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BOREAS AES Five-Day Averaged Surface Meteorological and Upper Air Data

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BOREAS AES Five-Day Averaged Surface Meteorological and Upper Air Data

Richard Strub, Jeffrey A. Newcomer

Summary

The Canadian Atmospheric Environment Service (AES) provided BOREAS with hourly and daily surface meteorological data from 23 of the AES meteorological stations located across Canada and upper air data from 1 station at The Pas, Manitoba. Due to copyright restrictions on the full-resolution surface meteorological data, this data set contains 5-day average values for the surface parameters. The upper air data are provided in their full resolution form. The 5-day averaging was performed in order to create a data set that could be publicly distributed at no cost. The original full-resolution data can be purchased from AES. Temporally, the surface meteorological data cover the period of January 1975 to December 1996 and the upper air data cover the period of January 1961 to November 1996. The data are provided in tabular ASCII files, and are classified as AFM-Staff data.

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1. Data Set Overview

1.1 Data Set Identification

BOREAS AES Five-Day Averaged Surface Meteorological and Upper Air Data

1.2 Data Set Introduction

The BOReal Ecosystem-Atmosphere Study (BOREAS) Staff Science effort covered those activities that were BOREAS community-level activities, or required uniform data collection procedures across sites and time. These activities included the acquisition of relevant meteorological data. These meteorological data were purchased from the Atmospheric Environment Service (AES) and then averaged for use by BOREAS researchers. This data set contains 5-day averages of hourly and daily data from 23 meteorological stations across Canada along with full-resolution upper air measurements from 1 station in The Pas, Manitoba.

1.3 Objective/Purpose

For BOREAS, the AES historic meteorological data were obtained in order to provide spatially and temporally extensive information over the region. The AES 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

The surface meteorology parameters include:

- 5-day averages of hourly values for sea level pressure, station pressure, dewpoint, wind direction, wind speed, dry and wet bulb temperature, relative humidity, cloud opacity, and cloud amount.
- 5-day averages of daily values for date, temperature, precipitation, and snow.
- The full-resolution upper air data set includes station ID, observation date and time, pressure, altitude, temperature, relative humidity, and wind speed and direction.

1.5 Discussion

These data were derived from the original daily and hourly meteorological data. Many of the stations only record temperature and precipitation. Generally, these stations were installed before BOREAS began and conform to AES criteria for accuracy and exposure. BOREAS Information System (BORIS) personnel derived the 5-day daily and hourly averages in the surface meteorology files in order to distribute the data at no cost. The original full-resolution data can be purchased from AES.

1.6 Related Data Sets

BOREAS AFM-05 Level-1 Upper-Air Network Data
BOREAS AFM-05 Level-2 Upper-Air Network Standard Pressure Level Data
BOREAS AFM-07 SRC Surface Meteorological and Radiation Data
BOREAS AES Five-Day Averaged Surface Meteorological and Upper Air Data
BOREAS AES MARSII Surface Meteorological Data
BOREAS AES READAC Surface Meteorological Data
Saskatchewan Forest Fire Control Centre Surface Meteorological Data

2. Investigator(s)

2.1 Investigator(s) Name and Title

BOREAS Staff Science

2.2 Title of Investigation

BOREAS Staff Science Meteorological Data Acquisition Program

2.3 Contact Information

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3. Theory of Measurements

BOREAS staff does not have any detailed information on how the original full-resolution measurements were made at the various AES stations. The best source of information for this would be AES. Due to turnover and staff changes at AES, there is not a single point of contact for these data at this time. See Section 9.2 for details on how the averaging was performed.

4. Equipment

4.1 Sensor/Instrument Description

BOREAS staff does not have specific descriptions of the various types of instruments used by AES to collect the data. The user is encouraged to contact AES or to review the information contained in AES (1989).

4.1.1 Collection Environment

The data were collected continuously in all types of weather.

4.1.2 Source/Platform

See AES (1989) in Section 17.2.

4.1.3 Source/Platform Mission Objectives

See AES (1989) in Section 17.2.

4.1.4 Key Variables

The surface meteorology parameters include:

- 5-day averages of hourly values for sea level pressure, station pressure, dewpoint, wind direction, wind speed, dry and wet bulb temperature, relative humidity, cloud opacity, and cloud amount.
- 5-day averages of daily values for date, time, temperature, precipitation, and snow.
- The upper air data set includes station ID, observation date and time, pressure, altitude, temperature, relative humidity, and wind speed and direction.

4.1.5 Principles of Operation

See AES (1989) in Section 17.2.

4.1.6 Sensor/Instrument Measurement Geometry

See AES (1989) in Section 17.2.

4.1.7 Manufacturer of Sensor/Instrument

See AES (1989) in Section 17.2.

4.2 Calibration

4.2.1 Specifications
See AES (1989) in Section 17.2.

4.2.1.1 Tolerance
See AES (1989) in Section 17.2.

4.2.2 Frequency of Calibration
See AES (1989) in Section 17.2.

4.2.3 Other Calibration Information
See AES (1989) in Section 17.2.

5. Data Acquisition Methods

The full-resolution surface and upper air data were obtained from AES. The averaging of the surface data was performed by BORIS staff.

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 AES station identifier, the station name, the latitude and longitude coordinates, and the type of reporting for each station. Detailed descriptions of these sites are available from the Prairies Provinces volume of the Climatological station catalog from Environment Canada. Note that the station numbers starting with 4 are contained in the province of Saskatchewan, and the station numbers starting with 5 are in the province of Manitoba. Information provided to BORIS staff by AES 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 Number	Name	Latitude	Longitude	Report Types
4060620	Big River, SK	53° 50' N	107° 02' W	Daily
4051080	Cameo, SK	53° 17' N	106° 32' W	Daily
4071560	Choiceland, SK	53° 30' N	104° 29' W	Daily
4061861	Cree Lake, SK	57° 21' N	107° 08' W	Daily
4052448	Ethelton, SK	52° 46' N	104° 54' W	Daily
4063020	Green Lake, SK	54° 17' N	107° 47' W	Daily
4063560	Island Falls, SK	55° 32' N	102° 21' W	Daily
4064150	La Ronge A, SK	55° 09' N	105° 16' W	Daily, Hourly
4074640	Lost River, SK	53° 17' N	104° 20' W	Daily
4063755	Key Lake, SK	57° 15' N	105° 37' W	Daily
4075518	Nipawin A, SK	53° 20' N	104° 00' W	Daily
4056240	Prince Albert A, SK	53° 13' N	105° 41' W	Daily, Hourly
4046360	Rabbit Lake, SK	53° 06' N	107° 52' W	Daily
4057120	Saskatoon A, SK	52° 10' N	106° 41' W	Daily, Hourly
4068560	Waskesiu Lake, SK	53° 55' N	106° 05' W	Daily
4068840	Whitesand Dam, SK	56° 14' N	103° 09' W	Daily
5060623	Crosslake Jenpeg, MB	53° 09' N	99° 17' W	Daily
5050960	Flin Flon A, MB	54° 41' N	101° 41' W	Daily
5031111	Grand Rapids, MB	53° 09' N	99° 17' W	Daily
5061646	Lynn Lake A, MB	56° 52' N	101° 05' W	Daily, Hourly
506B047	Norway House A, MB	53° 58' N	97° 50' W	Daily, Hourly
5062529	Ruttan Lake, MB	56° 29' N	99° 39' W	Daily
5062922	Thompson A, MB	55° 48' N	97° 52' W	Daily, Hourly
5063041	Wabowden, MB	54° 55' N	98° 39' W	Daily
The upper air stations were located at:				
5052880	The Pas A, MB	53° 58' N	101° 06' W	Daily, Upper Air
505KR20	The Pas A, MB	53° 58' N	101° 06' W	Upper Air

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 hourly data are complete from 01-Jan-1976 to 31-Dec-1996. The upper air data cover the period of January 1961 to November 1996. The following table gives the range of dates over which the daily data were provided for the various stations.

Station Number	Name	Date Range
4060620	Big River, SK	01-Jan-75 to 31-Aug-96
4051080	Cameo, SK	01-Jan-75 to 31-Dec-96
4052448	Ethelton, SK	01-Jan-75 to 31-Dec-96
4056240	Prince Albert A, SK	01-Jan-75 to 31-Dec-96
4057120	Saskatoon A, SK	01-Jan-75 to 31-Dec-93
4061861	Cree Lake, SK	01-Jan-75 to 31-Dec-93
4063020	Green Lake, SK	01-Jan-75 to 31-Dec-90
4063560	Island Falls, SK	01-Jan-75 to 31-Dec-96
4063755	Key Lake, SK	01-Jan-76 to 31-Dec-96
4064150	La Ronge A, SK	01-Jan-75 to 31-Dec-96
4068560	Waskesiu Lake, SK	01-Jan-75 to 31-Dec-95
4068840	Whitesand Dam, SK	01-Jan-75 to 31-Dec-96
4071560	Choiceland, SK	01-Jan-75 to 31-Dec-94
4074640	Lost River, SK	01-Jan-75 to 31-Dec-94
4075518	Nipawin A, SK	01-Jan-75 to 31-Dec-96
4046360	Rabbit Lake, SK	01-Jan-75 to 31-Dec-89
5031111	Grand Rapids, MB	01-Jan-75 to 31-Dec-96
5050960	Flin Flon A, MB	01-Jan-75 to 31-Dec-96
5052880	The Pas A, MB	01-Jan-75 to 31-Dec-96
5060623	Crosslake Jenpeg, MB	01-Jan-75 to 31-Dec-96
5061646	Lynn Lake A, MB	01-Jan-75 to 31-Dec-96
5062529	Ruttan Lake, MB	01-Jan-75 to 31-Dec-91
5062922	Thompson A, MB	01-Jan-75 to 31-Dec-96
5063041	Wabowden, MB	01-Jan-82 to 31-Dec-96
506B047	Norway House A, MB	01-Jan-75 to 31-Dec-96

7.2.2 Temporal Coverage Map

Not available.

7.2.3 Temporal Resolution

The original surface data were provided as hourly and daily values. Due to copyright constraints, these data have been averaged over 5-day periods. For the daily surface data, the data presented are averages of the original data over non-overlapping 5-day periods. For the hourly data, the data presented are averages of the hourly values over non-overlapping 5-day periods. In the event of a leap year, the last row of data for the year is a 6-day average. If data were missing, the average is only over those days in which there were valid data. The upper air data are presented in their original and full-resolution form.

7.3 Data Characteristics

7.3.1 Parameter/Variable

The parameters contained in the 5-day averaged hourly surface meteorological data files on the CD-ROM are:

```
          Column Name
------------------------------
SITE_NAME
SUB_SITE
START_DATE
END_DATE
TIME_OBS
MEAN_MSL_PRESS
MEAN_DEWPOINT_TEMP
MEAN_WIND_DIR
MEAN_WIND_SPEED
MEAN_STN_PRESS
MEAN_DRY_BULB_TEMP
MEAN_WET_BULB_TEMP
MEAN_REL_HUM
MEAN_TOTAL_CLOUD_AMOUNT
MEAN_TOTAL_CLOUD_OPACITY
CRTFCN_CODE
REVISION_DATE
```

The parameters contained in the 5-day averaged daily surface meteorological data files on the CD-ROM are:

```
          Column Name
------------------------------
SITE_NAME
SUB_SITE
START_DATE
END_DATE
MEAN_MAX_AIR_TEMP
MEAN_MIN_AIR_TEMP
MEAN_AVG_AIR_TEMP
MEAN_PRECIP_1200
MEAN_PRECIP_1800
MEAN_PRECIP_2400
MEAN_PRECIP_0600
MEAN_TOTAL_RAIN_24
MEAN_TOTAL_SNOW_24
MEAN_TOTAL_PRECIP_24
MEAN_SNOW_DEPTH
CRTFCN_CODE
REVISION_DATE
```

The parameters contained in the full-resolution upper air winds data files on the CD-ROM are:

Column Name
SITE_NAME
SUB_SITE
DATE_OBS
TIME_OBS
ATMOSPHERIC_PRESS
ALTITUDE
WIND_DIR
WIND_SPEED
CRTFCN_CODE
REVISION_DATE

The parameters contained in the full-resolution upper air soundings data files on the CD-ROM are:

Column Name
SITE_NAME
SUB_SITE
DATE_OBS
TIME_OBS
ATMOSPHERIC_PRESS
ALTITUDE
AIR_TEMP
REL_HUM
WIND_DIR
WIND_SPEED
CRTFCN_CODE
REVISION_DATE

7.3.2 Variable Description/Definition

The descriptions of the parameters contained in the 5-day averaged hourly surface meteorological 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.
START_DATE	The date on which the collection of data commenced.
END_DATE	The date on which the collection of the data was

	terminated.
TIME_OBS	The Greenwich Mean Time (GMT) when the data were collected.
MEAN_MSL_PRESS	The mean of the calculated instantaneous mean sea level pressure values for the given time over the period defined by the start and end dates.
MEAN_DEWPOINT_TEMP	The mean daily measured dew-point temperature for the period defined by the start and end dates.
MEAN_WIND_DIR	The mean direction from which the wind was travelling, increasing in a clockwise direction from the north for the period defined by the start and end dates.
MEAN_WIND_SPEED	The mean wind speed for the period defined by the start and end dates.
MEAN_STN_PRESS	The mean daily instantaneous atmospheric pressure at the measurement station for the period defined by the start and end dates.
MEAN_DRY_BULB_TEMP	The mean daily temperature measured from the dry -bulb thermometer for the period defined by the start and end dates.
MEAN_WET_BULB_TEMP	The mean daily temperature measured from the wet -bulb thermometer for the period defined by the start and end dates.
MEAN_REL_HUM	The mean daily calculated relative humidity for the period defined by the start and end dates.
MEAN_TOTAL_CLOUD_AMOUNT	The mean daily total cloud amount for the period defined by the start and end dates.
MEAN_TOTAL_CLOUD_OPACITY	The mean daily total cloud opacity for the period defined by the start and end dates.
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.

The descriptions of the parameters contained in the 5-day averaged daily surface meteorological 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.

START_DATE	The date on which the collection of data commenced.
END_DATE	The date on which the collection of the data was terminated.
MEAN_MIN_AIR_TEMP	The mean of the daily minimum air temperatures for the period defined by the start and end dates.
MEAN_AVG_AIR_TEMP	The mean of the daily average air temperatures for the period defined by the start and end dates.
MEAN_PRECIP_1200	The mean of the precipitation values for the six -hour period ending at 1200 GMT (0600 local time) for the period defined by the start and end dates.
MEAN_PRECIP_1800	The mean of the precipitation values for the six -hour period ending at 1800 GMT (1200 local time) for the period defined by the start and end dates.
MEAN_PRECIP_2400	The mean of the precipitation values for the six -hour period ending at 2400 GMT (1800 local time) for the period defined by the start and end dates.
MEAN_PRECIP_0600	The mean of the precipitation values for the six -hour period ending at 0600 GMT (2400 local time) for the period defined by the start and end dates.
MEAN_TOTAL_RAIN_24	The mean total daily rainfall for the period defined by the start and end dates.
MEAN_TOTAL_SNOW_24	The mean total daily snowfall for the period defined by the start and end dates.
MEAN_TOTAL_PRECIP_24	The mean total daily precipitation for the period defined by the start and end dates.
MEAN_SNOW_DEPTH	The mean depth of snow.
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.

The descriptions of the parameters contained in the full-resolution upper air winds 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.
TIME_OBS	The Greenwich Mean Time (GMT) when the data were collected.
ATMOSPHERIC_PRESS	The atmospheric pressure.
ALTITUDE	The altitude above sea level.
AIR_TEMP	The air temperature.
WIND_DIR	The direction from which the wind was traveling, increasing in a clockwise direction from north.
WIND_SPEED	The wind speed.
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.

The descriptions of the parameters contained in the full-resolution upper air soundings 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.
TIME_OBS	The Greenwich Mean Time (GMT) when the data were collected.
ATMOSPHERIC_PRESS	The atmospheric pressure.
ALTITUDE	The altitude above sea level.
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.
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 5-day averaged hourly surface meteorological data files on the CD-ROM are:

Column Name	Units
SITE_NAME	[none]
SUB_SITE	[none]
START_DATE	[DD-MON-YY]
END_DATE	[DD-MON-YY]
TIME_OBS	[HHMM GMT]
MEAN_MSL_PRESS	[kiloPascals]
MEAN_DEWPOINT_TEMP	[degrees Celsius]
MEAN_WIND_DIR	[degrees]
MEAN_WIND_SPEED	[meters][second^-1]
MEAN_STN_PRESS	[kiloPascals]
MEAN_DRY_BULB_TEMP	[degrees Celsius]
MEAN_WET_BULB_TEMP	[degrees Celsius]
MEAN_REL_HUM	[percent]
MEAN_TOTAL_CLOUD_AMOUNT	[tenths]
MEAN_TOTAL_CLOUD_OPACITY	[tenths]
CRTFCN_CODE	[none]
REVISION_DATE	[DD-MON-YY]

The measurement units for the parameters contained in the 5-day averaged daily surface meteorological data files on the CD-ROM are:

Column Name	Data Source
SITE_NAME	[none]
SUB_SITE	[none]
START_DATE	[DD-MON-YY]
END_DATE	[DD-MON-YY]
MEAN_MAX_AIR_TEMP	[degrees Celsius]
MEAN_MIN_AIR_TEMP	[degrees Celsius]
MEAN_AVG_AIR_TEMP	[degrees Celsius]
MEAN_PRECIP_1200	[millimeters]
MEAN_PRECIP_1800	[millimeters]
MEAN_PRECIP_2400	[millimeters]
MEAN_PRECIP_0600	[millimeters]
MEAN_TOTAL_RAIN_24	[millimeters]
MEAN_TOTAL_SNOW_24	[millimeters]
MEAN_TOTAL_PRECIP_24	[millimeters]
MEAN_SNOW_DEPTH	[millimeters]
CRTFCN_CODE	[none]
REVISION_DATE	[DD-MON-YY]

The measurement units for the parameters contained in the full-resolution upper air winds data files on the CD-ROM are:

Column Name	Data Source
SITE_NAME	[none]
SUB_SITE	[none]
DATE_OBS	[DD-MON-YY]
TIME_OBS	[HHMM GMT]
ATMOSPHERIC_PRESS	[kiloPascals]
ALTITUDE	[meters]
AIR_TEMP	[degrees Celsius]
WIND_DIR	[degrees]
WIND_SPEED	[meters][second^-1]
CRTFCN_CODE	[none]
REVISION_DATE	[DD-MON-YY]

The measurement units for the parameters contained in the full-resolution upper air soundings data files on the CD-ROM are:

Column Name	Data Source
SITE_NAME	[none]
SUB_SITE	[none]
DATE_OBS	[DD-MON-YY]
TIME_OBS	[HHMM GMT]
ATMOSPHERIC_PRESS	[kiloPascals]
ALTITUDE	[meters]
AIR_TEMP	[degrees Celsius]
REL_HUM	[percent]
WIND_DIR	[degrees]
WIND_SPEED	[meters][second^-1]
CRTFCN_CODE	[none]
REVISION_DATE	[DD-MON-YY]

7.3.4 Data Source

The sources of the parameter values contained in the 5-day averaged hourly surface meteorological data files are:

Column Name	Data Source
SITE_NAME	[Assigned by BORIS]
SUB_SITE	[Assigned by BORIS]
START_DATE	[Supplied by AES]
END_DATE	[Supplied by AES]
TIME_OBS	[Supplied by AES]
MEAN_MSL_PRESS	[Supplied by AES]
MEAN_DEWPOINT_TEMP	[Supplied by AES]
MEAN_WIND_DIR	[Supplied by AES]
MEAN_WIND_SPEED	[Supplied by AES]
MEAN_STN_PRESS	[Supplied by AES]
MEAN_DRY_BULB_TEMP	[Supplied by AES]
MEAN_WET_BULB_TEMP	[Supplied by AES
MEAN_REL_HUM	[Supplied by AES]

MEAN_TOTAL_CLOUD_AMOUNT	[Supplied by AES]
MEAN_TOTAL_CLOUD_OPACITY	[Supplied by AES]
CRTFCN_CODE	[Assigned by BORIS]
REVISION_DATE	[Assigned by BORIS]

The sources of the parameter values contained in the 5-day averaged daily surface meteorological data files are:

Column Name	Data Source
SITE_NAME	[Assigned by BORIS]
SUB_SITE	[Assigned by BORIS]
DATE_OBS	[Supplied by AES]
MAX_AIR_TEMP	[Supplied by AES]
MIN_AIR_TEMP	[Supplied by AES]
MEAN_AIR_TEMP	[Supplied by AES]
PRECIP_1200	[Supplied by AES]
PRECIP_1800	[Supplied by AES]
PRECIP_2400	[Supplied by AES]
PRECIP_0600	[Supplied by AES]
TOTAL_RAIN_24	[Supplied by AES]
TOTAL_SNOW_24	[Supplied by AES]
TOTAL_PRECIP_24	[Supplied by AES]
SNOW_DEPTH	[Supplied by AES]
CRTFCN_CODE	[Assigned by BORIS]
REVISION_DATE	[Assigned by BORIS]

The source of the parameter values contained in the full-resolution upper air winds data files on the CD-ROM are:

Column Name	Data Source
SITE_NAME	[Assigned by BORIS]
SUB_SITE	[Assigned by BORIS]
DATE_OBS	[DD-MON-YY]
TIME_OBS	[Supplied by AES]
ATMOSPHERIC_PRESS	[Supplied by AES]
ALTITUDE	[Supplied by AES]
AIR_TEMP	[Supplied by AES]
WIND_DIR	[Supplied by AES]
WIND_SPEED	[Supplied by AES]
CRTFCN_CODE	[Assigned by BORIS]
REVISION_DATE	[Assigned by BORIS]

The sources of the parameter values contained in the full-resolution upper air soundings 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 AES]
TIME_OBS	[Supplied by AES]
ATMOSPHERIC_PRESS	[Supplied by AES]

ALTITUDE	[Supplied by AES]
AIR_TEMP	[Supplied by AES]
REL_HUM	[Supplied by AES]
WIND_DIR	[Supplied by AES]
WIND_SPEED	[Supplied by AES]
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 5-day averaged hourly surface meteorological 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-999-THO01	REG-999-SKN01	None	None	None	None
SUB_SITE	STAFF-HISHY	STAFF-HISHY	None	None	None	None
START_DATE	01-JAN-76	27-DEC-96	None	None	None	None
END_DATE	05-JAN-76	01-JAN-97	None	None	None	None
TIME_OBS	0	2300	None	None	None	None
MEAN_MSL_PRESS	-99.9	104.42	None	None	None	None
MEAN_DEWPOINT_TEMP	-45.5	18.6	-999	None	None	None
MEAN_WIND_DIR	-277.7	847.9	None	None	None	None
MEAN_WIND_SPEED	0	40	-999	None	None	None
MEAN_STN_PRESS	-99.9	101.51	None	None	None	None
MEAN_DRY_BULB_TEMP	-43.7	32.8	-999	None	None	None
MEAN_WET_BULB_TEMP	-41.9	21.6	-999	None	None	None
MEAN_REL_HUM	15.8	100	-999	None	None	None
MEAN_TOTAL_CLOUD_AMOUNT	0	1	-999	None	None	None
MEAN_TOTAL_CLOUD_OPACITY	0	1	-999	None	None	None
CRTFCN_CODE	CPI	CPI	None	None	None	None
REVISION_DATE	04-NOV-98	11-NOV-98	None	None	None	None

The following table gives information about the parameter values found in the 5-day averaged daily surface meteorological 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-999-THO01	TRN-999-TPA01	None	None	None	None
SUB_SITE	STAFF-HISDY	STAFF-HISDY	None	None	None	None
START_DATE	01-JAN-75	26-DEC-96	None	None	None	None
END_DATE	01-JAN-75	31-DEC-96	None	None	None	None
MEAN_MAX_AIR_TEMP	-35.1	34.4	-999	None	None	None
MEAN_MIN_AIR_TEMP	-48	20.1	-999	None	None	None
MEAN_AVG_AIR_TEMP	-40.4	26.6	-999	None	None	None
MEAN_PRECIP_1200	0	12.9	-999	None	None	None
MEAN_PRECIP_1800	0	10.6	-999	None	None	None
MEAN_PRECIP_2400	0	14.8	-999	None	None	None
MEAN_PRECIP_0600	0	11.2	-999	None	None	None

MEAN_TOTAL_RAIN_24	0	26.4	-999	None	None	None
MEAN_TOTAL_SNOW_24	0	120	-999	None	None	None
MEAN_TOTAL_PRECIP_24	0	26.4	-999	None	None	None
MEAN_SNOW_DEPTH	0	1350	-999	None	None	None
CRTFCN_CODE	CPI	CPI	None	None	None	None
REVISION_DATE	04-NOV-98	10-NOV-98	None	None	None	None

The following table gives information about the parameter values found in the upper air winds 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	TRN-999-TPA01	TRN-999-TPA01	None	None	None	None
SUB_SITE	STAFF-HSUW1	STAFF-HSUW2	None	None	None	None
DATE_OBS	01-JUL-81	30-NOV-96	None	None	None	None
TIME_OBS	0	1800	None	None	None	None
ATMOSPHERIC_PRESS	5	101.7	None	None	None	None
ALTITUDE	273	74155	-999	None	None	None
WIND_DIR	0	360	None	None	None	None
WIND_SPEED	0	3329	None	None	None	Blank
CRTFCN_CODE	CPI	CPI	None	None	None	None
REVISION_DATE	03-JUN-97	10-JUL-97	None	None	None	None

The following table gives information about the parameter values found in the upper air sounding 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	TRN-999-TPA01	TRN-999-TPA01	None	None	None	None
SUB_SITE	STAFF-HSUA1	STAFF-HSUA2	None	None	None	None
DATE_OBS	01-JAN-61	30-NOV-96	None	None	None	None
TIME_OBS	0	1800	None	None	None	None
ATMOSPHERIC_PRESS	5	105	None	None	None	None
ALTITUDE	-240	21428	-999	None	None	None
AIR_TEMP	-79	35.5	-999	None	None	None
REL_HUM	0	100	-999	None	None	None
WIND_DIR	0	580	-999	None	None	Blank
WIND_SPEED	0	935	-999	None	None	None
CRTFCN_CODE	CPI	CPI	None	None	None	None
REVISION_DATE	22-MAY-97	08-JUL-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 sample data records from a 5-day averaged hourly surface meteorological data file on the CD-ROM:

```
SITE_NAME,SUB_SITE,START_DATE,END_DATE,TIME_OBS,MEAN_MSL_PRESS,
MEAN_DEWPOINT_TEMP,MEAN_WIND_DIR,MEAN_WIND_SPEED,MEAN_STN_PRESS,
MEAN_DRY_BULB_TEMP,MEAN_WET_BULB_TEMP,MEAN_REL_HUM,MEAN_TOTAL_CLOUD_AMOUNT,
MEAN_TOTAL_CLOUD_OPACITY,CRTFCN_CODE,REVISION_DATE
'NSA-999-THO01','STAFF-HISHY',01-JAN-93,05-JAN-93,600,101.75,-27.6,72.3,13.2,
98.82,-23.3,-23.6,68.4,.3,.4,'CPI',05-NOV-98
```

The following are wrapped versions of sample data records from a 5-day averaged daily surface meteorological data file on the CD-ROM:

```
SITE_NAME,SUB_SITE,START_DATE,END_DATE,MEAN_MAX_AIR_TEMP,MEAN_MIN_AIR_TEMP,
MEAN_AVG_AIR_TEMP,MEAN_PRECIP_1200,MEAN_PRECIP_1800,MEAN_PRECIP_2400,
MEAN_PRECIP_0600,MEAN_TOTAL_RAIN_24,MEAN_TOTAL_SNOW_24,MEAN_TOTAL_PRECIP_24,
MEAN_SNOW_DEPTH,CRTFCN_CODE,REVISION_DATE
'TRN-999-TPA01','STAFF-HISDY',01-JAN-93,05-JAN-93,-17.8,-27.1,-22.4,0.0,.5,0.0,
0.0,0.0,6.4,.6,192.0,'CPI',10-NOV-98
```

The following are wrapped versions of a few selected records from an upper-air winds data file:

```
SITE_NAME,SUB_SITE,DATE_OBS,TIME_OBS,ATMOSPHERIC_PRESS,ALTITUDE,WIND_DIR,
WIND_SPEED,CRTFCN_CODE,REVISION_DATE
'TRN-999-TPA01','STAFF-HSUW2',01-SEP-81,0,97.9,273.0,310,6.0,'CPI',03-JUN-97
'TRN-999-TPA01','STAFF-HSUW2',01-SEP-81,0,93.7,640.0,314,8.0,'CPI',03-JUN-97
```

The following are wrapped versions of a few selected records from an upper-air soundings data file:

```
SITE_NAME,SUB_SITE,DATE_OBS,TIME_OBS,ATMOSPHERIC_PRESS,ALTITUDE,AIR_TEMP,REL_HUM,
WIND_DIR,WIND_SPEED,CRTFCN_CODE,REVISION_DATE
'TRN-999-TPA01','STAFF-HSUA2',01-JAN-77,0,99.85,-999.0,-20.3,63.0,-999,-999.0,
'CPI',22-MAY-97
'TRN-999-TPA01','STAFF-HSUA2',01-JAN-77,0,96.4,-999.0,-14.8,54.0,-999,-999.0,
'CPI',22-MAY-97
```

8. Data Organization

8.1 Data Granularity

For the 5-day averaged hourly data, the smallest unit of data is the information for a given 1-month period. For the 5-day averaged daily data, the smallest unit of data is the information for a given year. For the upper air data, the smallest unit of data is the information for the flights that occurred within a given month.

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

Each of the original hourly and daily data sets were averaged over non-overlapping 5-day periods in order to make these data distributable at no cost. For the daily data, this involved averaging the data over non-overlapping 5-day periods. For the hourly data, this involved averaging the data for a given hour for non-overlapping 5-day periods. In case of a leap year, the last row of data is a 6-day average to avoid overlap of data from multiple years. If the original data were missing/invalid for a particular hour or day, these values were excluded from the averaging. If a data value had a value of 0.0, it was included in the averaging.

9.2.2 Processing Changes

None given.

9.3 Calculations

9.3.1 Special Corrections/Adjustments

None given.

9.3.2 Calculated Variables

See Section 9.2.1.

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
The original data were not quality assessed except to note where missing values occurred for averaging operations. BORIS staff is confident that the averaging operations were carried out as described in Section 9.2.1.

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
An automated quality assurance program was run on this data set to identify anomalies including sudden jumps or drops (spikes) in the data. Any problems of this sort are identified in Section 11.2.

11. Notes

11.1 Limitations of the Data
See Section 10.2.2.

11.2 Known Problems with the Data
Snow on the ground will not be available if snow on the ground is reported only on the last day of the month.

In 1981, many nonprimary stations began to observe daily snow depth. Frequently, zero amounts are not entered and are entered as missing. This deficiency is most evident after the last spring measurement.

Invalid data were not included in the averaging process. If there were invalid data in the original data set, they were not included in the averaging, resulting in average values for less than 5 days. A value of -999 signifies that all 5 days had invalid data.

If the date was missing from the original data set and all of the data columns were flagged as invalid, then that data record is not included in the averaged data. The following original data sets were incomplete:

Rabbit Lake	1986,1987,1988,1989
Cameo	1996
Ethelton	1983,1992,1996
Big River	1996
Key Lake	1976,1977,1978,1979
La Ronge A	1996
Whitesand Dam	1996
Grand Rapids	1996

The Pas A	1996
Crosslake Jenpeg	1996
Lynn Lake A	1996
Thompson A	1996

11.3 Usage Guidance

Users are advised to read the information in this document before using the data and to contact AES regarding the collection of the original data.

11.4 Other Relevant Information

None given.

12. Application of the Data Set

These data could be used for course scale modeling efforts of for looking at trends in meteorological conditions over time.

13. Future Modifications and Plans

None given.

14. Software

14.1 Software Description

BORIS personnel developed a program in C to perform the 5-day averaging.

14.2 Software Access

The software can be obtained from the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) (see Section 15).

15. Data Access

The 5-day averaged surface meteorological and upper air data are available from the Earth Observing System Data and Information System (EOSDIS) ORNL 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

21X Micrologger Operator's Manual, Revision 8/91, Campbell Scientific, Inc.

17.2 Journal Articles and Study Reports

AES. 1989. Climatological Station Catalogue - Prairie Provinces. Environment Canada. Atmospheric Environment Service.

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 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
SK	- Saskatchewan
SSA	- Southern Study Area
T/RH	- Temperature / Relative Humidity
TBRG	- Tipping Bucket Rain Gauge
URL	- Uniform Resource Locator

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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 derived by BORIS staff from the original data provided by the Atmospheric Environment Service (AES) of Canada. The efforts of the BORIS staff to process and document these data and the efforts of AES staff in providing the data and working out a distribution agreement are greatly appreciated.

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

BOREAS Staff Science, "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.

Also, cite the BOREAS CD-ROM set as:

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. Collected Data of The Boreal Ecosystem-Atmosphere Study. NASA. CD-ROM. NASA, 2000.

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13. ABSTRACT *(Maximum 200 words)*

The Canadian Atmospheric Environment Service (AES) provided BOREAS with hourly and daily surface meteorological data from 23 of the AES meteorological stations located across Canada and upper air data from 1 station at The Pas, Manitoba. Due to copyright restrictions on the full-resolution surface meteorological data, this data set contains 5-day average values for the surface parameters. The upper air data are provided in their full resolution form. The 5-day averaging was performed in order to create a data set that could be publicly distributed at no cost. The original full-resolution data can be purchased from AES. Temporally, the surface meteorological data cover the period of January 1975 to December 1996 and the upper air data cover the period of January 1961 to November 1996. The data are provided in tabular ASCII files, and are classified as AFM-Staff data.

14. SUBJECT TERMS
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