
CO₂ CARBON ISOTOPE RATIOS AT THE NIWOT RIDGE AMERIFLUX SITE
Release 2.3 Jan 14, 2010

Principal Investigator (primary contact regarding these data):

Dr. Dave Bowling
Dept. of Biology
257 South 1400 East
University of Utah
Salt Lake City, UT, 84112-0820
(801)-581-2130
bowling@biology.utah.edu

This research was supported by

- 1) Office of Science (BER), U. S. Department of Energy, Grant No. DE-FG02-04ER63904
- 2) National Science Foundation grant DEB 0743251
- 3) University of Utah

Data were collected using a tunable diode laser absorption spectrometer as described in these publications (the first group is most relevant, the second group includes papers from a preliminary experiment at Niwot Ridge in 2003, and an instrumentation paper):

- Schaeffer SM, Miller JB, Vaughn BH, White JWC, Bowling DR (2008) Long-term field performance of a tunable diode laser absorption spectrometer for analysis of carbon isotopes of CO₂ in forest air, *Atmospheric Chemistry and Physics*, 8:5263–5277.
- Bowling DR, Burns SP, Conway T, Monson R, White JWC (2005) Extensive observations of CO₂ carbon isotope content in and above a high-elevation subalpine forest, *Global Biogeochemical Cycles*, 19, GB3023, doi:10.1029/2004GB002394.
- Schaeffer SM, Anderson DE, Burns SP, Monson RK, Sun J, Bowling DR (2008) Canopy structure and atmospheric flows in relation to the $\delta^{13}\text{C}$ of respired CO₂ in a subalpine coniferous forest, *Agricultural and Forest Meteorology*, 148:592-605.
- Zobitz JM, Keener JP, Schnyder H, Bowling DR (2006) Sensitivity analysis and quantification of uncertainty for isotopic mixing relationships in carbon cycle research, *Agricultural and Forest Meteorology*, 136:56-75.
- Zobitz JM, Burns SP, Ogee J, Reichstein M, Bowling DR (2007) Partitioning net ecosystem exchange of CO₂: comparison of a Bayesian/isotope approach to environmental regression methods, *Journal of Geophysical Research*, 112, G03013, doi:10.1029/2006JG000282.
- Zobitz JM, Burns SP, Reichstein M, Bowling DR (2008) Partitioning net ecosystem carbon exchange and the carbon isotopic disequilibrium in a subalpine forest. *Global Change Biology*, 14, 1785-1800.
- Bowling DR, Sargent SD, Tanner BD, and Ehleringer JR (2003) Tunable diode laser absorption spectroscopy for stable isotope studies of ecosystem-atmosphere CO₂ exchange, *Agricultural and Forest Meteorology*, 118, 1-19.

Data Version History:

Version 1: released May 2007

2003 data used in Bowling et al. (2005), Schaeffer et al. (2008), and Zobitz et al. (2006, 2007)

Version 2: released Jan 2008, includes 2003 data from ver 1 (unchanged) and 2005-2007 data from version 2.

Version 2.1 – 2.2

Shared with a few interested colleagues.

Version 2.3

Released Jan 2010. New time stamp format used. Period of record Sept 2005 – end of 2010. Includes 2003 data from ver 1 (unchanged).

POLICY REGARDING USE OF THIS DATA

(This is primarily the data-sharing policy of the National Oceanic and Atmospheric Administration, Global Monitoring Division, Carbon Cycle Greenhouse Gases Group, with which we are not affiliated. However, we have adopted their policy and they deserve credit for the text below.)

We reserve the right to modify this data in the future (for example, unknown new corrections may be required). Changes will be posted to data website.

These data are made freely available to the public and the scientific community in the belief that their wide dissemination will lead to greater understanding and new scientific insights. The availability of these data does not constitute publication of the data. We rely on the ethics and integrity of the user to assure that we receive fair credit for our work. If the data are obtained for potential use in a publication or presentation, Dave Bowling should be informed at the outset of the nature of this work. If the data are essential to the work, or if an important result or conclusion depends on our data, co-authorship or acknowledgement in publications may be appropriate. This should be discussed at an early stage in the work. Manuscripts using our data should be sent to Dave Bowling for review before they are submitted for publication so we can ensure that the quality and limitations of the data are accurately represented.

Use of these data implies an agreement to reciprocate. Laboratories making similar measurements agree to make their own data available to the general public and to the scientific community in an equally complete and easily accessible form. Modelers are encouraged to make available to the community, upon request, their own tools used in the interpretation of the data, namely well documented model code, transport fields, and additional information necessary for other scientists to repeat the work and to run modified versions. Model availability includes collaborative support for new users of the models.

Every effort is made to produce the most accurate and precise measurements possible. However, we reserve the right to make corrections to the data based on recalibration of standard gases or for other reasons deemed scientifically justified. We are not responsible for results and conclusions based on use of these data without regard to this warning.

DATA DESCRIPTION AND FILE FORMATS

VER1: Data for 2003 did not change in the version 2.x releases. Relevant files:

- data policy ver1.doc
- 2003_Niwot_TDL_data_6min_v1.txt

VER2: Relevant files:

- data policy ver 2.3 100114.doc (this file)
- Niwot_TDL_data_30min_v2_3_100114.txt
- Niwot_read_data_v2_3.m

VER2 files are comma-delimited text files, one file for the period Sept 2005-Dec 31 2009. There may be up to 9 heights measured during a given measurement cycle, including these heights above ground:

0.1, 0.5, 1.0, 2.0, 5, 7, 9, 11, and 21.5 m

The 21.5m height is co-incident with the eddy covariance measurement height on the AmeriFlux tower (PI Russ Monson, University of Colorado). During 2003, a complete cycle (all heights) was measured every 6 minutes, during 2005 and later, a complete cycle was measured every 10 minutes.

Data from 2003 represent measurements every 6 minutes, and the time stamp represents the middle of the 6-minute measurement period.

Data from 2005-2009 are 30-min means of the 10-minute measurements. Time stamps represent the beginning of the 30-minute (or 10-minute) period. Earlier versions of this documentation file (081022) listed this incorrectly as the middle.

Ver 2.3 data can be read by the matlab file Niwot_read_data_v2_3.m

The period of record is:

- 2003, day 184 to day 289
- 2004, no data
- 2005, day 257 to day 365
- 2006, day 1 to day 365
- 2007, day 1 to day 365
- 2008, day 1 to day 366 (leap year)
- 2009, day 1 to day 365

Data files have the following columns, in order:

- Decimal day (continuous, relative to 2006, Jan 1 2006 at midnight = day 1.0)
- Year
- Month
- Day of month
- Hour
- minute
- CO2 21.5m (ppm)
- CO2 11m
- CO2 9m
- CO2 7m
- CO2 5m
- CO2 2m
- CO2 1m
- CO2 0.5m
- CO2 0.1m
- d13C 21.5m (permil)
- d13C 11m
- d13C 9m

d13C 7m
d13C 5m
d13C 2m
d13C 1m
d13C 0.5m
d13C 0.1m

Missing data are indicated by NaN.