Tall tower N2O data

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Data Fair Use Policy

http://ameriflux.lbl.gov/data/data-policy/

Revised July 2017

\*added TGA status filter\*

%Details regarding the measurement and calibration of the tall tower n2o data

can found here:

"Reconciling the differences between top-down and bottom-up estimates of nitrous oxide emissions for the US Corn Belt",

T.J. Griffis, X. Lee, J.M. Baker, M.P. Russelle, X. Zhang, R. Venterea, and D.B. Millet

(Global Biogeochemical Cycles, 2013, 27, 746-754, doi: 10.1002/gbc.20066)

As of July 2017 we have added the following details:

**Tall tower nitrous oxide observations**

Tall tower N2O mixing ratios were measured using a tunable diode laser technique (TGA100, Campbell Scientific Inc., Logan, Utah, USA). The TDL measured N2O at wavenumber 2243.760 cm−1. The TDL was maintained at the base of the tall tower in a temperature-controlled radio communications building. Calibrations were performed hourly with standards traceable to the NOAA-ESRL (National Oceanic and Atmospheric Administration - Earth System Research Laboratory) 2006A N2O mole fraction scale. The NOAA-ESRL gold standard (Standard Cylinder #CA07980) has a mixing ratio (mean ± 1 standard deviation) of 324.30 ± 0.09 ppb as determined by NOAA-ESRL). The hourly precision of the tall tower calibration measurements was calculated from Allan variance analysis of working standards and was 0.50 ppb (16).

Air from the tall tower was sampled from inlets at approximately 32, 56, 100, and 185 m. Air was pulled continuously through each of the inlets using a flow rate in excess of 15 SLPM to the base of the tower and then sub-sampled at 3 SLPM using a custom designed manifold. The air sampling and calibration consisted of the following sampling sequence where each inlet was sampled for 15 s: ultra zero air; CO2 span 1; N2O span; CO2 span 2; 185 m inlet; 100 m inlet; 56 m inlet; and 32 m inlet. The air samples were dried prior to analysis using a Nafion dryer. All of the calibrated data were then block averaged into hourly values. The hourly values were filtered using a basic low pass/high pass filter and subsequent wavelet decomposition (described below). Extreme N2O outliers are defined as > 360 ppb or < 315 ppb. Further, any hourly periods with the TGA100 system reporting a status error were filtered. The TGA100 error status usually indicates that the laser was not locked onto the target absorption line.

A basic low pass/high pass filter for N2O and CO2 have been used to quality control these data. These thresholds could be tightened further, but provide a very good first level of filtering

Additional filtering using wavelet analyses is also provided. Here, we used the Haar wavelet to decompose the original N2O signal into low-pass filtered coefficients and high-pass filtered details using level 1 through level 6 decomposition. All analyses were performed using the *wavedec* function available in the MATLAB Wavelet Toolbox (MATLAB, R2013b The Mathworks Inc., MA, USA). The wavelet filtered data A1 through A6 are also provided here.

The data represent hourly averages (LOCAL STANDARD TIME)

Column 1 = decimal day of year

column 2 = N2O mixing ratio ppb (hourly average value measured at 100 m basic filtering)

column 3 = N2O mixing ratio ppb (hourly average value measured at 100 m wavelet filtering A1)

column 4 = N2O mixing ratio ppb (hourly average value measured at 100 m wavelet filtering A2)

column 5 = N2O mixing ratio ppb (hourly average value measured at 100 m wavelet filtering A3)

column 6 = N2O mixing ratio ppb (hourly average value measured at 100 m wavelet filtering A4)

column 7 = N2O mixing ratio ppb (hourly average value measured at 100 m wavelet filtering A5)

column 8 = N2O mixing ratio ppb (hourly average value measured at 100 m wavelet filtering A6)

All mixing ratio data are calibrated against CMDL traceable standards each hour

Data are provided in text (tab delimited) format.