Technical Report Series on the
Boreal Ecosystem-Atmosphere Study (BOREAS)

Forrest G. Hall and Sara K. Conrad, Editors

Volume 234

BOREAS TGB-7 Ambient Air
Herbicide and Organochlorine
Concentration Data

Don Waite
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National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

November 2000
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Summary

The BOREAS TGB-7 team measured the concentration and flux of several agricultural pesticides in air, rainwater, and dry deposition samples in order to determine the associated yearly deposition rates. This data set contains information on the ambient air concentration of seven herbicides [2,4-dichlorophenoxyacetic acid (2,4-D), bromoxynil, dicamba, 2-methyl-4-chlorophenoxyacetic acid (MCPA), triallate, trifluralin, and diclop-methyl] known to appear in the atmosphere of the Canadian prairies. Also, the concentration of three herbicides (atrazine, alachlor, and metolachlor), two groups of insecticides (lindane and breakdown products and dichloro-diphenyl-trichloroethane (DDT) and breakdown products), and several polychlorinated biphenyls commonly used in the central United States was measured. All of these chemicals are reported, in the literature, to be transported in the atmosphere. Many have been reported to occur in boreal and arctic food chains. The sampling was carried out from 16-Jun to 13-Aug-1993 and 04-May to 20-Jul-1994 at the BOREAS site in the Prince Albert National Park (Waskesiu). The data are stored in tabular ASCII files.

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1. Data Set Overview

1.1 Data Set Identification

BOREAS TGB-07 Ambient Air Herbicide and Organochlorine Concentration Data

1.2 Data Set Introduction

This data set contains herbicide and organochlorine concentrations in ambient air samples collected from Waskesiu.
1.3 Objective/Purpose
The objective of this study was to measure the ambient air concentration of herbicides and organochlorines in the boreal forest at Waskesiu.

1.4 Summary of Parameters and Variables
This data set contains herbicide and organochlorine concentrations in air samples collected Waskesiu.

1.5 Discussion
The deposition into the boreal forest of seven herbicides [2,4-dichlorophenoxyacidic acid (2,4-D), bromoxynil, dicamba, 2-methyl-4-chlorophenoxyacetic acid (MCPA), triallate, trifluralin, and diclopin-methyl] known to appear in the atmosphere of the Canadian prairies, three herbicides (atrazine, alachlor, and metolachlor) commonly used in the central United States, two groups of insecticides (lindane and breakdown products and dichloro-diphenyl-trichloroethene (DDT) and breakdown products), plus several polychlorinated biphenyls was measured. All of these chemicals are reported, in the literature, to be transported in the atmosphere. Many have been reported to occur in boreal and arctic food chains. The sampling was carried out at the BOREal Ecosystem-Atmosphere Study (BOREAL) site in the Prince Albert National Park (PANP) (Waskesiu).

1.6 Related Data Sets
BOREAL TGB-07 Dry Deposition Herbicide and Organochlorine Flux Data
BOREAL TGB-07 Rainwater Herbicide and Organochlorine Concentration Data
BOREAL TGB-09 Above-Canopy NMHC at SSA-OBS, SSA-OJP, and SSA-OA Sites
BOREAL TGB-10 Volatile Organic Carbon Data over the SSA
BOREAL TGB-10 Oxidant Concentration Data over the SSA
BOREAL TGB-10 Oxidant Flux Data over the SSA

2. Investigator(s)

2.1 Investigator(s) Name and Title
Don Waite
Environment Canada

Allan Cessna
Agriculture and Agri-Foods Canada

Narine Gurprasad
Environment Canada

2.2 Title of Investigation
Atmospheric Transport of Agricultural Pesticides into the Boreal Ecosystem

2.3 Contact Information
Contact 1:
Dr. Don Waite
Environment Canada
Room 300 Park Plaza
2365 Albert Street
Regina, Saskatchewan
S4P 4K1 Canada
(306) 780-6438
(306) 780-7614 (fax)
Don.Waite@EC.GC.CA
3. Theory of Measurements

Each sample consisted of approximately 2100 m³ of air aspirated by a high-volume sampler (Model PS-1, General Metal Works, Village of Cleves, OH). The sampling unit consisted of a 102-mm-diameter borosilicate filter in front of a composite polyurethane foam (PUF)/XAD-2 resin plug (Cessna et al., 1997). The sampler operated continuously for 7 days for each sample.

4. Equipment

4.1 Sensor/Instrument Description

4.1.1 Collection Environment
The data were collected under all environmental conditions.

4.1.2 Source/Platform
Ground.

4.1.3 Source/Platform Mission Objectives
None given.

4.1.4 Key Variables
The key variable is herbicide or organochlorine concentration in ambient air.

4.1.5 Principles of Operation
Ambient air samples were collected with a GM Manufacturing Company Hi-Volume sampler fitted with a glass fiber pre-filter and a composite PUF/XAD-2 resin cartridge. Air is drawn through the filtering unit by means of a vacuum pump. For this study, the pump operated continuously for 7-day sampling periods.

4.1.6 Sensor/Instrument Measurement Geometry
PUF Sampler: A high-volume air sampler collecting ambient concentrations of material on a sampling unit consisting of a glass fiber filter followed by a PUF plug and XAD-2 resin cartridge.

4.1.7 Manufacturer of Sensor/Instrument
None given.

4.2 Calibration
4.2.1 Specifications
The samplers operated 24 hours per day over each 7-day sampling period. The PUF samplers were calibrated to aspirate 2100 m$^3$ over the 7-day sampling period. The air flow through the PUF/XAD-2 sampling unit (12.5 m$^3$/hr) was calibrated using a Sierra-Misco, Inc. (Berkeley, CA) orifice head and air flow was monitored during operation by integral Venturi/Magnahelic gauges. The PUF/XAD-2 sampling unit consisted of a borosilicate prefilter and 25 mL of XAD-2 resin sandwiched between two PUF plugs (Cessna et al., 1997).

4.2.1.1 Tolerance
None given.

4.2.2 Frequency of Calibration
None given.

4.2.3 Other Calibration Information
None.

5. Data Acquisition Methods
The herbicide analyses were carried out at the Agriculture and Agri-Food Canada Research Station at Regina, Saskatchewan, whereas insecticide and organochlorine analysis was carried out by the Environment Canada laboratory in Edmonton, Alberta. All residues were quantified and confirmed using a Hewlett-Packard gas chromatograph equipped with a mass selective detector (GC-MSD).

Extraction of PUF/XAD-2 Sampling Units:
On alternate weeks, the PUF/XAD-2 sampling units were extracted for herbicide or for insecticide and organochlorine content. For herbicide analysis, the sampling unit was Soxhlet extracted for 8 h with acetone (Grover et al., 1994). The acetone extract was concentrated to ~0.5 mL using a rotary evaporator (water bath 30 °C) and then methylated with ethereal diazomethane. The methylated extract was subjected to Florisil column cleanup prior to analysis by GC-MSD. For insecticide and organochlorine analysis, the PUF sampling unit was Soxhlet extracted for 12 h with dichloromethane. The extract was concentrated using a rotary evaporator and then subjected to Florisil column cleanup prior to analysis by GC-MSD.

Residue Analysis and Confirmation:
The Hewlett-Packard GC-MSD system and operating conditions used for herbicide residue analysis have been described previously (Cessna et al., 1997). A similar GC-MSD system was used for insecticide and organochlorine analysis; however, the column employed was a 30 m x 0.25 mm I.D. Rtx-5 column (0.25-µm film thickness). For operation of the GC, helium was used as the carrier gas and the temperature program was initially held at 80 °C for 1 minute and then ramped to 200 °C at 15 °C/min; then it was held at 200 °C for 5 minutes, increased at 8 °C/min to 300 °C, and held for 10 minutes. A split/splitless injector was used in the splitless mode. Injection port and transfer line temperatures were 270 °C and 280 °C, respectively.

Depending on the compound, from two to four ions were monitored on the MSD. The presence of each compound was considered to be confirmed if all ions monitored were present, a peak appeared at the retention time (± 0.02 min) obtained for a standard solution of the pesticide in the reconstructed chromatograms of all ions, and the peak area ratio was within 30% of the ratio obtained using a standard solution of the pesticide.
6. Observations

6.1 Data Notes
None.

6.2 Field Notes
None.

7. Data Description

7.1 Spatial Characteristics

7.1.1 Spatial Coverage
The North American Datum of 1983 (NAD83) coordinates for the Southern Study Area (SSA) measurement site are:

<table>
<thead>
<tr>
<th>Longitude</th>
<th>Latitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waskesiu</td>
<td>106.067° W</td>
</tr>
</tbody>
</table>

7.1.2 Spatial Coverage Map
None given.

7.1.3 Spatial Resolution
The measurements were made at a single location in the SSA.

7.1.4 Projection
Not applicable.

7.1.5 Grid Description
Not applicable.

7.2 Temporal Characteristics

7.2.1 Temporal Coverage
The data were collected from 16-Jun to 13-Aug-1993 and 04-May to 20-Jul-1994.

7.2.2 Temporal Coverage Map
All the data were collected at the same location.

7.2.3 Temporal Resolution
The samplers operated 24 hours per day over each 7-day sampling period.

7.3 Data Characteristics
### 7.3.1 Parameter/Variable

The parameters contained in the data files on the CD-ROM are:

<table>
<thead>
<tr>
<th>Column Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE_NAME</td>
</tr>
<tr>
<td>SUB_SITE</td>
</tr>
<tr>
<td>START_DATE</td>
</tr>
<tr>
<td>END_DATE</td>
</tr>
<tr>
<td>Bromoxynil Conc</td>
</tr>
<tr>
<td>2,4-D Conc</td>
</tr>
<tr>
<td>MCPA Conc</td>
</tr>
<tr>
<td>Diclofop Conc</td>
</tr>
<tr>
<td>Triallate Conc</td>
</tr>
<tr>
<td>Trifluralin Conc</td>
</tr>
<tr>
<td>Alachlor Conc</td>
</tr>
<tr>
<td>Atrazine Conc</td>
</tr>
<tr>
<td>Alpha-HCH Conc</td>
</tr>
<tr>
<td>Gamma-HCH Conc</td>
</tr>
<tr>
<td>4,4'-DDE Conc</td>
</tr>
<tr>
<td>4,4'-DDD Conc</td>
</tr>
<tr>
<td>4,4'-DDT Conc</td>
</tr>
<tr>
<td>Tetrachloro-Biphenyl Conc</td>
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<tr>
<td>Hexachloro-Biphenyl Conc</td>
</tr>
<tr>
<td>Octachloro-Biphenyl Conc</td>
</tr>
<tr>
<td>Dichloro-Biphenyl Conc</td>
</tr>
<tr>
<td>Trichloro-Biphenyl Conc</td>
</tr>
<tr>
<td>CRTFCN_CODE</td>
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<tr>
<td>REVISION_DATE</td>
</tr>
</tbody>
</table>

### 7.3.2 Variable Description/Definition

The descriptions of the parameters contained in the data files on the CD-ROM are:

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE_NAME</td>
<td>The identifier assigned to the site by BOREAS, in the format SSS-TTT-CCCCC, where SSS identifies the portion of the study area: NSA, SSA, REG, TRN, and TTT identifies the cover type for the site, 999 if unknown, and CCCCC is the identifier for site, exactly what it means will vary with site type.</td>
</tr>
<tr>
<td>SUB_SITE</td>
<td>The identifier assigned to the sub-site by BOREAS, in the format GGGGG-IIIII, where GGGGG is the group associated with the sub-site instrument, e.g. HYD06 or STAFF, and IIIII is the identifier for sub-site, often this will refer to an instrument.</td>
</tr>
<tr>
<td>START_DATE</td>
<td>The date on which the collection of data commenced.</td>
</tr>
<tr>
<td>END_DATE</td>
<td>The date on which the collection of the data was</td>
</tr>
</tbody>
</table>
Bromoxynil concentration, concentration of bromoxynil.

Dichlobenil concentration, concentration of dichlobenil.

2,4-D concentration, concentration of 2,4-DICHLOROPHENOXYACIDIC ACID.

MCPA concentration, concentration of MCPA.

Diclofop concentration, concentration of diclofop.

Triallate concentration, concentration of triallate.

Trifluralin concentration, concentration of trifluralin.

Alachlor concentration, concentration of alachlor.

Atrazine concentration, concentration of atrazine.

Metolachlor concentration, concentration of metolachlor.

Alpha-HCH concentration, concentration of alpha-hexachlorocyclohexane.

Gamma-HCH concentration, concentration of gamma-hexachlorocyclohexane.

4,4'-DDE concentration, concentration of 4,4' DDE.

4,4'-DDD concentration, concentration of 4,4' DDD.

4,4'-DDT concentration, concentration of 4,4' DDT.

Tetrachlorobiphenyl concentration, concentration of tetrachlorobiphenyl.

Pentachlorobiphenyl concentration, concentration of pentachlorobiphenyl.

Hexachlorobiphenyl concentration, concentration of hexachlorobiphenyl.

Octachlorobiphenyl concentration, concentration of octachlorobiphenyl.

Dichlorobiphenyl concentration, concentration of dichlorobiphenyl.

Trichlorobiphenyl concentration, concentration of trichlorobiphenyl.

The BOREAS certification level of the data.
Examples are CPI (Checked by PI), CGR (Certified by Group), PRE (Preliminary), and CPI-??? (CPI but questionable).

The most recent date when the information in the referenced data base table record was revised.

### 7.3.3 Unit of Measurement

The measurement units for the parameters contained in the data files on the CD-ROM are:

<table>
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<th>Column Name</th>
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<tr>
<td>SUB_SITE</td>
<td>[none]</td>
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<tr>
<td>START_DATE</td>
<td>[DD-MON-YY]</td>
</tr>
<tr>
<td>END_DATE</td>
<td>[DD-MON-YY]</td>
</tr>
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<td>BROMOXYNIL_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>DICAMBA_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>2,4-D_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>MCPA_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>DICLOFOP_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>TRIALLATE_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>TRIFLURALIN_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>ALACHLOR_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>ATRAZINE_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>METOLACHLOR_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>ALPHA-HCH_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>GAMMA-HCH_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>4,4'-DDE_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>4,4'-DDD_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>4,4'-DDT_CONC</td>
<td>[picograms][meter^-3]</td>
</tr>
<tr>
<td>TETRACHLORO-BIPHENYL_CONC</td>
<td>[picograms][meter^-3]</td>
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</tbody>
</table>
7.3.4 Data Source

The sources of the parameter values contained in the data files on the CD-ROM are:

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<th>Column Name</th>
<th>Data Source</th>
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<tr>
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<tr>
<td>END_DATE</td>
<td>Investigator</td>
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<tr>
<td>DICAMBA_CONC</td>
<td>Hewlett-Packard gas chromatograph</td>
</tr>
<tr>
<td>2,4-D_CONC</td>
<td>Hewlett-Packard gas chromatograph</td>
</tr>
<tr>
<td>MCPA_CONC</td>
<td>Hewlett-Packard gas chromatograph</td>
</tr>
<tr>
<td>DICLOFOP_CONC</td>
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<td>TRIALLATE_CONC</td>
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<tr>
<td>METOLACHLOR_CONC</td>
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<td>Hewlett-Packard gas chromatograph</td>
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<tr>
<td>OCTACHLORO-BIPHENYL_CONC</td>
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<td>DICHLORO-BIPHENYL_CONC</td>
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<tr>
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7.3.5 Data Range

The following table gives information about the parameter values found in the data files on the CD-ROM.

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<th>Maximum Data</th>
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<th>Unrel Data</th>
<th>Below Data</th>
<th>Detect Limit</th>
<th>Data Collectd</th>
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</thead>
<tbody>
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<td>None</td>
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<td>DICAMBA_CONC</td>
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<td>None</td>
<td>-777</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Page 8
<table>
<thead>
<tr>
<th>Compound</th>
<th>Conc Value</th>
<th>Limit Value</th>
<th>Detection Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCPA</td>
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<td>None</td>
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<tr>
<td>GAMMA-HCH</td>
<td>-999</td>
<td>None</td>
<td>-777</td>
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<tr>
<td>4,4'-DDE</td>
<td>-999</td>
<td>None</td>
<td>-777</td>
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<td>4,4'-DDD</td>
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<td>48.87</td>
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<tr>
<td>4,4'-DDT</td>
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<td>TETRACHLORO-BIPHENYL</td>
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<td>HEXACHLORO-BIPHENYL</td>
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<td>OCTACHLORO-BIPHENYL</td>
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<td>DICHLORO-BIPHENYL</td>
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<td>10.47</td>
<td>-999</td>
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<td>TRICHLORO-BIPHENYL</td>
<td>-999</td>
<td>None</td>
<td>-777</td>
</tr>
</tbody>
</table>

Minimum Data Value -- The minimum value found in the column.
Maximum Data Value -- The maximum value found in the column.
Missing Data Value -- The value that indicates missing data. This is used to indicate that an attempt was made to determine the parameter value, but the attempt was unsuccessful.
Unrel Data Value -- The value that indicates unreliable data. This is used to indicate an attempt was made to determine the parameter value, but the value was deemed to be unreliable by the analysis personnel.
Below Detect Limit -- The value that indicates parameter values below the instruments detection limits. This is used to indicate that an attempt was made to determine the parameter value, but the analysis personnel determined that the parameter value was below the detection limit of the instrumentation.
Data Not Collected -- This value indicates that no attempt was made to determine the parameter value. This usually indicates that BORIS combined several similar but not identical data sets into the same data base table but this particular science team did not measure that parameter.

Blank -- Indicates that blank spaces are used to denote that type of value.
N/A -- Indicates that the value is not applicable to the respective column.
None -- Indicates that no values of that sort were found in the column.
7.4 Sample Data Record

The following are wrapped versions of data record from a sample data file on the CD-ROM.

SITE_NAME, SUB_SITE, START_DATE, END_DATE, BRMYCONC, DICAMBA_CONC, 2,4-D_CONC, MCPA_CONC, DICLOFOP_CONC, TRIALLATE_CONC, TRIFLURALIN_CONC, ALACHLOR_CONC, ATRAZINE_CONC, METOLACHLOR_CONC, ALPHA-HCH_CONC, GAMMA-HCH_CONC, 4,4'-DDE_CONC, 4,4'-DDD_CONC, 4,4'-DDT_CONC, TETRACHLORO-BIPHENYL_CONC, PENTACHLORO-BIPHENYL_CONC, HEXACHLORO-BIPHENYL_CONC, OCTACHLORO-BIPHENYL_CONC, DICHLORO-BIPHENYL_CONC, TRICHLORO-BIPHENYL_CONC, CRTFCN_CODE, REVISION_DATE

'SSA-999-WSK05', 'TGB07-CON01', I6-JUN-93, 21-JUN-93, -777.0, -777.0, -777.0, 16.0, -999.0, -777.0, -777.0, -999.0, -999.0, CPI, I6-APR-97

'SSA-999-WSK05', 'TGB07-CON01', 21-JUN-93, 25-JUN-93, -777.0, -777.0, -777.0, -777.0, -777.0, 96.0, -777.0, -777.0, -999.0, -777.0, CPI, I6-APR-97

'SSA-999-WSK05', 'TGB07-CON01', 28-JUN-93, 02-JUL-93, -999.0, -999.0, -777.0, -999.0, -999.0, -999.0, -999.0, -999.0, -999.0, CPI, I6-APR-97

8. Data Organization

8.1 Data Granularity

The smallest unit of data tracked by BORIS was the herbicide concentration in the air sample for a given site in a given sampling period.

8.2 Data Format(s)

The Compact Disk-Read-Only Memory (CD-ROM) files contain American Standard Code for Information Interchange (ASCII) numerical and character fields of varying length separated by commas. The character fields are enclosed with single apostrophe marks. There are no spaces between the fields.

Each data file on the CD-ROM has four header lines of Hyper-Text Markup Language (HTML) code at the top. When viewed with a Web browser, this code displays header information (data set title, location, date, acknowledgments, etc.) and a series of HTML links to associated data files and related data sets. Line 5 of each data file is a list of the column names, and line 6 and following lines contain the actual data.

9. Data Manipulations

9.1 Formulae

9.1.1 Derivation Techniques and Algorithms

None given.

9.2 Data Processing Sequence

9.2.1 Processing Steps

None given.

9.2.2 Processing Changes

None given.

9.3 Calculations
9.3.1 Special Corrections/Adjustments
   None given.

9.3.2 Calculated Variables
   None given.

9.4 Graphs and Plots
   None given.

10. Errors

10.1 Sources of Error
   Irreproducible packing of the XAD-2 resin column.

10.2 Quality Assessment
   Standard laboratory procedures involving blanks, spikes and replicates.

10.2.1 Data Validation by Source
   None given.

10.2.2 Confidence Level/Accuracy Judgment
   None given.

10.2.3 Measurement Error for Parameters
   None given.

10.2.4 Additional Quality Assessments
   None given.

10.2.5 Data Verification by Data Center
   The data were examined for general consistency and clarity.

11. Notes

11.1 Limitations of the Data
   None given.

11.2 Known Problems with the Data
   None given.

11.3 Usage Guidance
   None given.

11.4 Other Relevant Information
   None given.

12. Application of the Data Set

   The data can be used to quantify the trace organic contaminants entering the site from atmospheric transport and identify chemicals that require further research.
13. Future Modifications and Plans

None given.

14. Software

14.1 Software Description
None given.

14.2 Software Access
None given.

15. Data Access

The ambient air herbicide and organochlorine concentration data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

15.1 Contact Information

For BOREAS data and documentation please contact:

ORNL DAAC User Services
Oak Ridge National Laboratory
P.O. Box 2008 MS-6407
Oak Ridge, TN 37831-6407
Phone: (423) 241-3952
Fax: (423) 574-4665
E-mail: ornldaac@ornl.gov or ornl@eos.nasa.gov

15.2 Data Center Identification

Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) for Biogeochemical Dynamics

15.3 Procedures for Obtaining Data

Users may obtain data directly through the ORNL DAAC online search and order system [http://www-eosdis.ornl.gov/] and the anonymous FTP site [ftp://www-eosdis.ornl.gov/data/] or by contacting User Services by electronic mail, telephone, fax, letter, or personal visit using the contact information in Section 15.1.

15.4 Data Center Status/Plans

The ORNL DAAC is the primary source for BOREAS field measurement, image, GIS, and hardcopy data products. The BOREAS CD-ROM and data referenced or listed in inventories on the CD-ROM are available from the ORNL DAAC.
16. Output Products and Availability

16.1 Tape Products
None.

16.2 Film Products
None.

16.3 Other Products
These data are available on the BOREAS CD-ROM series.

17. References

17.1 Platform/Sensor/Instrument/Data Processing Documentation
None given.

17.2 Journal Articles and Study Reports


17.3 Archive/DBMS Usage Documentation
None.

18. Glossary of Terms
None given.

19. List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>ASCII</td>
<td>American Standard for Information Interchange</td>
</tr>
<tr>
<td>BOREAS</td>
<td>BOReal Ecosystem-Atmosphere Study</td>
</tr>
<tr>
<td>BORIS</td>
<td>BOREAS Information System</td>
</tr>
<tr>
<td>CD-ROM</td>
<td>Compact Disk-Read-Only Memory</td>
</tr>
<tr>
<td>DAAC</td>
<td>Distributed Active Archive Center</td>
</tr>
<tr>
<td>EOS</td>
<td>Earth Observing System</td>
</tr>
<tr>
<td>EOSDIS</td>
<td>EOS Data and Information System</td>
</tr>
<tr>
<td>GC-MSD</td>
<td>Gas Chromatograph - Mass Selective Detector</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>GSFC</td>
<td>Goddard Space Flight Center</td>
</tr>
<tr>
<td>HTML</td>
<td>HyperText Markup Language</td>
</tr>
<tr>
<td>NASA</td>
<td>National Aeronautics and Space Administration</td>
</tr>
<tr>
<td>NMHC</td>
<td>Nonmethane Hydrocarbon</td>
</tr>
<tr>
<td>NSA</td>
<td>Northern Study Area</td>
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<tr>
<td>OA</td>
<td>Old Aspen</td>
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<tr>
<td>OBS</td>
<td>Old Black Spruce</td>
</tr>
<tr>
<td>OJP</td>
<td>Old Jack Pine</td>
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<tr>
<td>ORNL</td>
<td>Oak Ridge National Laboratory</td>
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<td>Prince Albert National Park</td>
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<td>PUF</td>
<td>Polyurethane Foam</td>
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<td>SSA</td>
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<td>TGB</td>
<td>Trace Gas Biogeochemistry</td>
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<td>URL</td>
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20. Document Information

20.1 Document Revision Date
Written: 04-Dec-1997
Last updated: 04-Aug-1999

20.2 Document Review Date(s)
Science Review:

20.3 Document ID

20.4 Citation
When using these data, please contact one of the individuals listed in Section 2.3 and as well as citing relevant papers in Section 17.2.

If using data from the BOREAS CD-ROM series, also reference the data as:

Also, cite the BOREAS CD-ROM set as:

20.5 Document Curator

20.6 Document URL
Technical Report Series on the Boreal Ecosystem-Atmosphere Study (BOREAS) TGB-7 Ambient Air Herbicide and Organochlorine Concentration Data

Don Waite
Forrest G. Hall and Sara K. Conrad, Editors

Goddard Space Flight Center
Greenbelt, Maryland 20771

National Aeronautics and Space Administration
Washington, DC 20546-0001

D. Waite: Environment Canada, Regina, Saskatchewan; S.K. Conrad: Raytheon ITSS

The BOREAS TGB-7 team measured the concentration and flux of several agricultural pesticides in air, rainwater, and dry deposition samples in order to determine the associated yearly deposition rates. This data set contains information on the ambient air concentration of seven herbicides [2,4-dichlorophenoxyacetic acid (2,4-D), bromoxynil, dicamba, 2-methyl-4-chlorophenoxyacetic acid (MCPA), triallate, trifluralin, and diclop-methyl] known to appear in the atmosphere of the Canadian prairies. Also, the concentration of three herbicides (atrazine, alachlor, and metolachlor), two groups of insecticides (lindane and breakdown products and dichloro-diphenyl-trichloroethylene (DDT) and breakdown products), and several polychlorinated biphenyls commonly used in the central United States was measured. All of these chemicals are reported, in the literature, to be transported in the atmosphere. Many have been reported to occur in boreal and arctic food chains. The sampling was carried out from 16-Jun to 13-Aug-1993 and 04-May to 20-Jul-1994 at the BOREAS site in the Prince Albert National Park (Waskesiu). The data are stored in tabular ASCII files.

BOREAS, trace gas biogeochemistry.