NASA/TM—2000–209891, Vol. 123

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

*Forrest G. Hall and Jeffrey A. Newcomer, Editors*

## Volume 123

## Saskatchewan Forest Fire Control Centre Surface Meteorological Data

*B. Funk and R. Strub*

National Aeronautics and
Space Administration

**Goddard Space Flight Center**
Greenbelt, Maryland 20771

September 2000

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# Saskatchewan Forest Fire Control Centre Surface Meteorological Data

*Barry Funk, Environmental Canada, Winnipeg, Manitoba, Canada*
*Richard Strub, Raytheon ITSS, NASA Goddard Space Flight Center, Greenbelt, Maryland*

National Aeronautics and
Space Administration

**Goddard Space Flight Center**
Greenbelt, Maryland 20771

September 2000

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# Saskatchewan Forest Fire Control Centre Surface Meteorological Data

Barry Funk, Richard Strub

## Summary

The Saskatchewan Forest Fire Control Centre (SFFCC) provided surface meteorological data to BOREAS from its archive. This data set contains hourly surface meteorological data from 18 of the meteorological stations located across Saskatchewan. Included in these data are parameters of date, time, temperature, relative humidity, wind direction, wind speed, and precipitation. Temporally, the data cover the period of May through September of 1994 and 1995. The data are provided in comma-delimited ASCII files, and are classified as AFM-Staff data.

## Table of Contents



## 1. Data Set Overview

### 1.1 Data Set Identification

Saskatchewan Forest Fire Control Centre Surface Meteorological Data

### 1.2 Data Set Introduction

These data contain hourly reports from 18 surface meteorological stations across Saskatchewan, Canada. Included in these data are parameters of date, time, temperature, relative humidity, wind direction, wind speed, and precipitation.

### 1.3 Objective/Purpose

For the BOReal Ecosystem-Atmosphere Study (BOREAS), the Saskatchewan Forest Fire Control Centre (SFFCC) meteorological data, along with the other climate information, were obtained in order to provide spatially and temporally extensive information over the region. The SFFCC monitoring sites were established to provide hourly weather reports, input to the operational program of forecasts and warnings, input to operational weather prediction models, and climate data.

### 1.4 Summary of Parameters

Parameters include date, time, temperature, relative humidity, wind direction, wind speed, and precipitation.

### 1.5 Discussion

These data were compiled by SFFCC from observations at remote automatic weather stations.

### 1.6 Related Data Sets

BOREAS AFM-07 SRC Surface Meteorological and Radiation Data
BOREAS AES MARS II Surface Meteorological Data
BOREAS AES READAC Surface Meteorological Data
BOREAS AES Five-Day Averaged Surface Meteorological and Upper Air Data
AES Canadian Hourly and Daily Surface Meteorological Data

## 2. Investigator(s)

### 2.1 Investigator(s) Name and Title

G. Barrie Atkinson BOREAS AES Project Scientist

### 2.2 Title of Investigation

BOREAS Staff Science Meteorological Data Acquisition Program

### 2.3 Contact Information

**Contact 1:**
G. Barrie Atkinson (Retired)
BOREAS AES Project Scientist
Environment Canada
1000 - 266 Graham Avenue
Winnipeg, Manitoba
Canada R3C 3V4
(204) 983-6059
(204) 983-4884 (fax)

**Contact 2:**
Barry Funk
Supervisor, Special Programs
Environment Canada
1000 - 266 Graham Avenue
Winnipeg, Manitoba
Canada R3C 3V4
(204) 983-2018
(204) 984-2072 (fax)

**Contact 3:**
Jeffrey A. Newcomer
Raytheon ITSS
Code 923
NASA GSFC
Greenbelt, MD 20771
(301) 286-785
(301) 286-0239
Jeffrey.Newcomer@gsfc.nasa.gov

# 3. Theory of Measurements

BOREAS staff does not have any detailed information on how the original full resolution measurements were made at the various SFFCC stations. The best source of information for this would be SFFCC. Due to turnover and staff changes at SFFCC, there is not a single point of contact for these data at this time.

# 4. Equipment

### 4.1 Sensor/Instrument Description

BOREAS staff does not have specific descriptions of the various types of instruments used by SFFCC to collect the data. Users are encouraged to contact SFFCC.

### 4.1.1 Collection Environment

The data were collected continuously in all types of weather.

### 4.1.2 Source/Platform

None given.

### 4.1.3 Source/Platform Mission Objectives

None given.

### 4.1.4 Key Variables

The parameters are date, time, temperature, relative humidity, wind direction, wind speed, and precipitation.

### 4.1.5 Principles of Operation

None given.

### 4.1.6 Sensor/Instrument Measurement Geometry

These data were compiled by SFFCC from observations at remote automatic weather stations.

### 4.1.7 Manufacturer of Sensor/Instrument

None given.

### 4.2 Calibration

### 4.2.1 Specifications

None given.

### 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

These data were compiled by SFFCC from observations at remote automatic weather stations.

# 6. Observations

### 6.1 Data Notes

None given.

### 6.2 Field Notes

These are historical data.

# 7. Data Description

### 7.1 Spatial Characteristics

#### 7.1.1 Spatial Coverage

The following table contains the latitude and longitude coordinates for each station. Information provided to BOREAS Information System (BORIS) staff indicated that the latitude and longitude coordinates of each station depended on whatever reference map was used at the time of station siting. As such, it is not clear what datum(s) should be associated with the coordinates.

| Station Name | Latitude | Longitude |
|---|---|---|
| BESNARD, SK | 55.3833° N | 106.0833° W |
| DIVIDE, SK | 53.8833° N | 108.4167° W |
| VIMY, SK | 53.8167° N | 107.5500° W |
| RABBIT HILL, SK | 54.3300° N | 107.1833° W |
| BIG RIVER, SK | 53.8333° N | 107.0333° W |
| WABENO, SK | 54.3500° N | 106.4700° W |
| WASKESIU, SK | 53.9167° N | 106.0833° W |
| WEYAKWIN, SK | 54.4667° N | 105.7833° W |
| LITTLE BEAR, SK | 54.2500° N | 104.5000° W |
| CANDLE LAKE, SK | 53.7830° N | 105.1330° W |
| EBCAM, SK | 53.6333° N | 103.3667° W |
| WILD CAT HILLS, SK | 53.3333° N | 102.4844° W |
| COOKSON, SK | 53.6670° N | 106.5000° W |
| TRACEY, SK | 54.9167° N | 105.5000° W |
| DORE, SK | 54.6081° N | 107.3611° W |
| MIRASTY, SK | 54.4730° N | 107.1071° W |
| TAGGART, SK | 54.2500° N | 107.3968° W |
| HACKETT, SK | 54.0946° N | 106.9048° W |

#### 7.1.2 Spatial Coverage Map

Not available.

#### 7.1.3 Spatial Resolution

The data represent point measurements of the various parameters at the locations given.

#### 7.1.4 Projection

Not applicable.

### 7.1.5 Grid Description
Not applicable.

## 7.2 Temporal Characteristics

### 7.2.1 Temporal Coverage
All of the stations collected data from 05-May to 30-Sep-1994 and from 01-May to 30-Sep-1995.

### 7.2.2 Temporal Coverage Map
Not available.

### 7.2.3 Temporal Resolution
BOREAS received data recorded at 1-hour intervals during the entire data collection 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
TIME_OBS
STATION_ID
AIR_TEMP
REL_HUM
WIND_DIR
WIND_SPEED
RAINFALL_LAST_HOUR
RAINFALL_LAST_24HOUR
CRTFCN_CODE
REVISION_DATE
```

### 7.3.2 Variable Description/Definition
The descriptions of the parameters contained in the data files onthe 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 BOREA
                               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.
```

| | |
|---|---|
| TIME_OBS | The Greenwich Mean Time (GMT) when the data were collected. |
| STATION_ID | The station identifier from which the measurement came. |
| AIR_TEMP | The air temperature. |
| REL_HUM | The calculated relative humidity. |
| WIND_DIR | The direction from which the wind was traveling, increasing in a clockwise direction from north. |
| WIND_SPEED | The wind speed. |
| RAINFALL_LAST_HOUR | The total amount of liquid precipitation that has fallen within the last hour (minute 00). |
| RAINFALL_LAST_24HOUR | The total amount of rainfall measured during the last 24 hours (12Z to 12Z). |
| 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] |
| TIME_OBS | [HHMM GMT] |
| STATION_ID | [none] |
| AIR_TEMP | [degrees Celsius] |
| REL_HUM | [percent] |
| WIND_DIR | [degrees] |
| WIND_SPEED | [meters][second^-1] |
| RAINFALL_LAST_HOUR | [millimeters] |
| RAINFALL_LAST_24HOUR | [millimeters] |
| 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 | [Supplied by SFFCC] |
| TIME_OBS | [Supplied by SFFCC] |
| STATION_ID | [Supplied by SFFCC] |
| AIR_TEMP | [Supplied by SFFCC] |
| REL_HUM | [Supplied by SFFCC] |
| WIND_DIR | [Supplied by SFFCC] |
| WIND_SPEED | [Supplied by SFFCC] |
| RAINFALL_LAST_HOUR | [Supplied by SFFCC] |

```
RAINFALL_LAST_24HOUR           [Supplied by SFFCC]
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 | REG-999-BEA01 | SSA-999-WSK01 | None | None | None | None |
| SUB_SITE | STAFF-FRS01 | STAFF-FRS01 | None | None | None | None |
| DATE_OBS | 05-MAY-94 | 01-OCT-95 | None | None | None | None |
| TIME_OBS | 0 | 2300 | None | None | None | None |
| STATION_ID | BEAUV | WYKWN | None | None | None | None |
| AIR_TEMP | -20 | 37.1 | -999 | None | None | None |
| REL_HUM | 0 | 100 | -999 | None | None | None |
| WIND_DIR | 0 | 315 | -999 | None | None | None |
| WIND_SPEED | 0 | 51.2 | -999 | None | None | None |
| RAINFALL_LAST_HOUR | 0 | 31.75 | -999 | None | None | None |
| RAINFALL_LAST_24HOUR | 0 | 138.17 | None | None | None | Blank |
| CRTFCN_CODE | CPI | CPI | None | None | None | None |
| REVISION_DATE | 07-AUG-96 | 04-APR-97 | 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 record from a sample data file on the CD-ROM.

```
SITE_NAME,SUB_SITE,DATE_OBS,TIME_OBS,STATION_ID,AIR_TEMP,REL_HUM,WIND_DIR,
WIND_SPEED,RAINFALL_LAST_HOUR,RAINFALL_LAST_24HOUR,CRTFCN_CODE,REVISION_DATE
'REG-999-BRI02','STAFF-FRS01',05-MAY-94,700,'BRVR',1.1,34.0,90,0.0,0.0,,'CPI',
07-AUG-96
'REG-999-BRI02','STAFF-FRS01',05-MAY-94,800,'BRVR',-.3,38.0,90,0.0,0.0,,'CPI',
07-AUG-96
```

## 8. Data Organization

### 8.1 Data Granularity

The smallest unit of data is a yearly set of hourly records for one station.

### 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

None given.

#### 9.1.1 Derivation Techniques and Algorithms

None given.

### 9.2 Data Processing Sequence

#### 9.2.1 Processing Steps

BORIS personnel loaded these data into a relational data base and converted the units to match those of other data sets.

#### 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
None given.

### 10.2 Quality Assessment
None given.

### 10.2.1 Data Validation by Source
None given.

### 10.2.2 Confidence Level/Accuracy Judgment
A quality assessment has not been done on these data.

### 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
None given.

## 11. Notes

### 11.1 Limitations of the Data
See Section 10.2.2.

### 11.2 Known Problems with the Data
A quality assessment has not been done on these data.

### 11.3 Usage Guidance
Users are advised to read the information in this document before using the data.

### 11.4 Other Relevant Information
None given.

## 12. Application of the Data Set

None given.

## 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 SFFCC surface meteorological 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 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

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.

## 17.2 Journal Articles and Study Reports

Newcomer, J., D. Landis, S. Conrad, S. Curd, K. Huemmrich, D. Knapp, A. Morrell, J. Nickeson, A. Papagno, D. Rinker, R. Strub, T. Twine, F. Hall, and P. Sellers, eds. 2000. Collected Data of The Boreal Ecosystem-Atmosphere Study. NASA. CD-ROM.

Sellers, P. and F. Hall. 1994. Boreal Ecosystem-Atmosphere Study: Experiment Plan. Version 1994-3.0, NASA BOREAS Report (EXPLAN 94).

Sellers, P. and F. Hall. 1996. Boreal Ecosystem-Atmosphere Study: Experiment Plan. Version 1996-2.0, NASA BOREAS Report (EXPLAN 96).

Sellers, P., F. Hall, and K.F. Huemmrich. 1996. Boreal Ecosystem-Atmosphere Study: 1994 Operations. NASA BOREAS Report (OPS DOC 94).

Sellers, P., F. Hall, and K.F. Huemmrich. 1997. Boreal Ecosystem-Atmosphere Study: 1996 Operations. NASA BOREAS Report (OPS DOC 96).

Sellers, P., F. Hall, H. Margolis, B. Kelly, D. Baldocchi, G. den Hartog, J. Cihlar, M.G. Ryan, B. Goodison, P. Crill, K.J. Ranson, D. Lettenmaier, and D.E. Wickland. 1995. The boreal ecosystem-atmosphere study (BOREAS): an overview and early results from the 1994 field year. Bulletin of the American Meteorological Society. 76(9):1549-1577.

Sellers, P.J., F.G. Hall, R.D. Kelly, A. Black, D. Baldocchi, J. Berry, M. Ryan, K.J. Ranson, P.M. Crill, D.P. Lettenmaier, H. Margolis, J. Cihlar, J. Newcomer, D. Fitzjarrald, P.G. Jarvis, S.T. Gower, D. Halliwell, D. Williams, B. Goodison, D.E. Wickland, and F.E. Guertin. 1997. BOREAS in 1997: Experiment Overview, Scientific Results and Future Directions. Journal of Geophysical Research 102(D24): 28,731-28,770.

## 17.3 Archive/DBMS Usage Documentation

None.

# 18. Glossary of Terms

None.

# 19. List of Acronyms

```
AES     - Atmospheric and Environment Service
AFM     - Airborne Fluxes and Meteorology
ASCII   - American Standard Code for Information Interchange
BOREAS  - BOReal Ecosystem-Atmosphere Study
BORIS   - BOREAS Information System
CD-ROM  - Compact Disk Read-Only Memory
CGR     - Certified by Group
CPI     - Checked by PI
CPI-??? - CPI but questionable
DAAC    - Distributed Active Archive Center
EOS     - Earth Observing System
EOSDIS  - EOS Data and Information System
GIS     - Geographic Information System
GMT     - Greenwich Mean Time
GSFC    - Goddard Space Flight Center
HTML    - HyperText Markup Language
MARSII  - Meteorological Automatic Reporting System II
MB      - Manitoba
NASA    - National Aeronautics and Space Administration
NSA     - Northern Study Area
ORNL    - Oak Ridge National Laboratory
PANP    - Prince Albert National Park
PI      - Principal Investigator
PRE     - Preliminary
READAC  - Remote Environmental Automated Data Acquisition Concept
SFFCC   - Saskatchewan Forest Fire Control Centre
SK      - Saskatchewan
SSA     - Southern Study Area
T/RH    - Temperature / Relative Humidity
TBRG    - Tipping Bucket Rain Gauge
URL     - Uniform Resource Locator
```

# 20. Document Information

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When using these data, please include the following acknowledgment as well as citations of relevant papers in Section 17.2:

These data were collected and provided to BORIS by the Saskatchewan Forest Fire Control Centre. Their willingness and efforts to provide the data are greatly appreciated.

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

Atkinson, G.B. and B. Funk, "BOREAS Staff Science Meteorological Data Acquisition Program." In Collected Data of The Boreal Ecosystem-Atmosphere Study. Eds. J. Newcomer, D. Landis, S. Conrad, S. Curd, K. Huemmrich, D. Knapp, A. Morrell, J. Nickeson, A. Papagno, D. Rinker, R. Strub, T. Twine, F. Hall, and P. Sellers. CD-ROM. NASA, 2000.

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Barry Funk and Richard Strub
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**13. ABSTRACT** *(Maximum 200 words)*

The Saskatchewan Forest Fire Control Centre (SFFCC) provided surface meteorological data to BOREAS from its archive. This data set contains hourly surface meteorological data from 18 of the meteorological stations located across Saskatchewan. Included in these data are parameters of date, time, temperature, relative humidity, wind direction, wind speed, and precipitation. Temporally, the data cover the period of May through September of 1994 and 1995. The data are provided in comma-delimited ASCII files, and are classified as AFM-Staff data.

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**17. SECURITY CLASSIFICATION OF REPORT**
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**18. SECURITY CLASSIFICATION OF THIS PAGE**
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**19. SECURITY CLASSIFICATION OF ABSTRACT**
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**20. LIMITATION OF ABSTRACT**
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