

NARSTO Support for Atmospheric Science Research and Data Collection Endeavors

Les A. Hook and Sigurd W. Christensen

**NARSTO Quality Systems Science Center
Oak Ridge National Laboratory, Oak Ridge, Tennessee**



2006 East Tennessee Ozone Study (ETOS) Science Workshop
Pollard Technological Conference Center
Oak Ridge, Tennessee
May 17-18, 2006

ORNL research was sponsored by the U.S. Department of Energy and performed at Oak Ridge National Laboratory (ORNL). ORNL is managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract DE-AC05-00OR22725

Welcome to NARSTO

NARSTO is a public/private alliance with members from Canada, Mexico, and the United States

Open to science and regulatory agencies, industries, academic institutions, environmental and public interest groups

Coordinates and Enhances Policy-Relevant Scientific Research and Assessment of Tropospheric Pollution

State of the Science Assessments for Ozone, Particulate Matter, and Emission Inventory Improvement

Sponsors Strategic Planning Workshops

Supported by Member Organizations "in-kind" Contributions

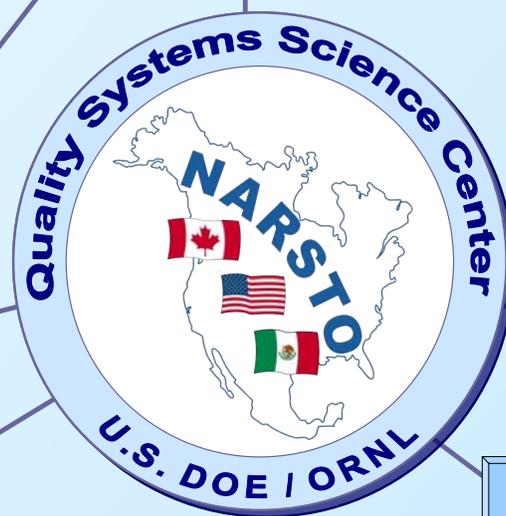
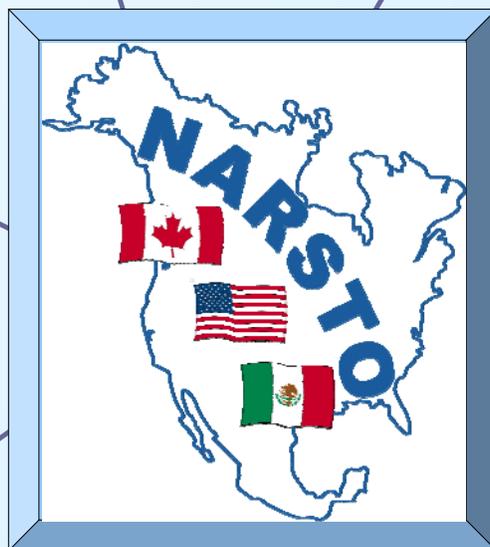
NARSTO Web Site
<http://narsto.org>

Data Archive
http://eosweb.larc.nasa.gov/PRODOCS/narsto/table_narsto.html

Quality Assurance Planning Support

Data Management Planning Support

QSSC Web Site
<http://cdiac.ornl.gov/programs/NARSTO>



New NARSTO Program Web Site

<http://narsto.org>

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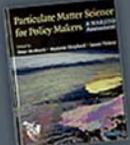
NARSTO

Better Air Quality for North America

NARSTO PRODUCTS:

- » Quality Systems Data Center
- » Permanent Data Archive
- » NARSTO Assessments

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FREE Copies Available Now!

NARSTO "Particulate Matter Assessment"

Phone: 509-542-0644
Email: [Bill Pennell](mailto:Bill.Pennell@narsto.org)



WELCOME TO THE NARSTO WEBSITE

NARSTO is a partnership among government, private industry, and research organizations in Canada, the United States and Mexico that is dedicated to improving the management of air quality in North America. [\[more \]](#)

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» **06/27/06 TO 06/30/06**
[NARSTO PM MODELING WORKSHOPS](#)

NARSTO will be hosting two back-to-back workshops on Aerosol/PM Modeling, including research and data needs for improving these models. The workshops will be held at the Millennium Harvest House Hotel in Boulder, Colorado June 27-30, 2006. [\[more \]](#)

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MEMBER PROFILE

South Coast Air Quality Management District
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FEATURED NEWS

Featured News articles are presented for information purposes. Opinions expressed in them do not necessarily represent the views of NARSTO or its members.

» **04/27/06** [Clean technology aims to rake in the green](#)

Venture capitalist John Doerr made his name and fortune with early investments in... [\[more \]](#)

» **04/27/06** [Ethanol: A Tragedy in 3 Acts](#)

Amid the current panic about gas prices many people are embracing ethanol. But that's not such a good idea [\[more \]](#)

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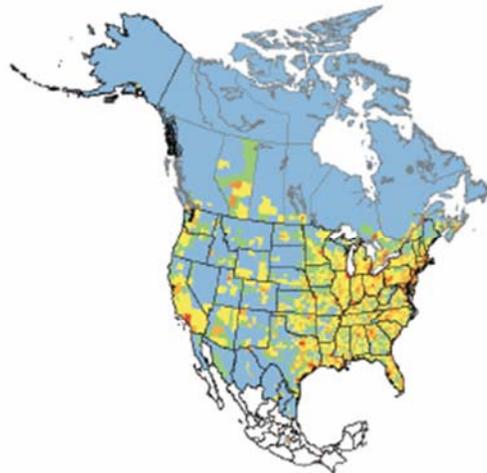
[Data Set **UPDATED**
Archiving Status](#)
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NARSTO-05-001

Improving Emission Inventories for Effective Air Quality Management Across North America



A NARSTO Assessment

Prepared by:

The NARSTO Emission Inventory Assessment Team

[Analysis Methods](#)



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Proposed Project Data Management Policy-/Guidance Documents

Data Management Policy-/Guidance Documents		Status / Contacts	Approved by / Date (yyyy/mm/dd)
>>> Organization			
DM-1	Data Flow Overview	<input type="checkbox"/>	<input type="checkbox"/>
DM-2	Data Policy Considerations	<input type="checkbox"/>	<input type="checkbox"/>
DM-3	Project Name Information	<input type="checkbox"/>	<input type="checkbox"/>
DM-4	Identifying Measurement and Sampling Sites	<input type="checkbox"/>	<input type="checkbox"/>
>>> Data and Metadata Reporting			
DM-5	Reporting Sampling and Measurement Dates and Times	<input type="checkbox"/>	<input type="checkbox"/>
DM-6	Identifying Chemical and Physical Variables and Descriptive Field Information	<input type="checkbox"/>	<input type="checkbox"/>
DM-7	Reporting Units for Chemical Variables, Particles, and Physical and Descriptive Variables	<input type="checkbox"/>	<input type="checkbox"/>
DM-8	Assigning Project-Specific and NARSTO Data Quality Flags	<input type="checkbox"/>	<input type="checkbox"/>
DM-9	Reporting and Flagging Values below Detection Limits	<input type="checkbox"/>	<input type="checkbox"/>
DM-10	Reporting Missing Data	<input type="checkbox"/>	<input type="checkbox"/>
DM-11	Reporting Uncertainty Estimates	<input type="checkbox"/>	<input type="checkbox"/>
DM-12	Reporting Conventions for Mass Measurements, Meteorological Data, and Temperature and Pressure Conditions	<input type="checkbox"/>	<input type="checkbox"/>
>>> Data Documentation and Archiving			
DM-13	Planning to Archive Data	<input type="checkbox"/>	<input type="checkbox"/>
DM-14	Creating Archive Documentation for Your Data Sets	<input type="checkbox"/>	<input type="checkbox"/>
DM-15	Creating a Searchable Index of Your Data Sets with Links to the Data Files	<input type="checkbox"/>	<input type="checkbox"/>
DM-16	Capturing Sampling and Analysis Information -- Pre- and Post-Measurement	<input type="checkbox"/>	<input type="checkbox"/>
DM-17	Defining the Quality Level of Data	<input type="checkbox"/>	<input type="checkbox"/>
>>> Data Systems Management			
DM-18	Day-to-Day Operation of Data Management Systems	<input type="checkbox"/>	<input type="checkbox"/>
DM-19	Managing Electronic and Hardcopy Format Project Records	<input type="checkbox"/>	<input type="checkbox"/>
DM-20	Data Management System and Software Configuration Control Guidelines	<input type="checkbox"/>	<input type="checkbox"/>

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Guidance Documents for NARSTO and U

Consensus Metadata Standards

[CONSENSUS METADATA STANDARD: Site Identifier](#)

[CONSENSUS METADATA STANDARD: Identifying Chemical and Physical Variables and Descriptive Metadata](#)

- [Non-chemical variables name reference table](#)
- [Chemical variables name and CAS reference table](#)
- [Variable names for chemicals without CAS numbers](#)

[CONSENSUS METADATA STANDARD: Data Quality Flags](#)

- [SS detailed flags 20010309.pdf](#)
- [SS detailed flags 20010309.csv](#)
- [SS detailed flags 20010309.xls](#)

Data Exchange Standard and Site Information Templates

[Data Exchange Standard template](#)

Data File and Data Set Naming and Archiving Guidance

[Archiving NARSTO Data Sets](#)

[Submittal of Uncertainty Estimates Memorandum](#)

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(May 2005)

Temp

	A	B	C	D	E	F
58						
59	*TABLE NAME					
60	*TABLE FOCUS	Surface--fixed				
61	*TABLE EXPLANATION OF ZERO OR NEGATIVE VALUES					
62	*TABLE EXPLANATION OF REPORTED DETECTION LIMIT VALUES					
63	*TABLE EXPLANATION OF REPORTED UNCERTAINTY					
64	*TABLE USER NOTE					
65	*TABLE USER NOTE2					
66	*TABLE KEY FIELD NAMES	Site ID: standard	Instrument co-location	Date start: local ti	Time start: local time	
67	*TABLE COLUMN NAME	Site ID: standard	Instrument co-location	Date start: local ti	Time start: local ti	Date end: local time
68	*TABLE COLUMN NAME TYPE	Variable	Variable	Variable	Variable	Variable
69	*TABLE COLUMN CAS IDENTIFIER	None	None	None	None	None
70	*TABLE COLUMN EXPLANATION OF DERIVED VARIABLE	Not applicable	Not applicable	Pending assignme	Pending assignme	Pending assignme
71	*TABLE COLUMN USER NOTE	None	None	None	None	None
72	*TABLE COLUMN USER NOTE2	None	None	None	None	None
73	*TABLE COLUMN UNITS	None	None	yyyy/mm/dd	hh:mm	yyyy/mm/dd
74	*TABLE COLUMN FORMAT TYPE	Char	Date	Time	Date	Time
75	*TABLE COLUMN FORMAT FOR DISPLAY		12	2	10	5
76	*TABLE COLUMN MISSING CODE	None	None	None	None	None
77	*TABLE COLUMN LOOKUP TABLE NAME	Site information	None	None	None	None
78	*TABLE COLUMN OBSERVATION TYPE	Supplementary data	Supplementary data	Supplementary data	Supplementary data	Supplementary data
79	*TABLE COLUMN FIELD SAMPLING OR MEASUREMENT	Not applicable	Not applicable	Pending assignme	Pending assignme	Pending assignme
80	*TABLE COLUMN PARTICLE DIAMETER--LOWER BOUND	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
81	*TABLE COLUMN PARTICLE DIAMETER--UPPER BOUND	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
82	*TABLE COLUMN PARTICLE DIAMETER--MEDIAN (UM)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
83	*TABLE COLUMN MEDIUM	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
84	*TABLE COLUMN COATING OR ABSORBING SOLUTION	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
85	*TABLE COLUMN WAVELENGTH (NM)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
86	*TABLE COLUMN WAVELENGTH--LOWER BOUND (NM)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
87	*TABLE COLUMN WAVELENGTH--UPPER BOUND (NM)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
88	*TABLE COLUMN SAMPLING HEIGHT ABOVE GROUND	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
89	*TABLE COLUMN INLET TYPE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
90	*TABLE COLUMN SAMPLING HUMIDITY OR TEMPERATURE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
91	*TABLE COLUMN LABORATORY ANALYTICAL METHOD	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
92	*TABLE COLUMN SAMPLE PREPARATION	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
93	*TABLE COLUMN BLANK CORRECTION	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
94	*TABLE COLUMN VOLUME STANDARDIZATION	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable



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Guidelines for Using Consistent Names and Units in ICARTT Format Data Files

March 16, 2006

Overview

The purpose of these guidelines is to provide a means for ICARTT data file format users to implement consistent variable names and units.

- These names and units (column headings) can be used to report measurements and metadata for various data types across multiple platforms.
- These names and units have been constructed to be "friendly" to most data user software and data systems. The combined name and unit column headings will be no longer than 30 characters.
- The chemical names are cross referenced with CAS Registry Numbers and CAS Ninth Collective Index nomenclature when applicable. Names for other chemical and physical measurement types and metadata are cross referenced with NARSTO Data Exchange Standard names. In both instances, this permits a nominal cross reference to the NARSTO DES data file format.
- Cross references to other organizational standards can be added (e.g., EPA AQS Parameters)
- These **accepted designations for names and units** of chemical and physical constituents and descriptive attributes (metadata) are maintained by the MILAGRO data management team [link]. Contact the MILAGRO data management team for assistance and to add new names and units.

Specific guidance

Please follow these links to more detailed guidance documents.

Constructing Column Headings for ICARTT format data files with accepted variable names and units:
[Column_Headings_20060208.pdf](#)

Accepted Names:

- Sampling, QC, and Metadata: [Names_sampling_qc_20060125.xls](#)
- Meteorological Measurements: [Names_meteorological_20060125.xls](#)
- Elements and Ions: [Names_element_ions_20060125.xls](#)
- Chemicals without CAS RNs: [Names_Chems_without_CAS_20060125.xls](#)
- Particle-related Measurements: [Names_particles_20060125.xls](#)
- Light and Optical Properties: [Names_optical_20060125.xls](#)
- Chemicals – Organics: [Names_chem_organics_20060202.xls](#)
- Chemicals – PCBs: [Names_chem_PCB_20060203.xls](#)
- Chemicals – Hopanes, etc.: [Names_chem_hopanes_20060203.xls](#)
- Chemicals – Co-eluting pairs: [Names_chem_co-eluting_organics_20060203.xls](#)

- **Essential Guide for Interpreting Codes used in Accepted Chemical Names**
[Names_chem_code_readme.pdf](#)

Accepted Units:

- Units Designation for all Name Types: [Units_to_append_20060125.xls](#)

Accepted designations for **names and units** of chemical and physical constituents and descriptive attributes (metadata) are maintained by the MILAGRO data management team [link]. Contact the MILAGRO data management team for assistance in adding new unit designations.

All files referenced in this document may be accessed through the
• NARSTO QSSC Web Site [<http://cdiac.ornl.gov/programs/NARSTO/>]

Guidelines for Archiving Data in the NARSTO Permanent Data Archive

May 2, 2006



Executive Summary

NARSTO archives air chemistry, meteorological, and related atmospheric data and metadata in a publicly accessible Permanent Data Archive (PDA). This document outlines how data are selected for archiving; identifies ways that Projects can foster archiving; lists items to consider when preparing data for archiving; and describes the archiving process.

Revised and Updated --

“Guidelines for Archiving Data in the NARSTO Permanent Data Archive”.

“NARSTO encourages Projects to utilize the NARSTO Data Exchange Standard (DES) format for ease of data evaluation, analyses, and sharing. In addition, we recognize that there are other widely accepted data exchange formats suitable for archiving.”

Implications?

NARSTO will encourage archiving of data in formats other than the DES that are supported by good metadata and documentation.



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Access NARSTO Data

Link to NARSTO Permanent Data Archive at Langley DAAC
Data Set Table
[...filename.htm]

Public Access FTP Site
hosted by NARSTO QSSC

[FTP Direct](#)

- Find NARSTO and Related Data Sets
- Review the Returned Metadata
- Link to and Download Selected Data Sets and Documentation

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NARSTO Data Sets



NARSTO (formerly North American Research Strategy for Tropospheric Ozone) is a public/private partnership, whose membership spans government, the utilities, industry, and academe throughout Mexico, the United States, and Canada. Its primary mission is to coordinate and enhance policy-relevant scientific research and assessment of tropospheric pollution behavior; its activities provide input for science-based decision-making and determination of workable, efficient, and effective strategies for local and regional air-pollution management. Data products from local, regional, and international monitoring and research programs are available.

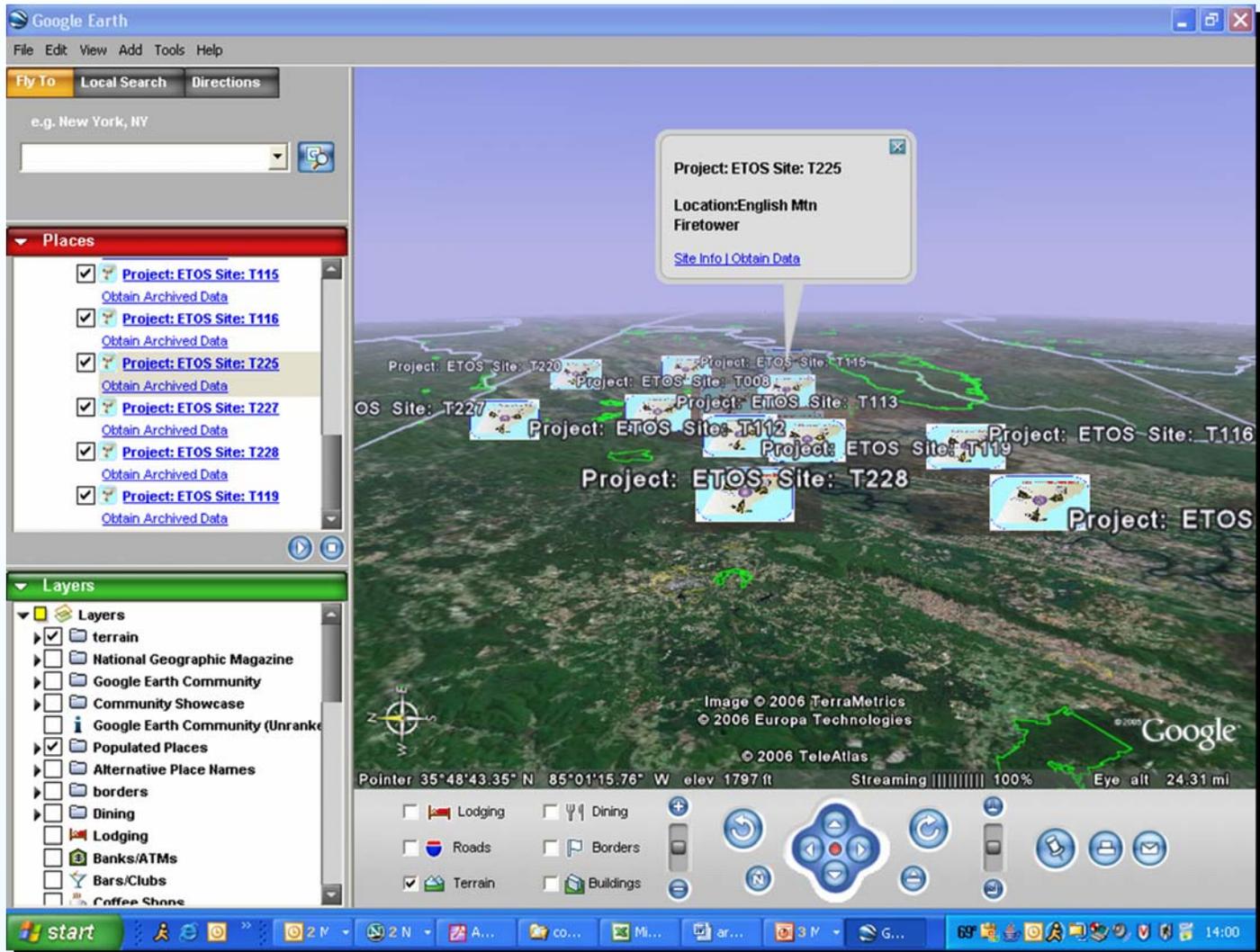
Guide and Data Documents provide more detailed information about the data sets. Parameters listed reflect general categories of measurements.

Documentation	Ordering Data	Relevant Links
NARSTO Project/Campaign Guide	Langley Web Ordering Tool	<ul style="list-style-type: none"> • NARSTO Home Page • NARSTO Quality System Science Center (QSSC) Web Site

Available Data Products

Study	Location
Environmental Protection Agency Supersites	<ul style="list-style-type: none"> • Atlanta, Georgia • Baltimore, Maryland • Fresno, California • Houston, Texas • Los Angeles, California • Pittsburgh, Pennsylvania
International Consortium for Atmospheric Research on Transport and Transformation (ICARTT), NorthEast Aerosol eXperiment (NEAX) 2004	<ul style="list-style-type: none"> • Northeastern United States
Northeast	<ul style="list-style-type: none"> • Northeastern United States
Pacific 20	
Southern Aircraft a	

Environmental Protection Agency Supersites				
Spatial Coverage: Atlanta, Georgia				
Data Set / Documentation (Select name to order)	Parameters	Temporal Coverage	Source/ Platform	Sensors
NARSTO EPA SS ATLANTA 1999 UAH MIPS DATA Documents: Guide	Virtual Temperature, Upper Level Winds	07/29/1999 - 09/02/1999	Ground Station	RASS - Radio Acoustic Sounding System
NARSTO EPA SS ATLANTA 1999 CHEM PM MET DATA Documents: Guide Project Overview (PDF) Data QA Plan (PDF) Data QA Report (PDF) Data Sampling Plan (PDF) Note: The negative sign is missing from the longitude in the following data files: NARSTO_EPA_SS_ATLANTA_GAS_GAS_DATA_1_KB_V1.csv and NARSTO_EPA_SS_ATLANTA_MET_MET_DATA_1_KB_V1.csv.	Carbon Monoxide, Nitrogen Oxides, Ozone, Surface Winds, Air Temperature, Humidity, Solar Irradiance, Particulate Matter, Ultraviolet Radiation, Surface Pressure, Nitric Acid, Aerosol Extinction, Aerosol Backscatter, Carbonaceous Aerosols, Nitrate Particles, Aerosol Optical Depth/Thickness	07/30/1999 - 09/03/1999	Ground Station, Meteorological Station, Laboratory	NDIR Gas Analyzer - Non-Dispersive Infrared Gas Analyzer, Chemluminescence, Hygrometer, Pyranometer, Aneroid Barometer, Ion Chromatograph, UV Ozone Detector, Anemometer, Thermistor, TEOM (Tapered element oscillating microbalance), Nephelometer, Integrating Nephelometer, Thermooptical transmission
NARSTO EPA SS ATLANTA RAPID SPMS DATA Documents: Guide	Particulates	08/10/1999 - 08/31/1999	Field Investigation	RSMS - Rapid Single-particle Mass Spectrometer



~~Fun with~~ Monitoring Sites in Google Earth

Compiled site locations for various atmospheric monitoring networks into Google Earth files with links to site information and data.

- ETOS
- IMPROVE
- NOAA Profiler Network
- CASTNET
- EPA AQS (TN)
- NADP/NTN: National Trends Network
- EPA Supersites
- Environment Canada PAC2001
- NAtChem/CORE Network
- MILAGRO Sites

