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Started: 6/3/2014

Last Update: 12/11/2015

Data Acknowledgement:

See www.arm.gov/publications/procedures

All instruments and the platform were provided with funds from the American Recovery and Reinvestment Act.

Program: GoAmazon IOP which for MAOS was conducted at the T3 site near Manacapuru, Amazonia, Brazil beginning ~2/1/2014 and concluding on 12/1/2015.

Platform: The MAOS-C (Mobile Aerosol Observing System-Chemistry).

These file(s) contain(s) the met data measured in MAOS-A (Mobile Aerosol Observing System-Aerosol). Data are reported at 10-s resolution. All zero, calibration and non-operational periods have been removed (empty field or NAN).

Instrument: These files contain the oxides of nitrogen measurements made with a custom assembled analyzer designed and assembled by Air Quality Design (<http://www.airqualitydesign.com>). The analyzer is based on two commercial oxides of nitrogen detectors made by Thermo Scientific (Model 42i TLE) and heavily modified by AQD. An external, temperature controlled inlet box is mounted at 10-m AGL and contains both a research grade, LED photolysis cell for converting NO2 to NO and a heated molybdenum converter for converting total NOy (all odd nitrogen species - NO, NO2, HNO3, aerosol NO3-, RNO3 and PAN but not HONO) into NO. One channel (leading from the photolysis cell to one 42i TLE) alternates at 1-min intervals between NO and NOx by switching the LED photoloysis cell on/off. The other channel (leading form the Mo converter to the second 42i TLE) is unswitched and measures total NOy. The Model 42i’s internally measure zero based on prereaction of the sample with ozone. Instrument response is measured by addition of NO in zero air at the sampling point (10-m). Converter efficiency is measured with standard gas-phase titration of the NO standard to NO2. On alternate days an HNO3 source is sampled. The calibration unit is a Thermo Scientific Model 146i calibrator with GPT and permeation oven.

Because the NO/NOx channel alternates between two modes and there is some dead time during the mode transition due to hydrodynamic broadening, the data are only reported for the valid periods of each mode. In order to calculate [NO2], the [NO] signal is subtracted from the [NOx] signal and then the photolysis conversion efficiency is applied. This can cause wildly incorrect NO2 values when the signal is changing rapidly.

No corrections have been made for ambient ozone or peroxy radical affects on the NO2 channel. No study has been made of water vapor effects on sensitivity.

File Structure:

As follows convention, data are reported as tab-delimited ASCII files. Files are formatted such that they are self documenting. For each data row:

Row 1: Filename

Row 4 (col 1 only): ARM Climate Research Facility

Row 5: SitePlatform

Row 7: Last revised date

Row 9: Instrument

Row 13: Instrument Mentor/Affiliation

Rows 14-19: Comments (operational conditions, calibrations, etc.)

Rows 21-24: Constants (usually defined in Comments)

Row 35: Column title

Row 36: Column units line 1

Row 37: Column units line 2

Row 40: First row of data

Time - Time is reported in UTC as set by an NTP server. Following convention, the time is the beginning of the period. The parameter reported at this time is the average of all points >= the time and < the next time. Data are reported at 10-s resolution. All non-operational periods have been removed (empty field or NAN).

Accuracy and Precision:

Under proper operating conditions and with close Mentor supervision, the accuracy and precision are well characterized. Under actual field conditions, the level of Operator experience, environmental and communication conditions can negatively affect the measurement uncertainty. The values provided here are Mentor best estimates under typical operating conditions.

NO – Units: ppbv. Precision: 0.01 ppbv (2 σ @ 15 s). Accuracy: greater of 0.01 ppbv or ±5%.

NOx – Units: ppbv. Precision: 0.03 ppbv (2 σ @ 15 s). Accuracy: greater of 0.03 ppbv or ±5%.

NOx – Units: ppbv. Precision: 0.05 ppbv (2 σ @ 15 s). Accuracy: greater of 0.05 ppbv or ±5%.

Note:

The photolysis cell for the NO2 channel was replaced in the previous field campaign. Unbeknownst to the Mentor or the operator, this replacement cell did not provide the expected conversion efficiency. As of 6/3/2014 it is unknown whether this performance issue was due to failure of LEDs or some other issue such as clogging. Until this problem is resolved, the NO2 values reported are both noisy and highly suspect. Some data is reported for 201402 and 201403, but no NO2 values are available for 201404

During the GoAmazon program there have been repeated power outages at the site. The NOx instrument has not recovered well from power interruptions. The site Operators put the instruments on UPS back up so they would continue operating through failures, but the instrument pumps shut off. This has complicated data analysis. The Mass Flow Meters in both TEI 42i-TLEs have failed and the pressure sensors have been erratic. Neither failure should affect the data quality as the flow to the instrument is controlled by independent Mass Flow Controllers in the inlet box. Periods of power outages have been removed from the data stream.

A review of the data on 10/08/2014, it was clear that beginning on 2014-06-13 06:38, the photolysis cell began functioning (albeit at a lower efficiency) through the replacement on 2014-08-09 16:20 when even better efficiency was achieved. Data are reported for this interim period but should be viewed with the knowledge of reduced precision and lower accuracy.

Posting History

6/3/2014 Posting to: c1.xdc.arm.gov /incoming/AOS\_QC/GoAmazon/NOx

mao\_ReadMe\_NOx.txt (This file in ASCII)

mao\_ReadMe\_NOx.docx (This file in Word)

Files of 0.1-Hz data and associated processing log files.

maomaoscs1.nox.10s.00.20140201.000000.m02.tsv

maomaoscs1. nox.10s.00.20140201.000000.m02.tsv.log.txt

maomaoscs1. nox.10s.00.20140201.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20140301.000000.m02.tsv

maomaosas1.nox.10s.00.20140301.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20140301.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20140401.000000.m02.tsv

maomaosas1.nox.10s.00.20140401.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20140401.000000.m02.tsv.plots.pdf

10/8/2014 Note: The 6/3/2014 mao\_ReadMe\_Nox incorrectly listed only 1 month of data

There were three months posted. The 6/3/2014 posting history is revised here.

Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx.txt (This file in ASCII)

mao\_ReadMe\_NOx.docx (This file in Word)

Files of 0.1-Hz data and associated processing log files.

maomaosas1.nox.10s.00.20140501.000000.m02.tsv

maomaosas1.nox.10s.00.20140501.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20140501.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20140601.000000.m02.tsv

maomaosas1.nox.10s.00.20140601.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20140601.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20140701.000000.m02.tsv

maomaosas1.nox.10s.00.20140701.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20140701.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20140801.000000.m02.tsv

maomaosas1.nox.10s.00.20140801.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20140801.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20140901.000000.m02.tsv

maomaosas1.nox.10s.00.20140901.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20140901.000000.m02.tsv.plots.pdf

11/13/2014 Note: The mao\_ReadMe\_NOx file has been rewritten slightly to correct descriptive errors. The file name convention of the ReadMe file has been revised to include the last revised date.

Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20141113.txt (This file in ASCII)

mao\_ReadMe\_NOx\_20141113.docx (This file in Word)

Files of 0.1-Hz data and associated processing log files.

maomaosas1.nox.10s.00.20141001.000000.m02.tsv

maomaosas1.nox.10s.00.20141001.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20141001.000000.m02.tsv.plots.pdf

1/18/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20150118.txt (This file in ASCII)

mao\_ReadMe\_NOx\_20150118.docx (This file in Word)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20141101.000000.m02.tsv

maomaosas1.nox.10s.00.20141101.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20141101.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20141201.000000.m02.tsv

maomaosas1.nox.10s.00.20141201.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20141201.000000.m02.tsv.plots.pdf

3/2/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20150302.txt (This file in ASCII)

mao\_ReadMe\_NOx\_20150302.docx (This file in Word)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20150101.000000.m02.tsv

maomaosas1.nox.10s.00.20150101.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150101.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20150201.000000.m02.tsv

maomaosas1.nox.10s.00.20150201.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150201.000000.m02.tsv.plots.pdf

4/21/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20150421.txt (This file in ASCII)

mao\_ReadMe\_NOx\_20150421.docx (This file in Word)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20150301.000000.m02.tsv

maomaosas1.nox.10s.00.20150301.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150301.000000.m02.tsv.plots.pdf

5/29/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20150421.txt (This file in ASCII)

mao\_ReadMe\_NOx\_20150421.docx (This file in Word)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20150401.000000.m02.tsv

maomaosas1.nox.10s.00.20150401.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150401.000000.m02.tsv.plots.pdf

6/15/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20150615.docx (This file in Word)

mao\_ReadMe\_NOx\_20150615.txt (This file in ASCII)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20150501.000000.m02.tsv

maomaosas1.nox.10s.00.20150501.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150501.000000.m02.tsv.plots.pdf

7/31/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20150731.docx (This file in Word)

mao\_ReadMe\_NOx\_20150731.txt (This file in ASCII)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20150601.000000.m02.tsv

maomaosas1.nox.10s.00.20150601.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150601.000000.m02.tsv.plots.pdf

8/20/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20150820.docx (This file in Word)

mao\_ReadMe\_NOx\_20150820.txt (This file in ASCII)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20150701.000000.m02.tsv

maomaosas1.nox.10s.00.20150701.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150701.000000.m02.tsv.plots.pdf

10/07/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20151007.docx (This file in Word)

mao\_ReadMe\_NOx\_20151007.txt (This file in ASCII)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20150801.000000.m02.tsv

maomaosas1.nox.10s.00.20150801.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150801.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20150901.000000.m02.tsv

maomaosas1.nox.10s.00.20150901.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20150901.000000.m02.tsv.plots.pdf

12/11/2015 Posting to c1.xdc.arm.gov /incoming/AOS\_QC/mao/NOx

mao\_ReadMe\_NOx\_20151211.docx (This file in Word)

mao\_ReadMe\_NOx\_20151211.txt (This file in ASCII)

Monthly files of 0.1-Hz data as a tab-delimited text file, text processing log file(s) and associated pdf time series plots.

maomaosas1.nox.10s.00.20151001.000000.m02.tsv

maomaosas1.nox.10s.00.20151001.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20151001.000000.m02.tsv.plots.pdf

maomaosas1.nox.10s.00.20151101.000000.m02.tsv

maomaosas1.nox.10s.00.20151101.000000.m02.tsv.log.txt

maomaosas1.nox.10s.00.20151101.000000.m02.tsv.plots.pdf

This concludes data for the GoAmazon IOP at the mao site