Supplement of

Drought resistance increases from the individual to the ecosystem level in highly diverse neotropical rain forest: a meta-analysis of leaf, tree and ecosystem responses to drought.

Thomas Janssen[1], Katrin Fleischer[2], Sebastiaan Luyssaert[3], Kim Naudts[1] & Han Dolman[1]

1. Department of Earth Sciences, Vrije Universiteit Amsterdam, the Netherlands
2. Land Surface - Atmosphere Interactions, Technische Universität München, Germany
3. Department of Ecological Sciences, Vrije Universiteit Amsterdam, the Netherlands

Correspondence to: Thomas Janssen (t.a.j.janssen@vu.nl)

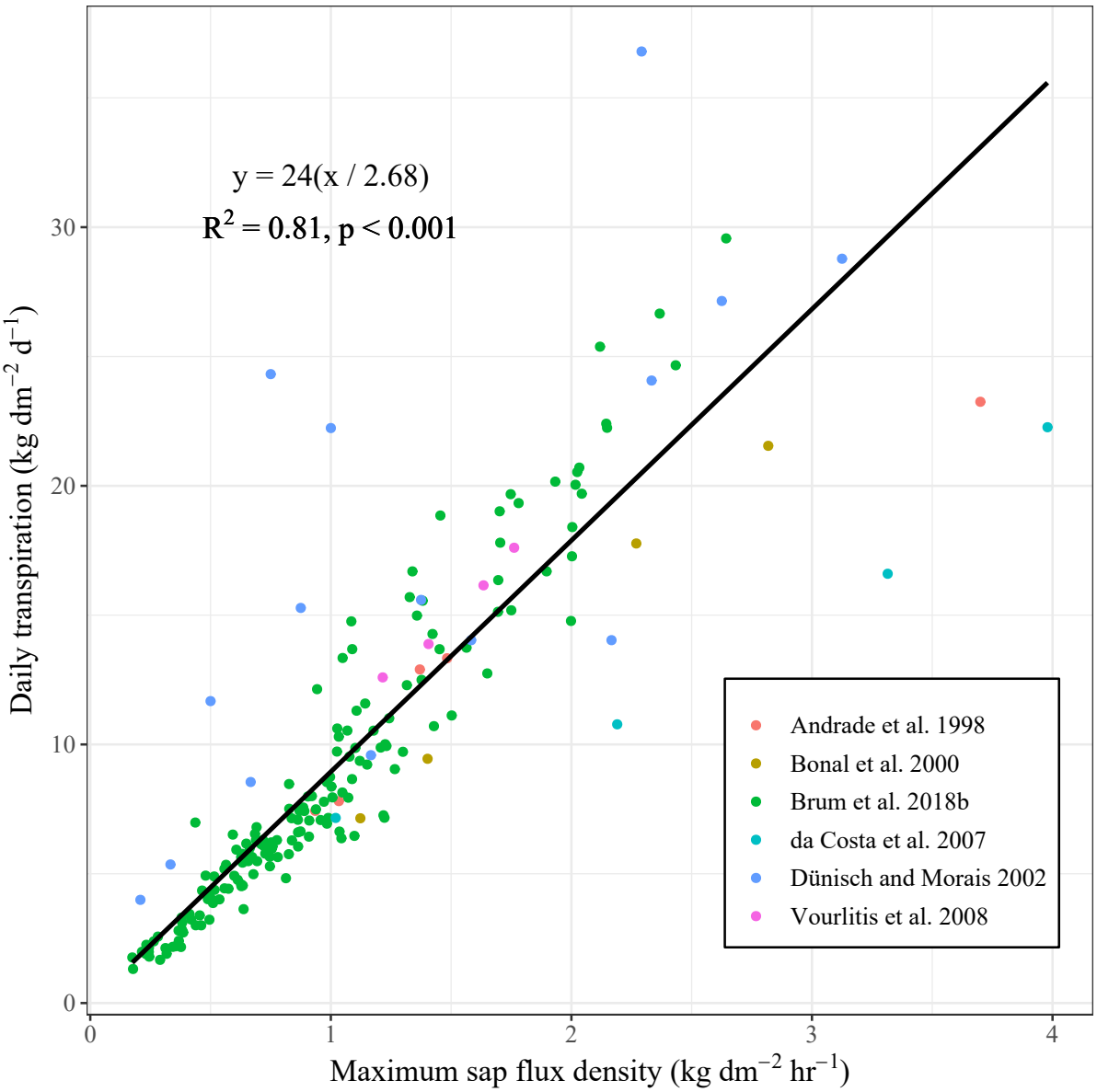

Figure S1: Relationship between daily transpiration and maximum daily sap flux density. Maximum daily sap flux density was divided by a fitted parameter (2.68) to derive average daily sap flux density and then multiplied by 24 hours to calculate daily transpiration.

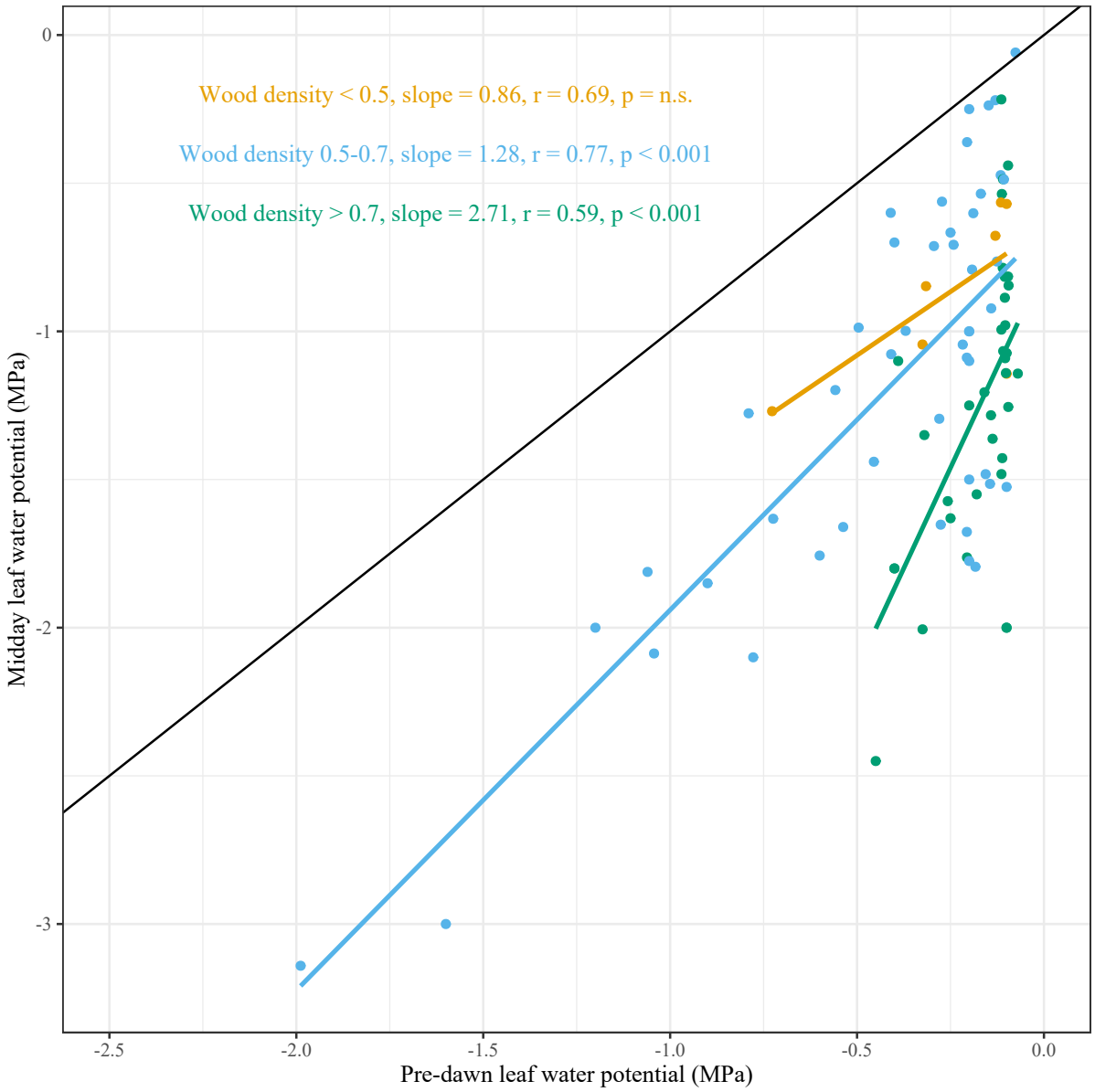

Figure S2: Relationships between pre-dawn leaf water potential and midday leaf water potential across neotropical tree species. The data was averaged by study, site and the date of measurement and grouped into three classes of varying wood density. Following Martinez-Vilalta et al. (2014) low wood density (< 0.5 g cm^{-3}) tree species in our meta-analysis show partly isohydric behaviour as the slope of the relationship between pre-dawn and midday leaf water potential is large than 0 but smaller than 1. Intermediate wood density species show strict anisohydric behaviour (slope ~ 1) and high wood density species (> 0.75 g cm^{-3}) show extreme anisohydric behaviour (slope > 1).

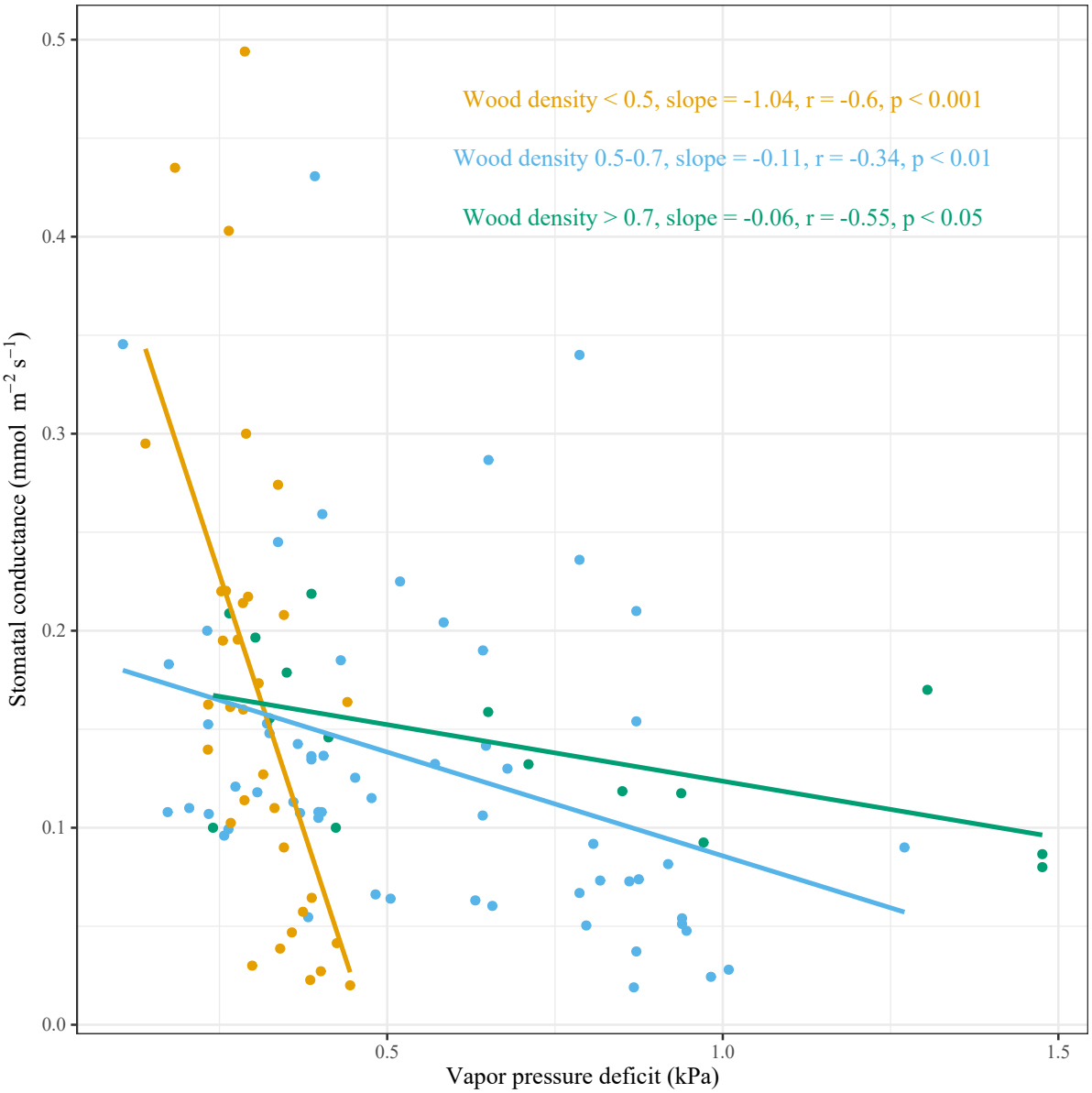

Figure S3: Relationships between stomatal conductance and atmospheric vapor pressure deficit across neotropical tree species. The data was averaged by study, site and the date of measurement and grouped into three classes of varying wood density.

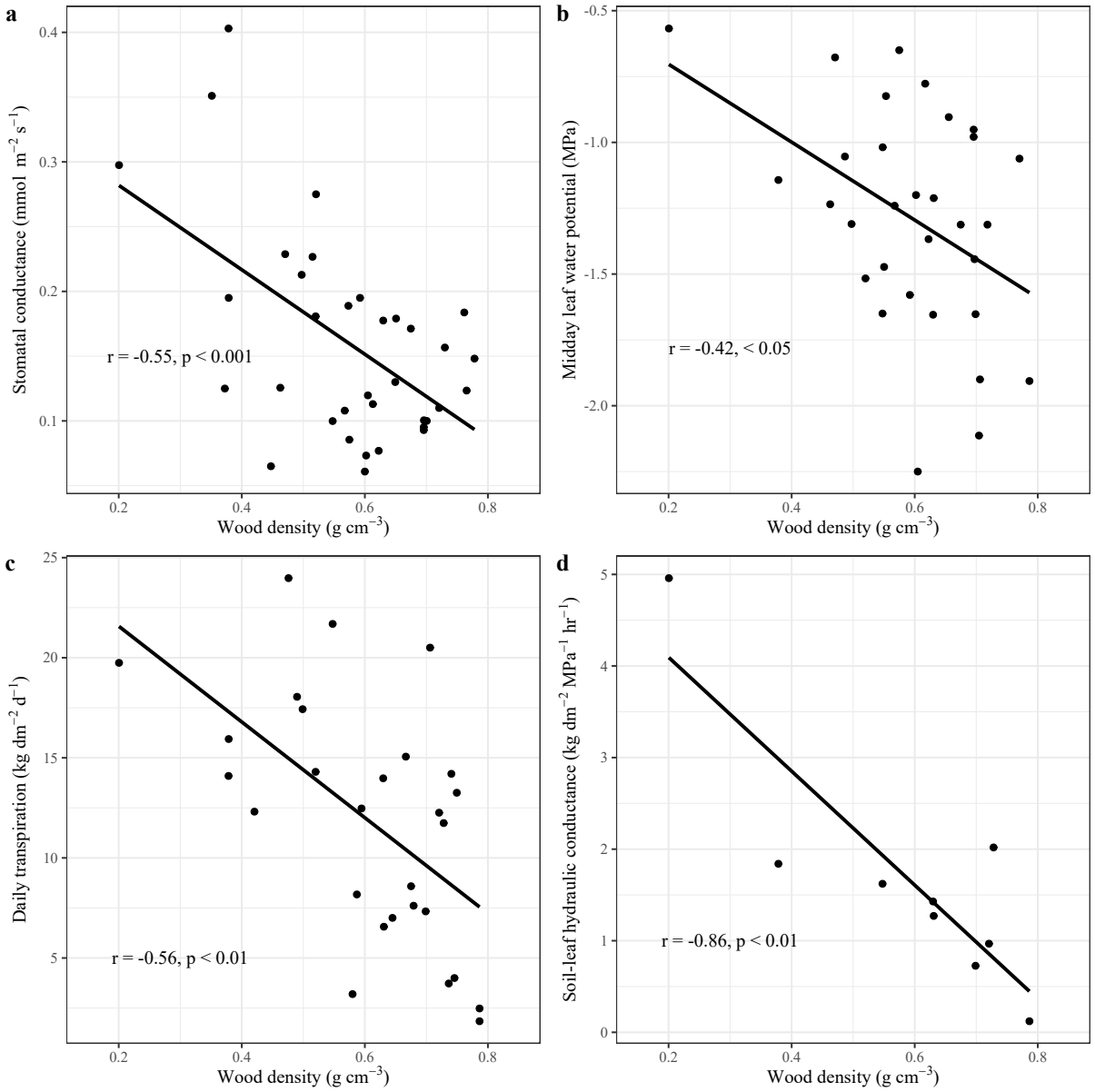

Figure S4: Relationships between study-averaged wood density and study-averaged measures of plant performance. Studies that measured low wood density tree species show high stomatal conductance, leaf water potential, daily transpiration and soil-leaf hydraulic conductance compared to studies that measured high wood density tree species.

References

Andrade, J. L., Meinzer, F. C., Goldstein, G., Holbrook, N. M., Cavelier, J., Jackson, P. and Silvera, K.: Regulation of water flux throught trunks, branches,and leaves in trees of a lowland tropical forest, Oecologia, 115, 463–471, 1998.

Bonal, D., Barigah, T. S., Granier, A. and Guehl, J. M.: Late-stage canopy tree species with extremely low δ13C and high stomatal sensitivity to seasonal soil drought in the tropical rainforest of French Guiana, Plant, Cell Environ., 23(5), 445–459, doi:10.1046/j.1365-3040.2000.00556.x, 2000.

Brum, M., López, J. G., Asbjornsen, H., Licata, J., Pypker, T., Sanchez, G. and Oiveira, R. S.: ENSO effects on the transpiration of eastern Amazon trees, Philos. Trans. R. Soc. B Biol. Sci., 373(1760), doi:10.1098/rstb.2018.0085, 2018.

Da Costa, R. F., Da Silva, V. D. P. R., Ruivo, M. L. P., Meir, P., Costa, A. C. L., Malhi, Y. S., Braga, A. P., Gonçalves, P. H. L., Silva, J. D. A. and Grace, J.: Transpiration in large size species in Caxiuanã National Forest, in the State of Pará, Brazil, Rev. Bras. Eng. Agric. e Ambient., 11(2), 180–189, doi:10.1590/S1415-43662007000200008, 2007.

Dünisch, O. and Morais, R. R.: Regulation of xylem sap flow in an evergreen , a semi-deciduous , and a deciduous Meliaceae species from the Amazon, Trees-Structure Funct., 16(6), 404–416, doi:10.1007/s00468-002-0182-6, 2002.

Martínez-Vilalta, J., Poyatos, R., Aguadé, D., Retana, J. and Mencuccini, M.: A new look at water transport regulation in plants, New Phytol., 204(1), 105–115, doi:10.1111/nph.12912, 2014.

Vourlitis, G. L., De Souza Nogueira, J., De Almeida Lobo, F., Sendall, K. M., De Paulo, S. R., Antunes Dias, C. A., Pinto, O. B. and De Andrade, N. L. R.: Energy balance and canopy conductance of a tropical semi-deciduous forest of the southern Amazon Basin, Water Resour. Res., 44(3), 1–14, doi:10.1029/2006WR005526, 2008.