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LCE: Leaf carbon exchange dataset for tropical, temperate, and boreal species of North and Central America

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Abstract. Leaf canopy carbon exchange processes, such as photosynthesis and respiration, are substantial components of the global carbon cycle. Climate models base their simulations of photosynthesis and respiration on an empirical understanding of the underlying biochemical processes, and the responses of those processes to environmental drivers. As such, data spanning large spatial scales are needed to evaluate and parameterize these models. Here, we present data on four important biochemical parameters defining leaf carbon exchange processes from 626 individuals of 98 species at 12 North and Central American sites spanning ~53° of latitude. The four parameters are the maximum rate of Rubisco carboxylation (V_{cmax}), the maximum rate of electron transport for the regeneration of Ribulose-1,5,-bisphosphate (J_{max}), the maximum rate of phosphoenolpyruvate carboxylase carboxylation (V_{pmax}), and leaf dark respiration (R_d). The raw net photosynthesis by intercellular CO_2 (A/C_i) data used to calculate V_{cmax}, J_{max}, and V_{pmax} rates are also presented. Data were gathered on the same leaf of each individual (one leaf per individual), allowing

for the examination of each parameter relative to others. Additionally, the dataset contains a number of covariates for the plants measured. Covariate data include (a) leaf-level traits (leaf mass, leaf area, leaf nitrogen and carbon content, predawn leaf water potential), (b) plant-level traits (plant height for herbaceous individuals and diameter at breast height for trees), (c) soil moisture at the time of measurement, (d) air temperature from nearby weather stations for the day of measurement and each of the 90 days prior to measurement, and (e) climate data (growing season mean temperature, precipitation, photosynthetically active radiation, vapor pressure deficit, and aridity index). We hope that the data will be useful for obtaining greater understanding of the abiotic and biotic determinants of these important biochemical parameters and for evaluating and improving large-scale models of leaf carbon exchange.

Key words: Photosynthesis, respiration, leaf carbon exchange, soil moisture, climate, temperature, precipitation, leaf traits, Vcmax, Jmax, DBH, LMA.

The metadata and data sets are available online at Supporting Information to this article at [*to be completed at proof stage*]. All data can also be accessed via GitHub at https://doi.org/10.5281/zenodo.826930 where users can report feedback and updated data can be released.

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