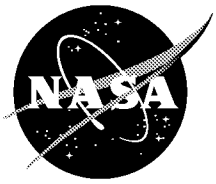
NASA/TM—2000–209891, Vol. 228



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

Forrest G. Hall and Sara K. Conrad, Editors

Volume 228

BOREAS TGB-5 Dissolved Organic Carbon Data from NSA Beaver Ponds

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November 2000

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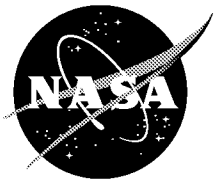

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BOREAS TGB-5 Dissolved Organic Carbon Data from NSA Beaver Ponds

Rick Bourbonniere

Summary

The BOREAS TGB-5 team collected several data sets related to carbon and trace gas fluxes and concentrations in the NSA. This data set contains concentrations of dissolved organic and inorganic carbon species from water samples collected at various NSA sites. In particular, this set covers the NSA Tower Beaver Pond Site and the NSA Gillam Road Beaver Pond Site, including data from all visits to open water sampling locations during the BOREAS field campaigns from April to September 1994. The data are provided in tabular ASCII files.

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1. Data Set Overview

1.1 Data Set Identification

BOREAS TGB-05 Dissolved Organic Carbon Data from NSA Beaver Ponds

1.2 Data Set Introduction

Organic matter is a major component of the boreal forest ecosystem, and can be considered as the defining parameter for biogeochemical processes occurring in the soil, wetlands, ponds, and lakes in the boreal forest. Beaver ponds are common in the boreal forest, and dissolved organic matter (DOM) is the dominant aquatic component.

1.3 Objective/Purpose

The Trace Gas Biogeochemistry (TGB) 05 team studied the character of DOM from an active beaver pond near Thompson, Manitoba, Canada, in conjunction with the BOReal Ecosystem-Atmosphere Study (BOREAS) project. This study spans the entire hydrologic cycle in 1994 from snowmelt and ice breakup through the spring flood, summer growing season and autumn draw down.

1.4 Summary of Parameters

Dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), particulate organic carbon (POC), and DOM fractions (see Section 18).

1.5 Discussion

Water samples were collected throughout the BOREAS sampling periods described above for all open water sites (including some earlier samples that were under ice) and from inflow, groundwater, and drainage sites. These samples were analyzed in a timely manner at a field lab in Thompson for various aquatic carbon species, as described in Sections 1.4 and 7.

1.6 Related Data Sets

BOREAS TGB-01 Soil CH4 and CO2 Profile Data over the NSA
BOREAS TGB-01 CO2 and CH4 Chamber Flux Data over the NSA
BOREAS TGB-01 CH4 Tower Flux Data over the NSA
BOREAS TGB-01/TGB-03 NEE and Air and Water Temperature Data over the NSA Fen
BOREAS TGB-03 CO2 and CH4 Chamber Flux Data over the NSA
BOREAS TGB-05 CO, CO2, and CH4 Chamber Flux Data over the NSA
BOREAS TGB-12 CO2 Flux Data over the NSA
BOREAS TGB-12 CO2 Soil Profile Data over the NSA
BOREAS TGB-12 Soil Carbon Isotope Data over the NSA
BOREAS TGB-12 Soil Carbon Map in Raster Format

2. Investigator(s)

2.1 Investigator(s) Name and Title

Dr. Richard A. Bourbonniere, TGB-05

2.2 Title of Investigation

Biogeochemistry of Dissolved Organic Matter - Disturbances

2.3 Contact Information

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3. Theory of Measurements

Chemical measurements were made on water samples. Dissolved carbon analyses were made using a Dohrmann DC-190 Carbon Analyzer. This instrument uses the High Temperature Catalytic Oxidation (HTCO) method to determine total carbon (TC) and organic carbon (DOC) species, and acidification and sparging for inorganic carbon (DIC) species. An alternate method of measuring DIC, the difference method (see below), was used for all 1994 samples. The quartz oxidation tube was filled with a catalyst made of platinum on alumina beads and placed in a furnace set at 900 degrees C; the carrier gas was Ultra High Purity Zero Air from Canox at 200 mL/min. The detector on this instrument is a Milton Roy Model 3300 nondispersive infrared (NDIR) gas analyzer (Mfg: Fuji Electric), which is a single-beam detector with a wide dynamic range. The instrument was used mostly in the automatic sampling mode (ASM), but occasionally manual injection was used. TC analyses were done on whole filtered samples, DOC was determined after acidification (pH <4 using 20% phosphoric acid) and sparging (5 minutes with carrier) to remove DIC, and DIC was determined by the difference: TC - DOC = DIC.

POC was determined by HTCO on filters using a CHN Analyzer after acidification to remove solid carbonates (done by Environment Canada's National Laboratory for Environmental Testing, Burlington, ON).

4. Equipment

4.1 Sensor/Instrument Description

4.1.1 Collection Environment

Samples 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

Fulvic Acid (FA), Humic Acid (HA), Hydrophobic Acid (HPOA), Hydrophobic Neutral (HPON), Hydrophilic Acid (HPIA), Hydrophilic Neutral (HPIN), and X4AC are fractions of DOM (see Section 18).

4.1.5 Principles of Operation

Dissolved carbon analyses were made using a Dohrmann DC-190 Carbon Analyzer. This instrument uses the High Temperature Catalytic Oxidation (HTCO) method to determine total (TC) and organic carbon (DOC) species, and acidification and sparging for inorganic carbon (DIC) species. An

alternate measurement of DIC, the difference method (see below) was used for all 1994 samples. The quartz oxidation tube was filled with a catalyst made of Platinum on Alumina beads, placed in a furnace set at 900 degrees C, and the carrier gas was Ultra High Purity Zero Air from Canox at 200 mL/min.

4.1.6 Sensor/Instrument Measurement Geometry

Not applicable.

4.1.7 Manufacturer of Sensor/Instrument

Dohrmann DC-190 Carbon Analyzer
Tekmar-Dohrmann
P.O. Box 429576
Cincinnati, OH 45249
(800)-543-4461 (Sales)
(800)-874-2004 (Service)
(513)-247-7000 (Outside the USA/Canada)
(513)-247-7050 (Fax)

4.2 Calibration

4.2.1 Specifications

The DC-190 uses a single-point calibration method. This is possible because of the wide dynamic range of the detector and the stable, closely spaced calibration curves stored in the instrument by the factory. Calibrations for TC and DOC were done using fresh dilutions of Potassium Biphthalate (KHP), primary standard grade, diluted with E-Pure water (Barnstead). System blanks were calculated by regressing results from low ppm range standards; the intercept of a "true value" vs. "measured value" was called the system blank and was subtracted from each analysis. The calibration factor was updated for each set of 32 samples, and system blank samples were included within each set.

Under the conditions described above, system blanks were typically between 1-2 mgC/L. Note that much of this is probably attributable to residual carbon in the E-Pure water, as carbon-free water was unattainable. Under these conditions, the system blank correction is probably higher than the actual system blank. Under the high TC and DOC conditions found for the waters in the Northern Study Area (NSA), the system blank accounts for 4-8% of the measured values, and the overcorrection could be as high as 3-6%. Without "carbon-free water," this could not be improved.

4.2.1.1 Tolerance

None given.

4.2.2 Frequency of Calibration

None given.

4.2.3 Other Calibration Information

None given.

5. Data Acquisition Methods

The DC-190 uses internal algorithms to calculate carbon concentrations that are reported directly in printed form for each analysis. Each sample was analyzed in triplicate for TC and in quadruplicate for DOC.

6. Observations

6.1 Data Notes

Raw data are held by the Principal Investigator (PI).

6.2 Field Notes

Extensive field notes were routinely made during sampling and recorded on microcassettes. Transcription can be made available by the PI.

7. Data Description

7.1 Spatial Characteristics

7.1.1 Spatial Coverage

All of the data in this set are results of analyses of water samples taken from the NSA Tower Beaver Pond Site (TP), including its groundwater inputs, open water sites on the pond, and its inflow and outflow creeks.

All site designations are TP for this data set. Subdesignations refer to the specific location within the TP watershed where the water sample was taken:

Sub-Site	Description
P1-P10	Ten refers to 10 open water sites on the Beaver Pond. Site P1 is the "main" site and is at the deepest part of the pond.
PL, B3	Sites along the boardwalk to the tower platform.
OD, UD	Sampled from over and under the main (east) dam.
NOD	Sampled from over the dam on the older pond to the north of TP.
WD	Sampled from the footbridge at the west dam outlet.
D, D2	Sampled from the Highway 391 (100 m from road) end of the drainage creeks that flowfrom the west and east dams, respectively.
I1, I2, I3	Inflow creeks on the south end of the pond, sampled at their mouths. I3 is the maininflow of surface water to the pond.
SM	Snowmelt collected during the thaw period.
FP, C, H	Samples from intermittent surface inflows along the southwest, south, and southeastperimeter of TP. These flowed only occasionally after rain events during the thawperiod.
SZ(S), SZ(M), SZ(D)	Shallow, Middle, and Deep piezometers (wells) from a nest adjacent to TP at the westend of the main (east) dam.
NZ(S), NZ(M), NZ(D)	Shallow, Middle, and Deep piezometers (wells) from a nest adjacent to the older pondto the north of TP and also near the west end of the old dam.
NZDP1, NZDP2	The first and second pools of groundwater collected from the NZ(D) piezometer overa number of days during Focused field Campaign-Thaw (FFC-T) and Intensive Field Campaign(IFC)-1.
HOLE	Water sampled through a hole in the ice adjacent to the boardwalk, equivalent to"B3" under ice conditions.
Sample Depth	All surface samples were taken at approximately 10 cm depth. Other depths refer tomeasured depths from the pond surface and piezometer depths are the deepest partof the interval sampled. The shallowest depth for any well is the deepest intervalfor the well above, and zero for the "shallow" wells.

7.1.2 Spatial Coverage Map
None given.

7.1.3 Spatial Resolution
The total area of the NSA Tower Beaver Pond is 5 ha, and its northern end is approximately 500 m south of Highway 391. All groundwater, inflow, and open water sites are within the 5-ha pond area, and outflow sites are either at the pond edge or adjacent to Highway 391. More details regarding the tower pond are found in Dove (1995). The North American Datum of 1983 (NAD83) coordinates of the Gillam Road Beaver Pond are 55.8958° N, 98.7583° W.

7.1.4 Projection
Not applicable.

7.1.5 Grid Description
Not applicable.

7.2 Temporal Characteristics

7.2.1 Temporal Coverage
All samples were collected between 22-Apr and 19-Sep-1994 (FFC-T, IFC-1, IFC-2, and IFC-3) and are of variable frequency by site (some daily for a short period, many weekly during IFCs, and some occasionally, e.g., once during an IFC, or once during the wet period).

7.2.2 Temporal Coverage Map
None given.

7.2.3 Temporal Resolution
Samples are of variable frequency by site (some daily for a short period, many weekly during IFCs, and some occasionally, e.g., once during an IFC, or once during the wet period).

7.3 Data Characteristics

7.3.1 Parameter/Variable
The parameters contained in the data files on the CD-ROM are:

```
         Column Name
------------------------------
SITE_NAME
SUB_SITE
DATE_OBS
WATER_DEPTH
TOTAL_DISS_C_CONC
DISS_ORG_C_CONC
DISS_INORG_C_CONC
FULVIC_ACID_CONC
HUMIC_ACID_CONC
HYDROPHOBIC_ACID_CONC
HYDROPHOBIC_NEUTRAL_CONC
HYDROPHILIC_ACID_CONC
HYDROPHILIC_NEUTRAL_CONC
XAD4_ACID_CONC
PART_ORG_C_CONC
CRTFCN_CODE
REVISION_DATE
```

7.3.2 Variable Description/Definition

For descriptions of the chemical nature of the fractions, consult Aiken et al. (1992), Bourbonniere (1989), Bourbonniere and van Halderen (1989), Bourbonniere et al. (1995), Leenheer (1981), and Malcolm and MacCarthy (1992).The PI can provide a "cookbook" description of the fractionation scheme for HA, FA, HPOA, HPON, HPIA, HPIN, and X4AC.The descriptions of the parameters contained in the data files on the CD-ROM are:

Column Name	Description
SITE_NAME	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.
SUB_SITE	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.
DATE_OBS	The date on which the data were collected.
WATER_DEPTH	The depth of the water at which the measurement was taken.
TOTAL_DISS_C_CONC	The total dissolved (organic and inorganic) carbon concentration.
DISS_ORG_C_CONC	Dissolved organic carbon concentration.
DISS_INORG_C_CONC	Dissolved inorganic carbon concentration.
FULVIC_ACID_CONC	Fulvic acid concentration.
HUMIC_ACID_CONC	Humic acid concentration.
HYDROPHOBIC_ACID_CONC	Hydrophobic acid concentration (fraction of fulvic acid).
HYDROPHOBIC_NEUTRAL_CONC	Hydrophobic neutral concentration (fraction of fulvic acid).
HYDROPHILIC_ACID_CONC	Hydrophilic acid concentration (fraction of fulvic acid).
HYDROPHILIC_NEUTRAL_CONC	Hydrophilic neutral concentration (fraction of fulvic acid).
XAD4_ACID_CONC	XAD-4 resin retained acid concentration (fraction of fulvic acid).
PART_ORG_C_CONC	Particulate organic carbon concentration.
CRTFCN_CODE	The BOREAS certification level of the data. Examples are CPI (Checked by PI), CGR (Certified by Group), PRE (Preliminary), and CPI-??? (CPI but questionable).
REVISION_DATE	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:

Column Name	Units
SITE_NAME	[none]
SUB_SITE	[none]
DATE_OBS	[DD-MON-YY]
WATER_DEPTH	[meters]
TOTAL_DISS_C_CONC	[milligrams C][liter^-1]
DISS_ORG_C_CONC	[milligrams C][liter^-1]
DISS_INORG_C_CONC	[milligrams C][liter^-1]
FULVIC_ACID_CONC	[milligrams C][liter^-1]
HUMIC_ACID_CONC	[milligrams C][liter^-1]
HYDROPHOBIC_ACID_CONC	[milligrams C][liter^-1]
HYDROPHOBIC_NEUTRAL_CONC	[milligrams C][liter^-1]
HYDROPHILIC_ACID_CONC	[milligrams C][liter^-1]
HYDROPHILIC_NEUTRAL_CONC	[milligrams C][liter^-1]
XAD4_ACID_CONC	[milligrams C][liter^-1]
PART_ORG_C_CONC	[milligrams C][liter^-1]
CRTFCN_CODE	[none]
REVISION_DATE	[DD-MON-YY]

7.3.4 Data Source

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

Column Name	Data Source
SITE_NAME	Assigned by BORIS
SUB_SITE	Assigned by BORIS
DATE_OBS	Investigator
WATER_DEPTH	Dohrmann DC-190 Carbon Analyzer
TOTAL_DISS_C_CONC	Dohrmann DC-190 Carbon Analyzer
DISS_ORG_C_CONC	Dohrmann DC-190 Carbon Analyzer
DISS_INORG_C_CONC	Dohrmann DC-190 Carbon Analyzer
FULVIC_ACID_CONC	Dohrmann DC-190 Carbon Analyzer
HUMIC_ACID_CONC	Dohrmann DC-190 Carbon Analyzer
HYDROPHOBIC_ACID_CONC	Dohrmann DC-190 Carbon Analyzer
HYDROPHOBIC_NEUTRAL_CONC	Dohrmann DC-190 Carbon Analyzer
HYDROPHILIC_ACID_CONC	Dohrmann DC-190 Carbon Analyzer
HYDROPHILIC_NEUTRAL_CONC	Dohrmann DC-190 Carbon Analyzer
XAD4_ACID_CONC	Dohrmann DC-190 Carbon Analyzer
PART_ORG_C_CONC	Dohrmann DC-190 Carbon Analyzer
CRTFCN_CODE	Assigned by BORIS
REVISION_DATE	Assigned by BORIS

7.3.5 Data Range

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

Column Name	Minimum Data Value	Maximum Data Value	Missng Data Value	Unrel Data Value	Below Detect Limit	Data Not Cllctd
SITE_NAME	NSA-BVP-FLXTR	NSA-BVP-FLXTR	None	None	None	None
SUB_SITE	TGB05-DOC01	TGB05-DOC34	None	None	None	None
DATE_OBS	22-APR-94	19-SEP-94	None	None	None	None
WATER_DEPTH	0	2.4	None	None	None	None
TOTAL_DISS_C_CONC	5.65	100.38	-999	None	None	None
DISS_ORG_C_CONC	.32	72.6	-999	None	None	None
DISS_INORG_C_CONC	0	69.2	-999	None	None	None
FULVIC_ACID_CONC	4.13	43.2	-999	None	None	None
HUMIC_ACID_CONC	0	25.48	-999	None	None	None
HYDROPHOBIC_ACID_CONC	7.64	20.4	-999	None	None	None
HYDROPHOBIC_NEUTRAL_CONC	0	9	-999	None	None	None
HYDROPHILIC_ACID_CONC	2.53	7.54	-999	None	None	None
HYDROPHILIC_NEUTRAL_CONC	0	5	-999	None	None	None
XAD4_ACID_CONC	0	5.1	-999	None	None	None
PART_ORG_C_CONC	.11	12.4	-999	None	None	None
PART_ORG_C_CONC	-999.9	12.4	-999	None	None	None
CRTFCN_CODE	CPI	CPI	None	None	None	None
REVISION_DATE	09-DEC-96	09-DEC-96	None	None	None	None

Minimum Data Value -- The minimum value found in the column.
Maximum Data Value -- The maximum value found in the column.
Missng 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 Cllctd -- 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 records from a sample data file on the CD-ROM.

```
SITE_NAME,SUB_SITE,DATE_OBS,WATER_DEPTH,TOTAL_DISS_C_CONC,DISS_ORG_C_CONC,
DISS_INORG_C_CONC,FULVIC_ACID_CONC,HUMIC_ACID_CONC,HYDROPHOBIC_ACID_CONC,
HYDROPHOBIC_NEUTRAL_CONC,HYDROPHILIC_ACID_CONC,HYDROPHILIC_NEUTRAL_CONC,
XAD4_ACID_CONC,PART_ORG_C_CONC,CRTFCN_CODE,REVISION_DATE
'NSA-BVP-FLXTR','TGB05-DOC03',22-APR-94,.1,-999.0,14.1,-999.0,-999.0,-999.0,-999
.0,-999.0,-999.0,-999.0,-999.0,'CPI',09-DEC-96
'NSA-BVP-FLXTR','TGB05-DOC03',24-APR-94,.1,-999.0,20.9,-999.0,-999.0,-999.0,-999
.0,-999.0,-999.0,-999.0,-999.0,'CPI',09-DEC-96
'NSA-BVP-FLXTR','TGB05-DOC03',28-APR-94,.1,-999.0,20.2,-999.0,-999.0,-999.0,-999
.0,-999.0,-999.0,-999.0,-999.0,.27,'CPI',09-DEC-96
```

8. Data Organization

8.1 Data Granularity

The smallest unit of data tracked by the BOREAS Information System (BORIS) was the measurement from a given site on a given day.

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

Some formulae were used in DOM fraction calculations prior to input into the data set - see Section 17, References.

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

All FA data are corrected for the average "filter blank" for the entire season. Difference calculations for DIC, HA, HPON, and X4AC occasionally resulted in small negative values, which were edited to zero.

9.3.2 Calculated Variables

None given.

9.4 Graphs and Plots

None given.

10. Errors

10.1 Sources of Error

The system blank for the Dohrmann DC-190 is the main source of error, but since carbon values are generally greater than 10 mgC/L, the correction is rarely more than 10% of the value and usually less than 5%.

10.2 Quality Assessment

10.2.1 Data Validation by Source

All carbon determinations reported are averages of 3 (TC) or 4 (DOC) replicate analyses on the Dohrmann DC-190.

10.2.2 Confidence Level/Accuracy Judgment

None given.

10.2.3 Measurement Error for Parameters

The precision for TC was typically +/- 0.8 mgC/L at the 50 mgC/L level; for DOC, a precision of +/- 0.5 mgC/L was typical at the 25 mgC/L level.

10.2.4 Additional Quality Assessments

A few obvious outlier values were deleted from the data set. These samples had very high DOC or TC values that resulted from contamination during sampling.

10.2.5 Data Verification by Data Center

Data were examined for general consistency and clarity.

11. Notes

11.1 Limitations of the Data

Not all parameters were determined for all samples, and not all sites were covered for all dates. See above descriptions.

11.2 Known Problems with the Data

System blanks were typically between 1-2 mgC/L. Note that much of this is probably attributable to residual carbon in the E-Pure water, as carbon-free water was unattainable. Under these conditions, the system blank correction is probably higher than the actual system blank. Under the high TC and DOC conditions found for the waters in the NSA, the system blank accounts for 4-8% of the measured values, and the overcorrection could be as high as 3-6%. Without carbon-free water, this could not be improved.

11.3 Usage Guidance

Note that the definition of HA used here is more like the traditional soil science definition and differs from that used by many aquatic scientists (see references). Note that DIC by difference is subject to more error than DIC measured directly.

11.4 Other Relevant Information

None given.

12. Application of the Data Set

This data set was created for BOREAS investigators who need soils data in the vicinity of the NSA for further modeling and to generate maps of carbon stocks and fluxes.

13. Future Modifications and Plans

None planned.

14. Software

14.1 Software Description

None.

14.2 Software Access

None given.

15. Data Access

The dissolved organic carbon data from NSA beaver ponds 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 http://www-eosdis.ornl.gov/.

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

Not applicable.

16.2 Film Products

Not applicable.

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.

17.2 Journal Articles and Study Reports

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17.3 Archive/DBMS Usage Documentation

None.

18. Glossary of Terms

The fractionation procedure for DOM results in these fraction definitions:

- Humic Acid (HA) - Precipitates within 24 hrs. at pH=2 from filtered whole water.
- Fulvic Acid (FA) - Components that are soluble at pH=2.

FA Subfractions:

- Hydrophobic Acid (HPOA) - Adsorbs to XAD-8 at pH=2 and is eluted with 0.1 M NaOH.
- Hydrophobic Neutral (HPON) - Adsorbs to XAD-8 at pH=2, does not elute with 0.1 M NaOH, extracted off resin with methanol and acetonitrile.
- Hydrophilic Acid (HPIA) - Adsorbs to XAD-4 resin at pH=2, elutes with 0.1 M NaOH.
- Hydrophilic Neutral (HPIN) - Passes through both resins.
- XAD-4 Acids (X4AC) - Adsorbs to XAD-4 at pH=2, does not elute with 0.1 M NaOH, extracted off resin with methanol and acetonitrile.

19. List of Acronyms

ASCII - American Standard Code for Information Interchange
ASM - Automatic Sampling Mode (for Carbon Analyzer)
BOREAS - BOReal Ecosystem-Atmosphere Study
BORIS - BOREAS Information System
CD-ROM - Compact Disk-Read-Only Memory
CHN - Carbon-Hydrogen-Nitrogen
DAAC - Distributed Active Archive Center
DIC - Dissolved Inorganic Carbon
DOC - Dissolved Organic Carbon
DOM - Dissolved Organic Matter
DOY - Day of Year (Julian Day)
EOS - Earth Observing System
EOSDIS - EOS Data and Information System
FA - Fulvic Acid (DOM that is soluble at pH=2)
FFC-T - Focused Field Campaign-Thaw
GIS - Geographic Information System
GP - Gillam Road Beaver Pond (NSA)
GSFC - Goddard Space Flight Center
HA - Humic Acid (DOM that is insoluble at pH=2)
HPIA - Hydrophilic Acid (fraction of FA)
HPIN - Hydrophilic Neutral (fraction of FA)
HPOA - Hydrophobic Acid (fraction of FA)
HPON - Hydrophobic Neutral (fraction of FA)
HTCO - High Temperature Catalytic Oxidation
HTML - HyperText Markup Language
IFC - Intensive Field Campaign
NASA - National Aeronautics and Space Administration
NDIR - Nondispersive Infrared
NSA - Northern Study Area
ORNL - Oak Ridge National Laboratory
PANP - Prince Albert National Park
PI - Private Investigator
POC - Particulate Organic Carbon
SSA - Southern Study Area
TC - Total Carbon
TGB - Trace Gas Biogeochemistry
TP - Tower Beaver Pond at the NSA (and sampling sites in its watershed)
URL - Uniform Resource Locator
X4AC - XAD-4 Acid (fraction of FA)

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13. ABSTRACT *(Maximum 200 words)*

The BOREAS TGB-5 team collected several data sets related to carbon and trace gas fluxes and concentrations in the NSA. This data set contains concentrations of dissolved organic and inorganic carbon species from water samples collected at various NSA sites. In particular, this set covers the NSA Tower Beaver Pond Site and the NSA Gillam Road Beaver Pond Site, including data from all visits to open water sampling locations during the BOREAS field campaigns from April to September 1994. The data are provided in tabular ASCII files.

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