

Search ORNL DAAC

Search

DAAC Home > Get Data > Field Campaigns > Atmospheric Tomography Mission (ATom) > User guide

## ATom: Black Carbon Mass Mixing Ratios from ATom-1 Flights

### Get Data

Documentation Revision Date: 2018-09-18

Data Set Version: 1

### Summary

This dataset provides black carbon (BC) mass mixing ratios (in units of ng BC / kg air) measured during NASA's Atmospheric Tomography (ATom)-1 flight campaign during July and August 2016. The BC-core masses of BC-containing aerosol particles were measured using a Single Particle Soot Photometer (SP2). Conversion to mass mixing ratio (MMR) is achieved by monitoring sample flow. Influences in air mass composition were determined using the Particle Analysis by Laser Mass Spectrometry (PALMS) instruments. Also included here are data from the Cloud, Aerosol and Precipitation Spectrometer (CAPS) instrument which are used to identify measurements taken while in clouds. Finally, the associated latitude, longitude, altitude, and the timestamp of each measurement are included. All data are at ten seconds resolution. ATom-1 flights originated from the Armstrong Flight Research Center in Palmdale, California, fly north to the western Arctic, south to the South Pacific, east to the Atlantic, north to Greenland, and return to California across central North America.

This dataset contains one data file in csv format.

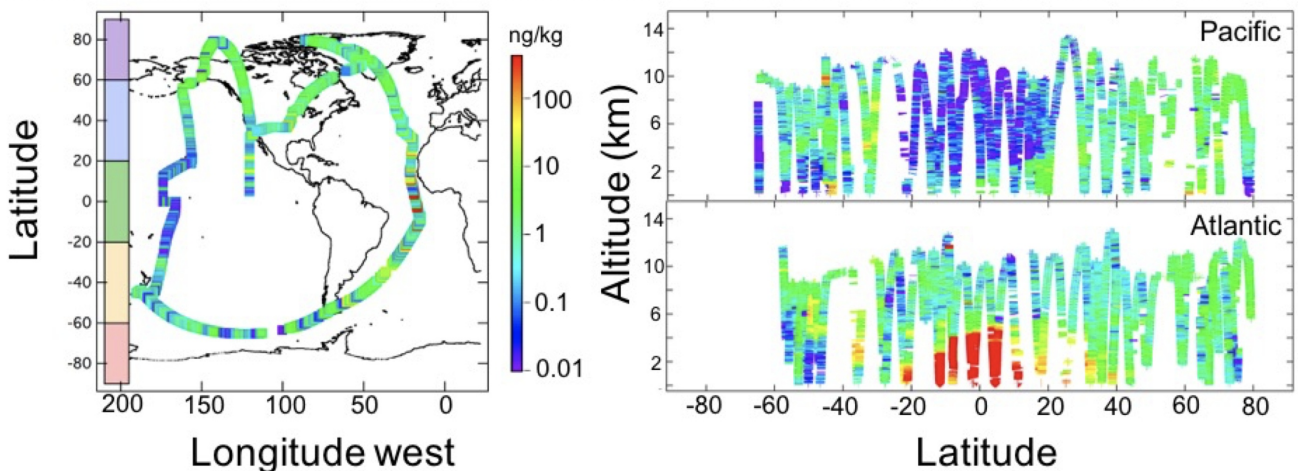


Figure 1: Left: Flight tracks (colored line) of the NASA DC-8 during the ATom-1 deployment. Right: Altitude vs latitude for the Pacific (top) and Atlantic (bottom) basins. Color in both figures represents black carbon mass-mixing ratio in units of ng rBC/kg of air.

### Citation

Katich, J.M., J.P. Schwarz, K. Froyd, B. Weinzierl, M. Dollner, T.P. Bui, C.S. Chang, and J.M. Dean-Day. 2018. ATom: Black Carbon Mass Mixing Ratios from ATom-1 Flights. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1618>

### Table of Contents

1. [Data Set Overview](#)
2. [Data Characteristics](#)
3. [Application and Derivation](#)
4. [Quality Assessment](#)
5. [Data Acquisition, Materials, and Methods](#)
6. [Data Access](#)
7. [References](#)

## 1. Data Set Overview

This dataset provides black carbon (BC) mass mixing ratios (in units of ng BC / kg air) measured during NASA's Atmospheric Tomography (ATom)-1 flight campaign during July and August 2016. The BC-core masses of BC-containing aerosol particles were measured using a Single Particle Soot Photometer (SP2). Conversion to mass mixing ratio (MMR) is achieved by monitoring sample flow. Influences in air mass composition were determined using the Particle Analysis by Laser Mass Spectrometry (PALMS) instruments. Also included here are data from the Cloud, Aerosol and Precipitation Spectrometer (CAPS) instrument which are used to identify measurements taken while in clouds. Finally, the associated latitude, longitude, altitude, and the timestamp of each measurement are included. All data are at ten seconds resolution. ATom-1 flights originated from the Armstrong Flight Research Center in Palmdale, California, fly north to the western Arctic, south to the South Pacific, east to the Atlantic, north to Greenland, and return to California across central North America.

**Project:** [Atmospheric Tomography Mission \(ATom\)](#)

The Atmospheric Tomography Mission (ATom) is a NASA Earth Venture Suborbital-2 mission. It will study the impact of human-produced air pollution on greenhouse gases and on chemically reactive gases in the atmosphere. ATom deploys an extensive gas and aerosol payload on the NASA DC-8 aircraft for systematic, global-scale sampling of the atmosphere, profiling continuously from 0.2 to 12 km altitude. Flights will occur in each of 4 seasons over a 4-year period.

**Related Publication:**

Katich, J.M., B.H. Samset, T.P. Bui, M. Dollner, K. Froyd, P. Campuzano-Jost, B.A. Nault, J.C. Schroder, B. Weinzierl, and J.P. Schwarz. *In review*. Strong contrast in remote black carbon aerosol loadings between the Atlantic and Pacific basins. *Journal of Geophysical Research- Atmospheres*.

**Related Dataset:**

Wofsy, S.C., et al. 2018. ATom: Merged Atmospheric Chemistry, Trace Gases, and Aerosols. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1581>

Wofsy, S.C., and ATom Science Team. 2018. ATom: Aircraft Flight Track and Navigational Data. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1613>

**Acknowledgement:** This work was supported by NASA (Grant Number NNX15AJ23G).

## 2. Data Characteristics

**Spatial Coverage:** ATom-1 flights with near-global coverage

**Spatial Resolution:** Point measurements along Atom-1 flight paths

**Temporal Coverage:** 2016-07-29 to 2016-08-23

**Temporal Resolution:** 10 seconds. PALMS data are at 3 minute resolution.

**Study Area** (Coordinates in decimal degrees).

Site	Northern Extent	Southern Extent	Western Extent	Eastern Extent
ATom-1 flights	80.00	-65.33	178.99	-180.00

**Data File Information:**

This dataset contains one data file in csv format: ***black\_carbon\_mass\_mix\_ratios.csv***

Variable Name	Units	Description
latitude	decimal degrees	Aircraft location measured by the onboard Meteorological Measurement System (MMS) instrument.
longitude	decimal degrees	Aircraft location measured by the onboard Meteorological Measurement System (MMS) instrument.
altitude	meters above mean sea level	Altitude measured by the onboard Meteorological Measurement System (MMS) instrument.
bc_mass_90_500_nm	ng BC / kg air	BC in the detectable range of 90-550nm measured by SP2 instrument
CAS_Ncoa1	number of particles / cm3	number of particles / cm3 in the 1-10 um size range as measured by the CAS instrument
CAS_Ncoa2	number of particles / cm3	number of particles / cm3 in the 10 - 30 um size range as measured by the CAS instrument
CAS_Ncoa3	number of particles / cm3	number of particles / cm3 in the 30 - 50 um size range as measured by the CAS instrument
bio_burn_frac_PALMS	number fraction	Biomass burning particles measured by the Particle Analysis by Laser Mass Spectrometry (PALMS) instrument.

Variable Name	Units	Description
UTC_mean	seconds	Elemental carbon particles measured by the Particle Analysis by Laser Mass Spectrometry (PALMS) Seconds since midnight (00:00:00 UTC) on the flight day. Information on flight dates for ATom-1 can be accessed from the ORNL DAAC dataset <i>ATom: Aircraft Flight Track and Navigational Data</i> (at <a href="https://doi.org/10.3334/ORNLDAAC/1613">https://doi.org/10.3334/ORNLDAAC/1613</a> ).

#### User Note:

Please note that these data represent the ATom-1 black carbon data initially released in June 2017 and used in Katich et al. (2018) study. The ATom-1 data have since been updated and revised. The latest version of the data are available in the following dataset:

Wofsy, S.C., et al. 2018. ATom: Merged Atmospheric Chemistry, Trace Gases, and Aerosols. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1581>

### 3. Application and Derivation

These data support the publication:

Katich, J.M., B.H. Samset, T.P. Bui, M. Dollner, K. Froyd, P. Campuzano-Jost, B.A. Nault, J.C. Schroder, B. Weinzierl, and J.P. Schwarz. *In review*. Strong contrast in remote black carbon aerosol loadings between the Atlantic and Pacific basins. *Journal of Geophysical Research- Atmospheres*.

### 4. Quality Assessment

Data uncertainty for each instrument is defined in the Wofsy et al. (2018) ATom Merge dataset (<https://doi.org/10.3334/ORNLDAAC/1581>).

### 5. Data Acquisition, Materials, and Methods

For details see the Wofsy et al. (2018) ATom Merge dataset (<https://doi.org/10.3334/ORNLDAAC/1581>).

### 6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

[ATom: Black Carbon Mass Mixing Ratios from ATom-1 Flights](#)

Contact for Data Center Access Information:

- E-mail: [uso@daac.ornl.gov](mailto:uso@daac.ornl.gov)
- Telephone: +1 (865) 241-3952

### 7. References

Katich, J.M., B.H. Samset, T.P. Bui, M. Dollner, K. Froyd, P. Campuzano-Jost, B.A. Nault, J.C. Schroder, B. Weinzierl, and J.P. Schwarz. *In review*. Strong contrast in remote black carbon aerosol loadings between the Atlantic and Pacific basins. *Journal of Geophysical Research- Atmospheres*.

Wofsy, S.C., et al. 2018. ATom: Merged Atmospheric Chemistry, Trace Gases, and Aerosols. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1581>

Wofsy, S.C., and ATom Science Team. 2018. ATom: Aircraft Flight Track and Navigational Data. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1613>



[Privacy Policy](#) | [Feedback](#) | [Help](#)



#### Home

#### About Us

Who We Are  
Partners  
User Working Group  
Data Citation Policy  
News

#### Get Data

Complete Dataset List  
Search for Data  
Field Campaigns  
Land Validation  
Regional/Global  
Model Archive

#### Submit Data

Submit Data Form  
Data Scope and Acceptance  
Data Authorship Policy  
Data Publication Timeline  
Detailed Submission Guidelines

#### Tools

MODIS  
THREDDS  
SDAT  
Daymet  
CARVE Data Viewer  
Soil Moisture Visualizer  
Land - Water Checker

#### Resources

Learning  
Data Management

#### Contact Us