

NET CARBON DIOXIDE AND WATER FLUXES OF GLOBAL TERRESTRIAL ECOSYSTEMS, 1969-1998

Summary:

The variability of net surface carbon assimilation (A_{smax}), net ecosystem surface respiration (R_{smax}), and net surface evapotranspiration (E_{tsmax}) among and within vegetation types was examined on the basis of a review of studies performed in either a micrometeorological setting or an enclosure setting. The majority of studies involved forests and C3 crops, particularly in the northern hemisphere; however, studies on tropical forests, C4 grasslands or wetlands were included. Data are presented for 133 published studies, although individual studies may not have measure all variables of interest.

Despite large variations within a vegetation type, enclosure studies tended to give highest A_{smax} rates in comparison with studies using micrometeorological techniques (Buchmann and Schulze 1999). Excluding enclosure studies, the investigators tested the effect of stand age and leaf area index (LAI) on net ecosystem gas exchange. The results from these analyses illustrate where gaps in scientific knowledge exist and how ecosystem properties affect the capacity of net ecosystem gas exchange.

The information was collected from papers with publication dates from 1969 to 1998. Mean maximum flux rates for the period chosen by the authors were used instead of absolute maximum values for flux rates. Positive values stand for CO_2 uptake by the vegetation and negative values represent CO_2 release from the ecosystem. More information about the compilation can be found in Buchmann and Schultze (1999) or the individual studies cited in the data table.

Data Citation:

Cite this data set as follows:

Buchmann, N., and E.-D. Schulze. 2003. Net Carbon Dioxide and Water Fluxes of Global Terrestrial Ecosystems, 1969-1998. Data set. Available on-line [<http://www.daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. [doi:10.3334/ORNLDAAAC/662](https://doi.org/10.3334/ORNLDAAAC/662).

References:

Buchmann, N., and E.-D. Schulze. Net CO_2 and H_2O fluxes of terrestrial ecosystems. 1999. *Global Biogeochemical Cycles* 13:3:751-760.

Data Format:

The Oak Ridge National Laboratory Distributed Active Archive Center (ORNL DAAC) for Biogeochemistry Dynamics organized and formatted these data for long-term archive.

The data file of 133 study sites includes 110 micrometeorological studies and 23 enclosure studies. The type of study (micrometeorological or enclosure) and classification of the ecosystem given by Buchmann were added to each entry. Also, for the geographic coordinates, S and W directions were given negative values, and N and E were given positive values.

The geographic coordinates given in the list should be used with caution because of inconsistency in reporting. The values appear to be decimal degrees, but it appears that sometimes the minutes of the location were rounded and used as the decimal part of the coordinate; i.e., coordinates for the Tennessee site are 35.6° N and 84.2° W. The most probable corresponding site in the FLUXNET network is Walker Branch Watershed, which has coordinates of 35° 57' 31.56 N and 84° 17' 14.76 W and the more precise decimal degrees of 35.9587 and -84.2874.

Data file of CO₂ and H₂O Fluxes

net_co2_h2o_table.csv or **net_co2_h2o_table.txt**: (ASCII tab-delimited file). Missing values set to -9999.

Variables	Description
Study_Type	Type of study
Classification	Ecosystem: Broad-leaved forests, C3 crops, C3 grasslands, C3/C4 savanna, C4 crops, C4 grasslands, Coniferous forests, Salt marsh, Tropical forests, or Tundra
Vegetation	Vegetation type or area e.g. picea sitkosis, pinus sylvestris, bog fen, etc.
Location	Country and/or city
Latitude	Latitude (please see caution in Data Format description)
Longitude	Longitude (please see caution in Data Format description)
LAI_max	Maximum canopy leaf area index (LAI)
Height	Maximum canopy height [m]
Age	Stand age [years]
Time	Time of year
Asmax	Net maximum surface assimilation of carbon [mmol] [m ⁻²] [s ⁻¹]
Rsmax	Net maximum ecosystem respiration of carbon [mmol] [m ⁻²] [s ⁻¹]
Gsmax	Ecosystem surface conductance values [mm] [s ⁻¹]
Etsmax	Net maximum daytime evapotranspiration [mm] [d ⁻¹]
Reference	Numbered reference that can be found in the companion reference file. Stars (*) denote unpublished data or manuscript in preparation at time of publication (1999).

Companion Reference File for Data

net_co2_h2o_references.txt: (also .pdf and .rtf formats)

Text file with references cross-referenced by citation number to data file.

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