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## 1. Data Set Description:

The Study of the Health Effects of the Mix of Urban Air Pollutants (SHEMP) was a three-year Toxic Substances Research Initiative study was undertaken to advance Canadian knowledge on the possible relationship between PM<sub>2.5</sub> composition and co-pollutants (e.g., NO<sub>2</sub>, O<sub>3</sub>) and health effects and on the behaviour of PM<sub>2.5</sub> in Canadian cities. The main objectives of this study were to obtain new information on the sources, formation and chemical make-up of PM<sub>2.5</sub> and the critical components of the air pollution mix responsible for health effects. Field measurement studies in Toronto and Vancouver were designed to meet these objectives and to provide the data to test the hypothesis that the organic fraction of PM<sub>2.5</sub> is a critical component with respect to cardio-respiratory disease. In this study, the sources, formation, and chemical content of breathable particles in air and the co-occurrence of other air pollutants were investigated.

Air samples were collected daily from sites in Toronto and Vancouver over 2-3 years. Chemical content and particle size were determined. Data were also collected on the presence of other air pollutants present in the form of gases (co-pollutants). A small number of samples were analyzed to determine whether the content of specific indicator chemicals in air particles could help find their pollution source (vehicle exhaust, cooking, wood burning etc.). Specific chemicals of breathable particles produced by different types of sources were identified. Similarly, a small number of samples were collected to assess if semi-volatile organic compounds (i.e., chemicals that may evaporate from the particle and are thus often not measured properly) are an important contributor to the mass of breathable particles.

The SHEMP study was lead by the Air Quality Research Branch of the Meteorological Service of Canada (MSC). The main collaborators were the Environmental Technology Centre of the Environmental Protection Service and the Chemistry Department of the University of Toronto. The breadth of the study also necessitated that many other organizations provide support, such as the Greater Vancouver Regional District, the Pacific Environmental Science Centre and the Ontario Ministry of the Environment.

### The data set should be cited as follows:

Brook, Jeffrey R., Tom Dann, Ewa Dabek-Zlotorzynska, and Scott A. Mabury. 2004. NARSTO SHEMP Particulate Matter Composition Data, Canada, 2000-2002. Available on-line via [NARSTO Data and Information](#) 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.

### Archived SHEMP Data Files

Data File Names	Links to Time Series Plots of Reported Variables (PDF)
NARSTO_ENVCAN_SHEMP_VAN_JRB_ORG+INORG_VAPS_2000_2002_V1.csv	<a href="#">View VAN_JRB_ORG+INORG_VAPS_2000_2002</a>
NARSTO_ENVCAN_SHEMP_VAN_JRB_PM25_PARTISOL_2000_2002_V1.csv	<a href="#">View VAN_JRB_PM25_PARTISOL_2000_2002</a>
NARSTO_ENVCAN_SHEMP_VAN_JRB_METALS_PARTISOL_2000_2002_V1.csv	<a href="#">View VAN_JRB_METALS_PARTISOL_2000_2002</a>



NARSTO_ENVCAN_SHEMP_VAN_JRB_CARBON_PARTISOL_2000_2002_V1.csv	<a href="#">View VAN_JRB_CARBON_PARTISOL_2000_2002</a>
NARSTO_ENVCAN_SHEMP_GAG_JRB_ORG+INORG_VAPS_2000_2002_V1.csv	<a href="#">View GAG_JRB_ORG+INORG_VAPS_2000_2002</a>
NARSTO_ENVCAN_SHEMP_GAG_JRB_PM25_PARTISOL_2000_2002_V1.csv	<a href="#">View GAG_JRB_PM25_PARTISOL_2000_2002</a>
NARSTO_ENVCAN_SHEMP_GAG_JRB_METALS_PARTISOL_2000_2002_V1.csv	<a href="#">View GAG_JRB_METALS_PARTISOL_2000_2002</a>
NARSTO_ENVCAN_SHEMP_GAG_JRB_CARBON_PARTISOL_2000_2002_V1.csv	<a href="#">View GAG_JRB_CARBON_PARTISOL_2000_2002</a>

### 3. References:

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- Lee, Patrick K. H., Jeffrey R. Brook, Ewa Dabek-Zlotorzynska, and Scott A. Mabury. 2003. Identification of the Major Sources Contributing to PM2.5 Observed in Toronto. *Environ. Sci. Technol.*, 37,4831-4840.
- Tan, Phillip V., Greg J. Evans, Julia Tsai, Sandy Owega, Michael S. Fila, Oscar Malpica, and Jeffrey R. Brook. On-line Analysis of Urban Particulate Matter Focusing on Elevated Wintertime Aerosol Concentrations. *Environ. Sci. Technol.* 2002, 36,3512-3518.
- Sharma, S., Brook, J.R., Cachier, H., Chow, J., Gaudenzi, A., Lu, G. 2002. Light absorption and thermal measurements of black carbon in different regions of Canada. *J GEOPHYS RES-ATMOS*, 107 (D24): 4771-4771
- Tsai, J., Evans, G., Jervis, R., Owega, S., Tan, P., Malpica, O., Fila, M. 2004. Chemical Composition and Source Apportionment of Toronto Summertime Urban Fine Aerosol (PM2.5). *J RADIOANAL NUCL CH*, 259 (1): 193-197.

### 4. Contact Information:

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#### 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.

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E-mail: [support-asdc@earthdata.nasa.gov](mailto: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](mailto:support-asdc@earthdata.nasa.gov) for instructions on mailing reprints.

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