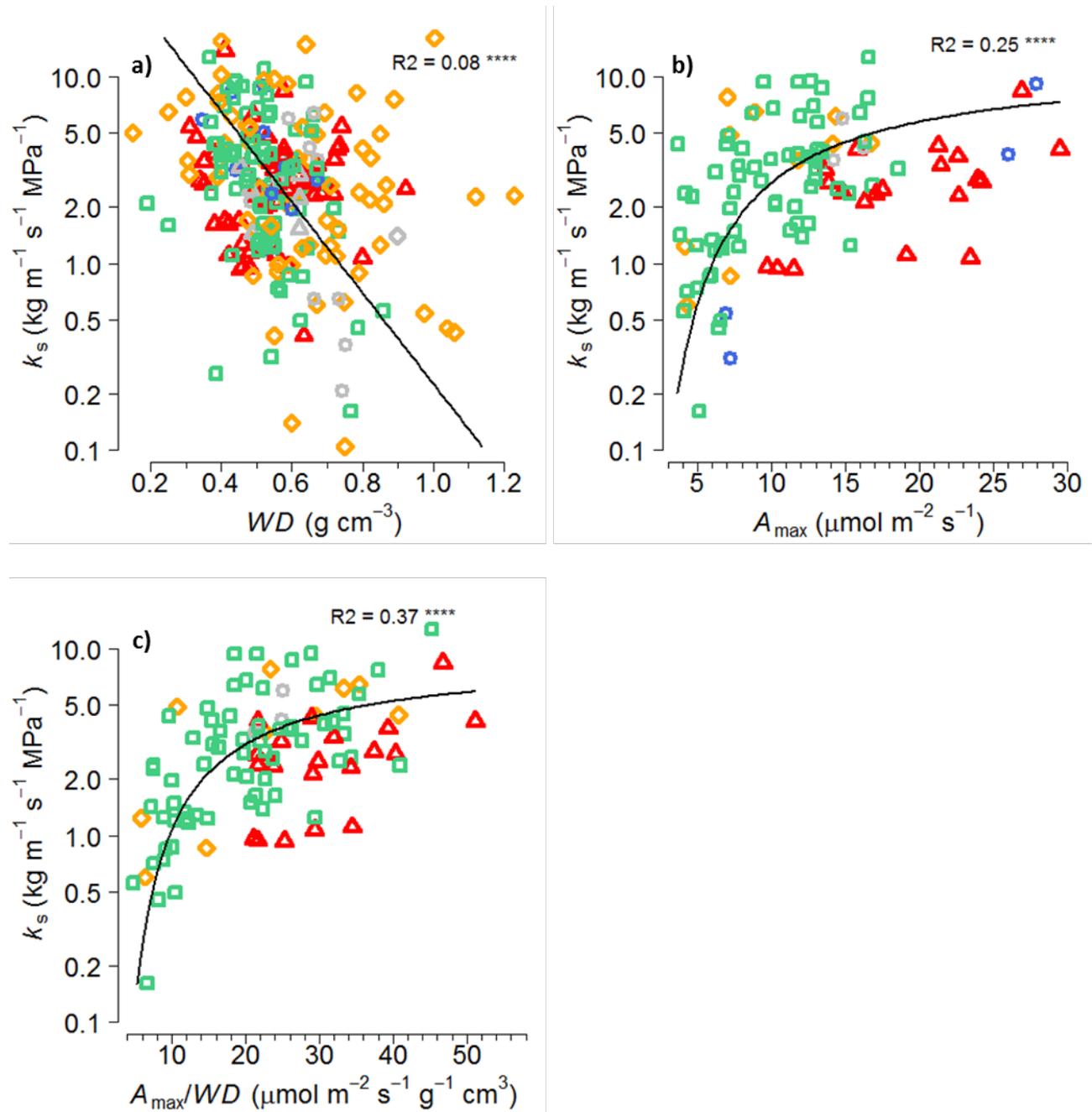
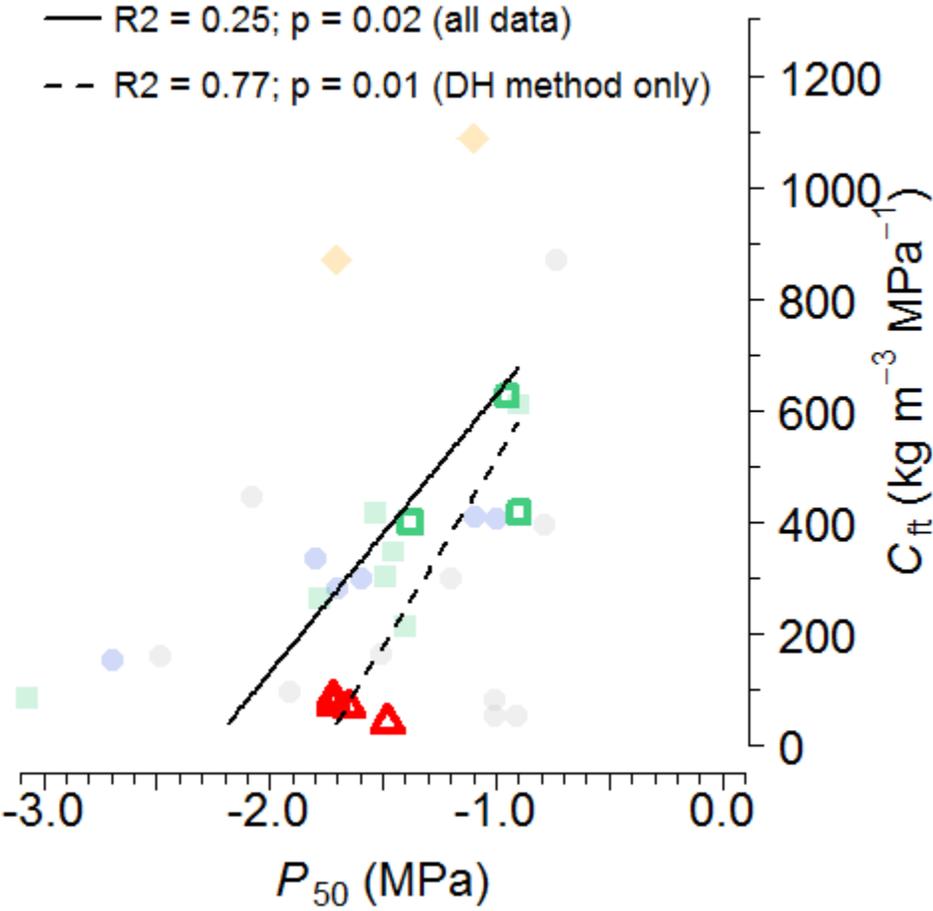


Fig. S2.3 Version of Fig. 8b of the main text without applying correction factor to sapwood PV curves, taking published capacitance at face value. Symbols as in Fig. 8 of main text.



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.

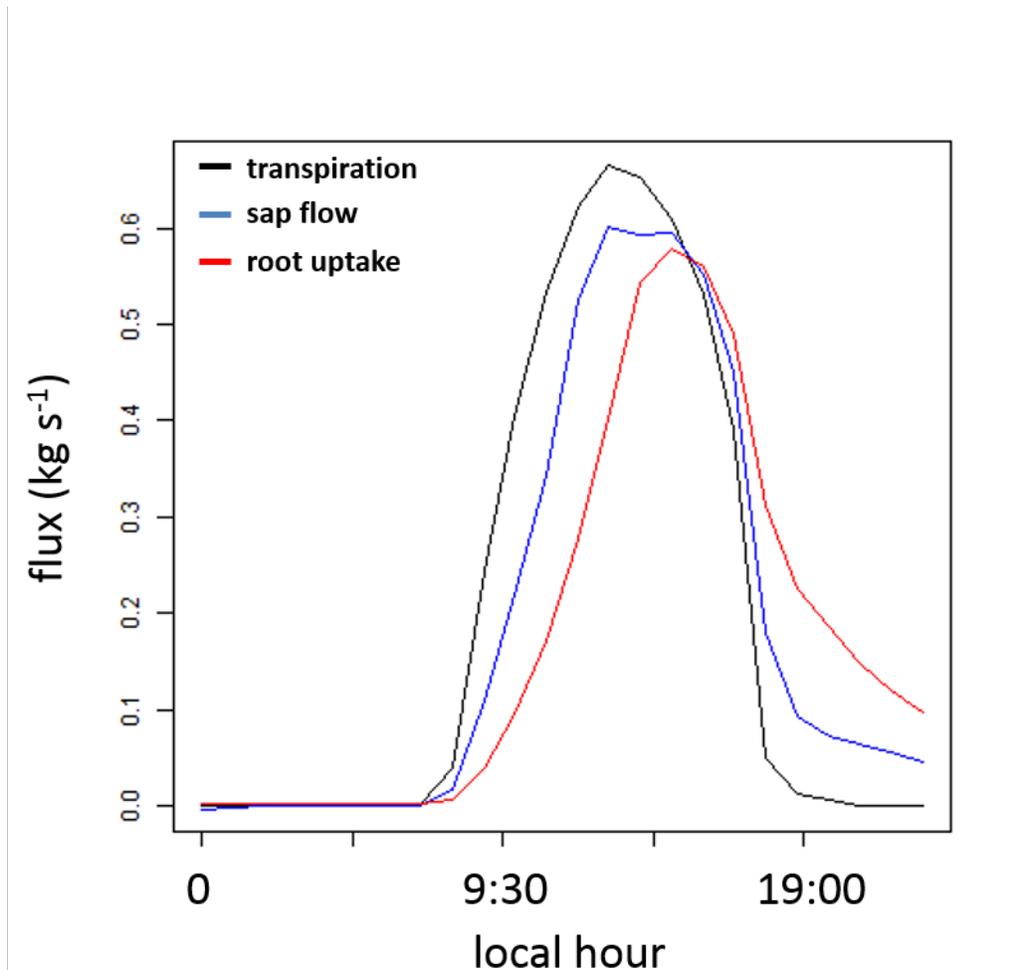


Fig. S3.3 Cumulative transpiration flux (community-level; negative means loss of water from ecosystem) with and without accounting for the “tendency term” $\frac{\partial Q_{top}}{\partial \theta_0}$ (change of transpiration with changes in leaf water content; see Section 5.3 of Supplement S1).

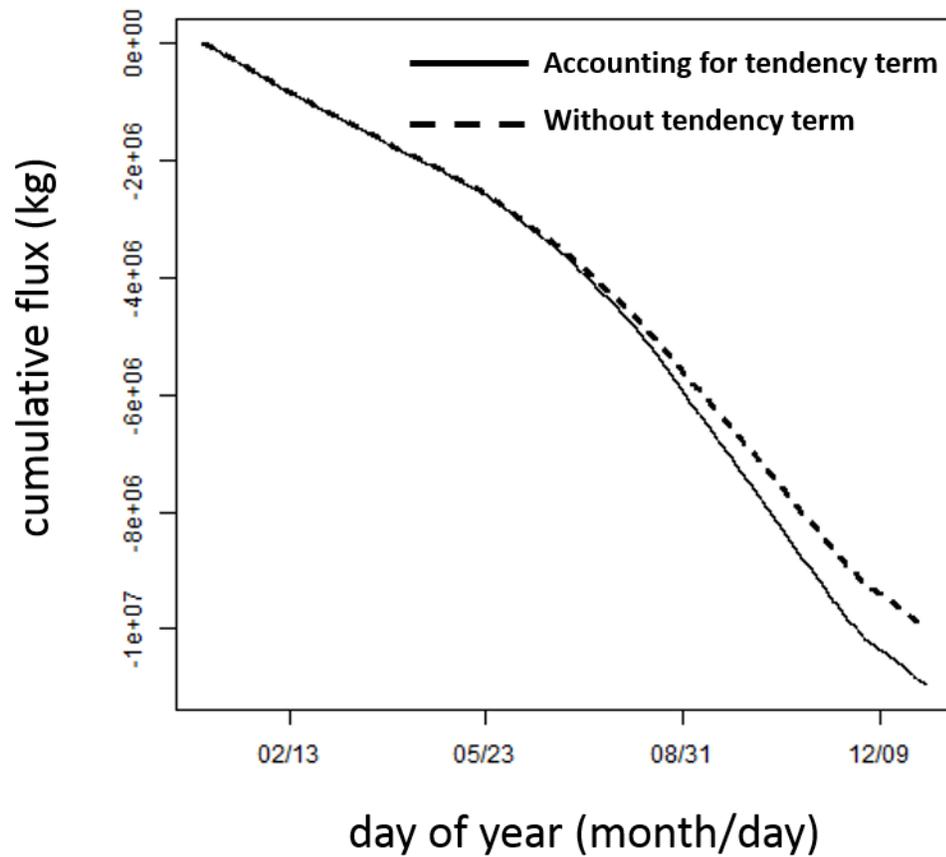
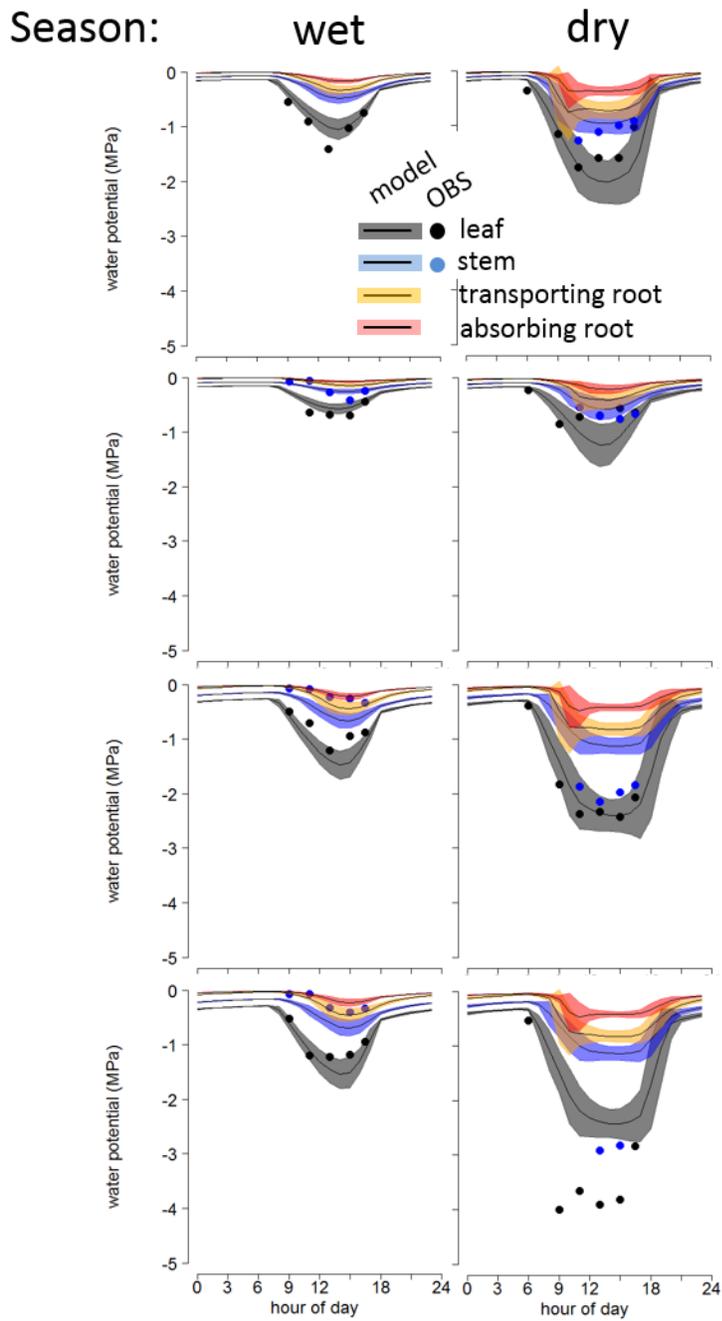


Fig. S3.4 Same as Fig. 11 of main text except with transporting and absorbing root water potentials given.



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., Joetzer, 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).

Choat, B., Jansen, S., Brodribb, T. J., Cochard, H., Delzon, S., Bhaskar, R., Bucci, S. J., Feild, T. S., Gleason, S. M., Hacke, U. G., Jacobsen, A. L., Lens, F., Maherali, H., Martínez-Vilalta, J., Mayr, S., Mencuccini, M., Mitchell, P. J., Nardini, A., Pittermann, J., Pratt, R. B., Sperry, J. S., Westoby, M., Wright, I. J., and Zanne, A. E.: Global convergence in the vulnerability of forests to drought, *Nature*, doi: 10.1038/nature11688, 2012. 2012.

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:”

Brodribb, T.J., N.M. Holbrook, and M.V. Gutierrez. 2002. Hydraulic and photosynthetic coordination in seasonally dry tropical forest trees. *Plant Cell and Environment* 25: 1435-1444.

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.

Bucci, S.J., Scholz F.G., Goldstein G., Meinzer F.C., Franco, A.C., Campanello, P.I., Villalobos-Vega, R., Bustamante, M. and Miralles-Wilhelm, F. 2006. Nutrient availability constrains the hydraulic architecture and water relations of savanna trees. *Plant Cell and Environment* 29: 2153-2167

Bucci, S.J. Scholz, F.G. Goldstein, G. Meinzer, F.C. Franco, A.C. Zhang Gu, Y. and Hao, Y. 2008. Water relations and hydraulic architecture in Cerrado trees: adjustments to seasonal changes in water availability and evaporative demand. *Brazilian Journal of Plant Physiology* 20: 233-245

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