NARSTO EPA_SS_PITTSBURGH Rapid Single-Particle Mass Spectrometer Data

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1. Data Set Description:

During 12 months, starting September 2001, individual aerosol particles were sized and analyzed using a Rapid Single-particle Mass Spectrometer (RSMS) in Pittsburgh. RSMS aerodynamically focuses one particle size at a time to the source region of a mass spectrometer and employs a 193 nm excimer laser to desorb and ionize the particle components. The ions are analyzed in a dual time-of-flight mass spectrometer and the spectrum is digitally recorded. Spectra are only saved if the ion peak in the spectrum is above a threshold level. Background spectra were determined and flagged. Particle size scans were initiated periodically and each size was sampled until 30 particle hits were obtained, unless the sampling time became excessive. Aerodynamic particle sizes ranged from about 40 to 1300 nm and were partitioned into nine discrete size classes logarithmically spaced, roughly, over the range.

Single particle data are valuable because

a. they are collected and analyzed real time so have excellent temporal resolution,
b. the particle-to-particle composition variations (external mixing properties) can be assessed, and
c. key particle sources are easily identified since the particles retain source characteristics.

The data resulting from these measurements consist of an aerodynamic particle size and a positive and negative mass spectrum of the components for each particle, along with the date and time of measurement and other incidental measurement parameters such as the laser pulse energy. Support for RSMS measurements was provided by the EPA Supersites program and additional funding from the EPA and DOE.

More information see The Pittsburgh Air Quality Study Overview (PDF).

The data set should be cited as follows:

Wexler, Anthony S. and Murray V. Johnston. 2003. NARSTO EPA_SS_PITTSBURGH Rapid Single-Particle Mass Spectrometer Data. Available on-line via NARSTO Data and Information at the Atmospheric Science Data Canter 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.

3. References:

- Phares, D.J., K.P. Rhoads, and A.S. Wexler. 2002. Performance of a single ultrafine particle mass spectrometer. Aerosol Sci. Tech. 36:583-592.
- Phares, D.J., K.P. Rhoads, A.S. Wexler, and M.V. Johnston. 2001. Size resolved ultrafine particle composition analysis Part 2:

Houston. J. Geophys. Res. In press.
- Rhoads, K.P., D.J. Phares, A.S. Wexler, and M.V. Johnston. 2001. Size-resolved ultrafine particle composition analysis Part1: Atlanta. J. Geophys. Res. In press.

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Data Center:

The User and Data Services Office at the NASA Langley Research Center 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.

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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 NARSTO data archive maintained at the NASA Langley Research Center Atmospheric Science Data Center".

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