NARSTO EPA_SS_FRESNO PM2.5 Particulate Nitrate and Sulfate Data

Table of Contents:

1. Data Set Description:

This data set contains measurements taken from two nitrate monitors (Model R&P8400N) which have been operated at the Fresno Supersite from December 1, 2000 to present, and one sulfate monitor (Model R&P8400S) which has been operated at the Fresno Supersite from January 29, 2002 to present. The sample collection time for all of these instruments is 8 minutes. The sample analysis time is 2 minutes. Data are output once every 10 minutes.

The Rupprecht & Patashnick Ambient Particulate Nitrate Monitor measures the amount of particulate nitrate in an air sample at a nearly continuous rate. The ambient aerosol is collected by impaction on a small metallic strip. At the end of collection, the strip is heated to 350°C for 0.05 sec to vaporize and decompose the particulate nitrate into oxides of nitrogen (NOX), which is then measured with a chemiluminescent NOX analyzer. This determines the amount of nitrate in the collected sample. Ammonium ions remain unaffected at this temperature and so are not detected. Prior to particle collection, the sampled air passes through a PM2.5 sharp cut cyclone to remove larger particles from the air stream and a charcoal denuder to remove acidic gases. The resulting air stream is then humidified to increase the diameter of the small particles and the collection efficiency of the impactor. The flow rate of the nitrate sample is controlled by a critical orifice at 1 l/min as is a bypass flow at 4 l/min. The concentration of the nitrate in the aerosol sample is determined from the NOX concentration, the flow rates of the sample and analysis phases, and the times of sample collection and analysis and is expressed as concentration at ambient temperature and pressure conditions.

The Rupprecht & Patashnick Ambient Particulate Sulfate Monitor, model 8400S, measures the amount of particulate sulfate in an air sample at a nearly continuous rate. The ambient aerosol is collected by impaction on a small metallic strip. At the end of collection, the strip is heated to 600°C for 0.05 sec to vaporize and decompose the particulate sulfate into sulfur dioxide, which is then measured with a pulsed fluorescence sulfur dioxide analyzer. This determines the total amount of sulfur in the collected sample, which in most situations is largely sulfate. Prior to particle collection, the sampled air passes through a PM2.5 sharp cut cyclone to remove larger particles from the air stream and a charcoal denuder to remove acidic gases. The resulting air stream is then humidified to increase the diameter of the small particles and the collection efficiency of the impactor. The flow rate of the sulfate sample is controlled by a critical orifice at 1 l/min as is a bypass flow at 4 l/min. The concentration of the aerosol is determined from the amount of sulfur collected, the flow rates of the sample and analysis phases, and the time of sample collection and analysis and is expressed as concentration at ambient temperature and pressure conditions.

The **Fresno Supersite** is one of several Supersites that was established in urban areas within the United States by the U.S. Environmental Protection Agency (EPA) to better understand the measurement, sources, and health effects of suspended particulate matter (PM). The site is located at 3425 First St., approximately 1 km north of the downtown commercial district. First Street is a four-lane artery with moderate traffic levels. Commercial establishments, office buildings, churches, and schools are located north and south of the monitor. Medium-density single-family homes and some apartments are located in the blocks to the east and west of First Street. The Fresno Supersite began operation in May of 1999 and continues today. More information can be found in the Quality Assurance Project Plan (PDF).

The U.S. EPA Particulate Matter (PM) Supersites Program was an ambient air monitoring research program from 1999-2004 designed to provide information of value to the atmospheric sciences, and human health and exposure research communities. Eight geographically diverse projects were chosen to specifically address these EPA research priorities: (1) to characterize PM, its constituents, precursors, co-pollutants, atmospheric transport, and its source categories that affect the PM in any region; (2) to address the research questions and scientific uncertainties about PM source-receptor and exposure-health effects relationships; and (3) to compare and evaluate different methods of characterizing PM including testing new and emerging measurement methods. Data collected by these projects are publicly available at the NARSTO Permanent Data Archive, NASA Langley DAAC. Data users should acknowledge the U.S. EPA Particulate Matter (PM) Supersites Program and the project investigator(s) listed below.

The data set should be cited as follows:
Watson, John G. and Judith C. Chow. 2006. NARSTO EPA_SS_FRESNO PM2.5 Particulate Nitrate and Sulfate Data. Available on-line via NARSTO Data and Informaton at the Atmospheric Science Data Center at NASA Langley Research Center, Hampton, Virginia, U.S.A.

2. Sample Data Record/Data Format:

Data files are in the NARSTO Data Exchange Standard (DES) format that is described in detail on the NARSTO Quality Systems Science Center (QSSC) web site. The files follow a tabular layout and are stored as ASCII comma-separated values files (.csv). The DES does not rely on row position to identify specific information, but uses a tag to describe the information contained in the row. The DES is a self-documenting format with three main sections: the header contains information about the contents of the file and the data originator; the middle section contains metadata tables that describe/define sites, flags, and other codified fields; and the final section is the main data table that contains key sampling and analysis information and the data values. Descriptions of the standardized metadata fields are also available on the QSSC web site.

Quality Control Level

The Quality Control (QC) Level is a number that indicates the overall quality of the data in the main table of the DES formatted files. The *QUALITY CONTROL LEVEL key phrase is located in the first few rows of the DES formatted data file. A short description of the QC level appears in parentheses after the number. As data usage and analyses progress, the Principal Investigator can upgrade the data to a higher QC level than originally submitted. The QC level and effective date for each data file are included in the following table.

Time-Series Plots

Time-series plots are included for all of the numeric variables in each of the data files. These plots are useful for screening for outliers and visualization of values less than the detection limit and values with other quality flags. Please note that some but not all of the plots were visually examined for possible outliers and other issues. Links to the plots for each data file are included in the following table.

Data File	QC Level (Efffective Date)	Links to Time-Series Plots (PDF)
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20001012_20001231_V1.csv	2 (20060830)	View 20001012_20001231
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20010101_20011231_V1.csv	2 (20060830)	View 20010101_20011231
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20020101_20021231_V1.csv	2 (20060830)	View 20020101_20021231
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20030101_20031231_V1.csv	2 (20060830)	View 20030101_20031231
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20040101_20040630_V1.csv	2 (20060830)	View 20040101_20040630
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20040701_20041231_V1.csv	2 (20060830)	View 20040701_20041231
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20050101_20050630_V1.csv	2 (20060830)	View 20050101_20050630
NARSTO_EPA_SS_FRESNO_RP8400N1_10MIN_20050701_20051231_V1.csv	1 (20060830)	View 20050701_20051231
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20001012_20001231_V1.csv	2 (20060830)	View 20001012_20001231
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20010101_20011231_V1.csv	2 (20060830)	View 20010101_20011231
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20020101_20021231_V1.csv	2 (20060830)	View 20020101_20021231
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20030101_20031231_V1.csv	2 (20060830)	View 20030101_20031231
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20040101_20040630_V1.csv	2 (20060830)	View 20040101_20040630
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20040701_20041231_V1.csv	2 (20060830)	View 20040701_20041231
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20050101_20050630_V1.csv	2 (20060830)	View 20050101_20050630
NARSTO_EPA_SS_FRESNO_RP8400N2_10MIN_20050701_20051231_V1.csv	1 (20060830)	View 20050701_20051231
NARSTO_EPA_SS_FRESNO_RP8400S_10MIN_20020129_20021231_V1.csv	2 (20060830)	View 20020129_20021231

NARSTO_EPA_SS_FRESNO_RP8400S_10MIN_20030101_20031231_V1.csv	2 (20060830)	View 20030101_20031231
NARSTO_EPA_SS_FRESNO_RP8400S_10MIN_20040101_20040630_V1.csv	2 (20060830)	View 20040101_20040630
NARSTO_EPA_SS_FRESNO_RP8400S_10MIN_20040701_20041231_V1.csv	2 (20060830)	View 20040701_20041231
NARSTO_EPA_SS_FRESNO_RP8400S_10MIN_20050101_20050331_V1.csv	2 (20060830)	View 20050101_20050331
NARSTO_EPA_SS_FRESNO_RP8400S_10MIN_20050401_20051231_V1.csv	1 (20060830)	View 20050401_20051231

3. References:

- Watson, J.G.; Chow, J.C. A wintertime PM2.5 episode at the Fresno, CA, supersite; Atmos. Environ. 2002, 36(3), 465-475.
- Watson, J.G.; Chow, J.C.; Bowen, J.L.; Lowenthal, D.H.; Hering, S.V.; Ouchida, P.; Oslund, W. Air quality measurements from the Fresno supersite; JAWMA 2000, 50(8), 1321-1334.
- Watson, J.G.; Chow, J.C. Comparison and evaluation of in-situ and filter carbon measurements at the Fresno Supersite; J. Geophys. Res. 2002, 107(D21), ICC 3-1-ICC 3-15, doi: 10.1029/2001JD000573.
- Watson, J.G.; Chow, J.C.; Hering, S.V.; Fitz, D.R. Final report for Phase I of Fresno supersite measurements; prepared for Cooperative Institute for Atmospheric Sciences and Terrestrial Applications, Las Vegas, NV, by Desert Research Institute: Reno, NV, 2002.
- Watson, J.G.; Chow, J.C.; Lowenthal, D.H.; Stolzenburg, M.R.; Kreisberg, N.M.; Hering, S.V. Particle size relationships at the Fresno supersite; JAWMA 2002, 52(7), 822-827.
- Watson, J.G.; Chow, J.C.; Fitz, D.R. Quality assurance project plan - Fresno Supersite (Revision 0); prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, by Desert Research Institute: Reno, NV, 2000.
- Watson, J.G.; Chow, J.C. Zone of representation for the Fresno, CA supersite; JAWMA 2002, in preparation.

4. Contact Information:

Investigator(s) Name and Title:

Name: Watson, Dr. John G.
E-mail: johnw@dri.edu

Name: Chow, Dr. Judith C.
E-mail: judyc@dri.edu

Data Center:

The User and Data Services Office at the Langley Atmospheric Science Data Center is involved throughout the system to monitor the quality of data on ingest, to ensure prompt replies to user questions, to verify media orders prior to filling them, and to ensure that the needs of the users are being met.

If you have a problem finding what you need, trouble accessing the system, or need an answer to a question concerning the data or how to obtain data, please contact the Users and Data Services staff.

Telephone: (757) 864-8656
FAX: (757) 864-8807
E-mail: support-asdc@earthdata.nasa.gov
URL: http://eosweb.larc.nasa.gov

5. Acknowledgement:

When data from the Langley Atmospheric Science Data Center are used in a publication, we request the following acknowledgment be included: "These data were obtained from the NASA Langley Research Center Atmospheric Science Data Center".

The Langley Data Center requests a reprint of any published papers or reports or a brief description of other uses (e.g., posters, oral presentations, etc.) of data that we have distributed. This will help us determine the use of data that we distribute, which is helpful in optimizing product development. It also helps us to keep our product-related references current.

Please contact us at support-asdc@earthdata.nasa.gov for instructions on mailing reprints.

Document Information:

Document Creation Date: September 11, 2006
Review Date:
Last Date Modified:
Document ID: TBD
Author: Langley Data Center User and Data Services Office
Langley DAAC Help Desk: Phone (757) 864-8656; E-mail support-asdc@earthdata.nasa.gov