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

Forrest G. Hall and David E. Knapp, Editors

Volume 117

BOREAS AES Campbell Scientific Surface Meteorological Data

G.B. Atkinson and B. Funk

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

September 2000

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BOREAS AES Campbell Scientific Surface Meteorological Data

G. Barrie Atkinson, Barry Funk

Summary

Canadian AES personnel collected data related to surface and atmospheric meteorological conditions over the BOREAS region. This data set contains 15-minute meteorological data from 14 automated meteorology stations located across the BOREAS region. Included in this data are parameters of date, time, mean sea level pressure, station pressure, temperature, dew point, wind speed, resultant wind speed, resultant wind direction, peak wind, precipitation, maximum temperature in the last hour, minimum temperature in the last hour, pressure tendency, liquid precipitation in the last hour, relative humidity, precipitation from a weighing gauge, and snow depth. Temporally, the data cover the period of August 1993 to December 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 Campbell Scientific Surface Meteorological Data

1.2 Data Set Introduction

This data set contains 15-minute data from 14 automated meteorology stations across the BOREAS region in Canada. Included in these data are parameters of day, time, mean sea level pressure, station pressure, temperature, dew point, wind speed, resultant wind speed, resultant wind direction, peak wind, precipitation, maximum temperature in the last hour, minimum temperature in the last hour, pressure tendency, liquid precipitation in the last hour, relative humidity, precipitation from a weighing gauge, and snow depth.

1.3 Objective/Purpose

These monitoring sites were established by the Atmospheric and Environment Service (AES) of Canada to provide hourly weather reports, input to the operational program of forecasts and warnings, input to operational weather prediction models, and climate data. The frequency of observations was increased to 15 minutes at the request of the BOReal Ecosystem-Atmosphere Study (BOREAS). Data collection for BOREAS began in August 1993.

1.4 Summary of Parameters

Parameters include: day, time, mean sea level pressure, station pressure, temperature, dew point, wind speed, resultant wind speed, resultant wind direction, peak wind, precipitation, maximum temperature in the last hour, minimum temperature in the last hour, pressure tendency, liquid precipitation in the last hour, relative humidity, precipitation from a weighing gauge, and snow depth.

1.5 Discussion

Generally these stations were installed before BOREAS began, and conform to Environment Canada's criteria for accuracy and exposure. Only stations Southend, Saskatoon (SK), and Waskesiu Lake, SK, have a Fisher and Porter weighing precipitation gauge. Only Waskesiu Lake, SK, measures snow depth.

1.6 Related Data Sets

BOREAS AFM-07 SRC Surface Meteorological and Radiation Data
BOREAS AES MARSII Surface Meteorological Data
BOREAS AES READAC 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

Environment Canada 15-Minute Autostation Data

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) 286-7858
(301) 286-0239 (fax)
Jeffrey.Newcomer@gsfc.nasa.gov

3. Theory of Measurements

None given.

4. Equipment

4.1 Sensor/Instrument Description

No specific descriptions were given of the various types of instruments. See Section 4.1.6 for information regarding the kinds of instruments that were at each site.

4.1.1 Collection Environment

The data were collected continuously in all types of weather.

4.1.2 Source/Platform

The various instruments were mounted on towers at the sites.

4.1.3 Source/Platform Mission Objectives

None given.

4.1.4 Key Variables

The parameters are date, time, mean sea level pressure and station pressure, temperature, dew point, wind speed and direction, peak wind, precipitation, maximum and minimum temperature in the last hour, pressure tendency.

4.1.5 Principles of Operation

None given.

4.1.6 Sensor/Instrument Measurement Geometry

Additional information about the local environment in which the instruments were positioned may be given in Section 7.

Parameter	Instrument	Instrument Description
Data Logger	A	CR10
	H	CR21X
Pressure	B	Setra 270
Hydro Thermistor	C	CS 207F
Radiation shield	D	Gill type
	I	wooden Stevenson screen, pipe stand
	J	wooden Stevenson screen, wooden stand

Parameter	Instrument	Instrument Description
Precipitation:		
tipping bucket	E	AES TBRG (Tipping Bucket Rain Gauge)
weighing gauge	K	Fisher and Porter with Nipher shield
	L	Fisher and Porter with alter shield
Snow Depth sensor	M	UDG01 ultrasonic depth gauge
Anemometer	F	RM Young
Tower	G	Hossick Tilting
	N	Hossick non-tilting

The following is a list of instruments used at the various sites. The following table indicates (by the letter) which instruments are present at each site.

STATION	WBL	WWC	WFO (FFN)	WGX	WHH	WLE	WLJ	WFF	WBU	WRJ	WJH	WSR	WLV	WIW
Data Logger	A	H	H	H	A	A	A	A	H	A	H	A	H	A
Pressure sensor	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Hydro Thermistor	C	C	C	C	C	C	C	C	C	C	C	C	C	C
height (cm)	200	120	115	115	280	120	120	120	122	137	120	115	120	134
Radiation shield	D	I	I	I	D	J	J	J	I	J	J	J	J	J
Precipitation														
Tipping Bucket	E	E	E	E	E	E	E	E	E	E	E	E	E	E
rim height (cm)	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Weighing gauge											K		K	
rim height (cm)											200		200	
Snow depth													M	
sensor height (mm)													2140	
Anemometer	F	F	F	F	F	F	F	F	F	F	F	F	F	F
cup height (m)	10	10	10	10	10	10	10	10	10	10	10	10	20	10
tower	G	G	G	G	G	G	G	G	G	G	G	G	N	G

ID	Name	
WBL	Bachelors Island	MB
WFO (FFN)	Flin Flon	MB
WGX	Gillam	MB
WHH	Hunters Point	MB
WWC	Collins Bay	SK
WLE	Lucky Lake	SK
WLJ	Meadow Lake	SK
WFF	Melfort	SK
WBU	Nipawin	SK
WRJ	Rosetown East	SK
WJH	Southend	SK
WSR	Spiritwood West	SK
WLV	Waskesiu Lake	SK
WIW	Watrous East	SK

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
See Section 6.2 for information regarding site visits and instrument maintenance.

4.2.3 Other Calibration Information
None given.

5. Data Acquisition Methods

During normal operation, the data were stored in the data logger, and downloaded once per month. For Environment Canada's purposes, the autostations were called hourly, and only the latest observation was retrieved.

6. Observations

6.1 Data Notes
None given.

6.2 Field Notes
The following was obtained from the inspection books. This is only a partial list of maintenance. Contact Environment Canada for any maintenance information after 1994. Questions should be directed to Environment Canada.

Normal practice is to disable the tipping bucket rain gauge (TBRG) for the winter and to disable the weighing gauge for the summer.

Location	Date of Visit	Actions During Visit
WBL Bachelors Island, MB	Inspection Jun. 18, 1993	The 207f Temperature/Relative Humidity (T/RH) sensor was replaced. A newly-calibrated TBRG bridge was installed and tested. The pressure offset was adjusted to 80.07 to bring the station pressure reading into closer agreement with the inspection aneroid barometer. All exposed equipment was cleaned of cobwebs, bugs and bird droppings. Several comparisons between station and inspection parameters yielded very close results.

WFO (FFN) Flin Flon, MB	Inspection Jun 16, 1993	Barometer comparison difference was 0.44. The offset was not adjusted. New T/RH probes installed. All other comparisons between station and inspection parameters yielded very close results.
	Visit Oct 29, 1993	Installation of base for BOREAS instruments.
	Inspection Mar 21, 1994	New bearings were installed in the Anemometer. The Stevenson Screen was releveled. The TBRG bridge was cleaned, calibrated and leveled. All normal autostation comparisons were completed, and were OK.
WGX Gillam, MB	Inspection May 26, 1993	Anemometer replaced; T/RH probes replaced; TBRG bridge and bucket assembly replaced. All normal autostation comparisons, including barometer, were completed, and were OK.
	Inspection May 12, 1994	A new bridge was installed on the TBRG, and the gauge was cleaned and leveled. All normal autostation comparisons, including barometer, were completed, and were OK.
WHH Hunters Point, MB	Inspection Jun 17, 1993	All the normal checks of the instrumentation were performed. All were OK, however the barometer gave an average difference of +0.49 mb which is approaching the limit.
	Inspection Nov 3, 1994	A new bridge was installed on the TBRG, and the gauge was cleaned and leveled. A new anemometer, both speed and direction, was installed. A new RH grid was installed. All the normal checks of the instrumentation were performed. All were OK, but the barometer gave a difference of 0.7 mb from the standard, humidity showed a 1.0 degree difference, and temperature showed a 0.2 degree difference.
WWC Collins Bay, SK	Inspection Jun 9, 1993	Newly calibrated TBRG bridge installed. Bucket cleaned and leveled. The speed head was replaced complete with new bearings. All checks with direction OK. A new hydristor was installed and all comparisons were within acceptable limits. Pressure comparisons OK.
	Inspection Sep 14, 1994	TBRG bridge cleaned, leveled and calibrated. New hydristor installed. All comparisons OK. Pressure comparisons OK. Wind speed head changed. All checks OK.

WLE Lucky Lake, SK	Inspection Apr 13, 1993	A new TBRG bridge installed, and the gauge leveled. A new pressure sensor was installed. A new hydristor was installed. A new anemometer head and new bearings were installed. All normal autostation comparisons, including barometer, were completed, and were OK.
	Inspection Apr 13, 1994	A new TBRG bridge installed, and the gauge leveled. A new hydristor was installed. A replacement anemometer head was installed. A number of comparisons between the Standard Barometer and the Setra pressure sensor revealed a pressure difference of between 0.6 and 0.7 mb. The pressure offset was adjusted to 80.08. The following comparisons showed differences between 0.05 and 0.1 mb. All other normal autostation comparisons were completed, and were OK.
WLJ Meadow Lake, SK	Inspection Mar 4, 1993	The anemometer was replaced with a rebuilt unit; the 207F humidity transducers was replaced; and the TBRG was leveled. All normal autostation comparisons, including barometer, were completed, and were OK.
	Visit May 28, 1993	The inspection office was notified by the Meadow Lake Weather Station that the wind direction at the auto-site was not the same as the U2A wind direction. Upon inspection, it was found that the RM Young wind detector was putting out a direction number 30 degrees off the true wind direction. The wind system was repointed, and passed all subsequent tests.
	Inspection Aug 9, 1994	The anemometer speed head was replaced; a new hydristor was installed; and the TBRG bridge was cleaned, leveled and calibrated. All normal autostation comparisons were completed, and were OK. The Stevenson screen and stand was painted.
WFF Melfort, SK	Visit Jun 28, 1993	A quick visit was made to the Melfort autostation while en route to Hudson Bay. A calibrated TBRG bridge was installed, and checks made. It was noticed that the psychrometer was dead, so a new motor was installed.
	Inspection Sep 22, 1993	The anemometer speed head was replaced; a new hydristor was installed and the TBRG bridge was cleaned and leveled.
	Inspection Jul 30, 1994	The TBRG bridge was cleaned and leveled. A new hydristor was installed. The anemometer speed head was changed. All normal autostation comparisons were completed, and were OK.
WBU Nipawin, SK	Inspection Sep 21, 1993	TBRG bridge was cleaned, leveled and calibrated. A new hydristor was installed. A new anemometer head (speed and direction) was installed as a magnet was loose on the speed shaft and the direction was not set on the alignment pin. All normal autostation comparisons were completed, and were OK.
	Inspection Jul 26, 1994	TBRG bridge was cleaned, leveled and calibrated. A new hydristor was installed. A new anemometer speed head was installed. All normal autostation comparisons were completed, and were OK.

WRJ Rosetown East, SK	Inspection Apr 14, 1993	TBRG bridge was calibrated. A new hydristor was installed. A new anemometer speed head and bearings was installed. All normal autostation comparisons were completed, and were OK.
	Inspection Mar 31, 1994	A new TBRG bridge was installed. The relative humidity grid was replaced. The anemometer speed head was replaced. The average difference between the inspection barometer and the station pressure was found to be 0.35 mb. An adjustment was made to the station pressure offset of 0.06, and subsequent comparisons showed an average difference of 0.1 mb. All other normal autostation comparisons were completed, and were OK.
WJH Southend, SK	Inspection Jun 8, 1993	A new TBRG bridge was installed, and the instrument leveled. The anemometer speed head was replaced complete with new bearings. A new hydristor was installed. The holding tank of the Fisher & Porter was cleaned, and a new charge added. Maximum reading was 500.1 mm. All normal autostation comparisons were completed, and were OK.
	Inspection Jun 23, 1994	A new TBRG bridge was installed, and the instrument leveled. The anemometer speed head was replaced complete with new bearings. A new hydristor was installed. The Fisher & Porter was cleaned, calibrated, the potentiometer was changed, and a new charge added. Maximum reading was 600.9 mm. All normal autostation comparisons were completed, and were OK.
WSR Spiritwood West, SK	Inspection Oct 6, 1993	TBRG bridge was cleaned and leveled. A new hydristor was installed. The anemometer speed head was changed. All normal autostation comparisons were completed, and were OK.
	Inspection May 27, 1994	Inside the TBRG a nest with 8 young mice was found. One mouse was found running along the base of the bridge itself. These rodents were probably the cause of discrepancies identified by the Saskatoon Forecast Office. The gauge was cleaned of nest and mice. A calibrated bridge was installed, and the gauge leveled. A new hydristor was installed. The anemometer speed head was changed. All normal autostation comparisons were completed, and were OK.

WLV Waskesiu Lake, SK	Inspection Jul 28, 1993	The TBRG was cleaned, calibrated and leveled. The anemometer was replaced with a rebuilt unit. Station pressure was checked against the calibration barometer, and over 8 readings the average difference was 0.49 mb with a range of 0.29 to 0.60, but no change was made to the pressure offset. The Fisher and Porter was cleaned, calibrated and recharged with glycol/oil. All other normal autostation comparisons were completed, and were OK.
	Visit Nov 17, 1993	The alter shield was removed from the Fisher and Porter, and replaced with a Nipher shield. The sonic transducer was replaced with a new retrofit for the snow depth sensor.
	Visit Mar 9, 1994	Precipitation amounts reported from the Fisher and Porter gauge had become suspect over the past several weeks, and in conjunction with George Davies, it was decided that the problem might be a malfunctioning shaft encoder. A new shaft encoder was installed, and appears to be operating normally, but time will tell. It should be noted that a significant amount of snow had accumulated on the shield of the Fisher and Porter gauge, which very likely had a significant impact on air flow over the gauge. No such accumulation was observed on the snow gauge Nipher shield.
	Inspection Sep 23, 1994	During the period Sep 21 to 23, 1994, a 60 foot tilting tower from Downsview was installed, replacing the 60 foot Hossick tower. The TBRG was cleaned and calibrated. The anemometer speed head was replaced, and the unit installed on the new tower. The hydristor was changed. The Fisher and Porter was recharged. All normal autostation comparisons, including the snow depth sensor and the Fisher and Porter, were completed, and were OK.
WIW Watrous East, SK	Visit Apr 15, 1993	The TBRG bridge was replaced.
	Inspection Oct 8, 1993	The RH grid was replaced. The anemometer wind speed detector was replaced. After, all normal autostation comparisons were completed, and were OK.
	Inspection Apr 20, 1994	The TBRG bridge was replaced and the gauge leveled. A new hydristor was installed. The anemometer speed head was replaced. After, all normal autostation comparisons were completed, and were OK.

7. Data Description

7.1 Spatial Characteristics

7.1.1 Spatial Coverage

The following table contain the North American Datum of 1983 (NAD83) latitude and longitude coordinates for each station, the elevation above sea level, and the data base site names. Below the tables is a detailed description of each site. (Latitude and longitude are given in degrees and minutes.)

ID	Name		Latitude	Longitude	Elevation
WBL	Bachelors Island	MB	51° 45' N	99° 54' W	255.9 (m)
WFO (FFN)	Flin Flon	MB	54° 41' N	101° 41' W	303.9
WGX	Gillam	MB	56° 22' N	94° 42' W	145.3
WHH	Hunters Point	MB	53° 02' N	100° 56' W	256.1
WWC	Collins Bay	SK	58° 11' N	103° 42' W	492.1
WLE	Lucky Lake	SK	50° 57' N	107° 09' W	664.7
WLJ	Meadow Lake	SK	54° 08' N	108° 31' W	481.0
WFF	Melfort	SK	52° 49' N	104° 36' W	490.0
WBU	Nipawin	SK	53° 20' N	104° 00' W	371.9
WRJ	Rosetown East	SK	51° 34' N	107° 55' W	586.0
WJH	Southend	SK	56° 20' N	103° 17' W	344.1
WSR	Spiritwood West	SK	53° 22' N	107° 33' W	584.3
WLV	Waskesiu Lake	SK	53° 55' N	106° 04' W	569.4
WIW	Watrous East	SK	51° 40' N	105° 24' W	525.6

SITE_NAME (from Database)	Common Name
REG-999-WBL01	Bachelors Island
TRN-999-FFN01	Flin Flon
REG-999-WGX01	Gillam
REG-999-WHH01	Hunters Point
REG-999-WWC01	Collins Bay
REG-999-WLE01	Lucky Lake
REG-999-WLJ01	Meadow Lake
REG-999-WFF01	Melfort
SSA-999-WBU01	Nipawin
REG-999-WRJ01	Rosetown East
REG-999-WJH01	Southend
REG-999-WSR01	Spiritwood West
SSA-999-WLV01	Waskesiu Lake
REG-999-WIW01	Watrous East

WBL Bachelors Island, MB

The weather station is located on an island at the south end of Lake Winnipegosis. The nearest community is the village of Winnipegosis, which is 10 km straight south of the island. Instrument exposure is excellent in all directions. The station is situated on a flat open area of the island. It is high enough off the lake shore to prevent damage from ice in the spring, but is close enough that it will be ideal for its primary purpose as an aid to marine forecasting for this lake. It is located on a narrow spit of land that is about 35 m across. The site is 1.4 m in elevation from the lake. The surrounding terrain is sand and gravel, with only a couple of 2-m dead tree skeletons approximately 6 m to the south. Otherwise, the surrounding area is lake. The nearest mainland is 2.5 km to the west.

WFO (FFN) Flin Flon, MB

The instrument area is located on the airport property, adjacent to the U2A tower and ceiling projector, about 150 m northwest of the airport terminal building. Exposure is excellent in all directions, with no obstructions present. The surrounding countryside is Precambrian Shield with numerous lakes, rock outcrops, and heavily forested areas. The station is located on a 1-km^2 peninsula at the midpoint of Lake Athapapuskow, a 20-km-long, 2-km-wide body of water running south-southwest to north-northeast. A rocky ridge, rising some 30 m, lies 1 km southwest to northwest of the station. The BOREAS Airborne Fluxes and Meteorology (AFM)-07 automated meteorological station is co-located with this autostation.

WGX Gillam, MB

The autostation instrument area, located northeast of the aircraft ramp and adjacent to the existing U2A tower, has excellent exposure. The area is about 175 m northeast of the airport terminal building and 250 m northeast of the manned instrument area. The immediate terrain is ungrassed natural ground, recently cleared of brush, and will need an annual brush clearing to maintain this exposure. Gillam Airport is located 1 km northeast of the town of Gillam on a flat open area beside Stephen's Lake. This reservoir lies to the west-northwest of the instrument area and is responsible for low stratus and fog in the spring and fall at this site. Because the runway and airport roads are gravel, there is a great deal of dust.

WHH Hunters Point, MB

The weather station is located on a long point of land at the north end of Lake Winnipegosis. The point extends 4 km northeastward into the lake and divides it into two bays: Overflow Bay to the north, and Dawson Bay to the south. The nearest settlement is Dawson Bay, which is near Highway 10 at the beginning of the point. Because the site is at the end of the point, almost surrounded by water, instrument exposure is excellent in all directions, except to the southwest, down the length of the point. The point was heavily wooded almost to the tip, and a significant amount of clearing was required in order to improve the exposure. The southwest quadrant has some very tall trees that will affect the wind flow from this direction. The surrounding countryside is heavily wooded with some open areas of marsh, and a fringe of tall grasses adjacent to the lake

WWC Collins Bay, SK

The instrument area is located at the northwest edge of the Eldor Mines Collins Bay staff accommodation complex. The automatic weather station is co-located with the manned observing program, sharing the same instrument area. The exposure is open to the south, west, and north, offering good air flow. To the east, there is some sheltering due to the 42- by 8- by 4-m office trailer. The mine site and the 30- by 30-m instrument area are located on a large plateau that rises about 60 m above the surrounding countryside. Trees extend around the perimeter of the complex. The wind equipment is mounted atop a 13-m tower in order to clear local obstructions, and is located in the instrument area. The RM Young anemometer is co-mounted with the U2A anemometer on the same mast at 10 m. The Collins Bay mine site is situated 4 km west of Wollaston Lake, and approximately 6 km south of Collins Creek. The terrain is rough and rolling, covered with 5- to 10-m evergreens. Numerous small lakes, muskeg, swamp, rock outcrops and rivers extend to the north and west.

WLE Lucky Lake, SK

The station is located approximately 3.5 km south-southwest of the town of Lucky Lake. From the intersection of #45 and #42, travel 0.5 km west on #42, cross the railway tracks, and then 3 km south on grid road #646. The station is established on relatively flat, open farmland. Lake Diefenbaker is situated 18 km south and curves to also be 15 km east as it winds its way northwards. To the east and south, the topography is more undulating with a significant number of sloughs (usually dry) dotting the landscape. Tree growth is at a minimum here, with only some planned shelterbelts breaking the otherwise void prairie landscape. The observing site provides excellent exposure to all sectors.

WLJ Meadow Lake, SK

The station is located on the Meadow Lake Airport property, 5 km west of the town of Meadow Lake, and approximately 7 km west of Meadow Lake. The topography to the east, north, and west of the airport is fairly flat, while to the south it rises from 480 m at the airport to 730 m 30 km south of the airport. This hilly area is well forested, while mixed farmland surrounds the airport for a radius of 15-25 km in the other directions. The instrument compound is located north of the terminal building, with cultivated farmland next to the site on the east, north, and west sides, and a trimmed grass area to the south. The exposure of the instruments is excellent, with no obstructions to airflow in any direction. The surface is grassed, and the compound is identified by a post and chain fence. The automatic weather station is co-located with the manned observing program.

WFF Melfort, SK

The Melfort autostation is located at the Melfort CDA Experimental Farm some 200 m southeast of the existing CDA climate station. The topography is generally flat farmland, with some shelterbelts. There appear to be no serious restrictive forces at play to hamper representative data collection.

WBU Nipawin, SK

The Nipawin automatic station is co-located with the manned program, in a fenced, protected yard, to the east of the aircraft parking and maintenance area. The station sensors share a common instrument area exposure, on a protected 39- by 39-m site, identified by a chain and post fence. The site is grassed and has excellent exposure in all directions. Air flow is unrestricted from all quadrants, and in the immediate vicinity the only source of heat might be the taxiway and apron, some 50 m to the south. To the east and south the surrounding countryside is flat, open farmland, with only the occasional natural bluff or planned shelterbelt. The Saskatchewan River Valley lies to the west, approximately 1.5 km distant, and runs north-south. To the north is farmland, with the outskirts of the town of Nipawin starting at a distance of 1.0 km. There is no sheltering of the instruments from any direction.

WRJ Rosetown East, SK

The station is located at the Rosetown Municipal Airport, located 4.2 km northeast of the town of Rosetown in Highway #7. The instruments are located on a level, grassed area with open exposure in all directions. Some effect may be noticeable from the airport hangers located 50 m to the north. These hangers range from 3.9 to 5.7 m in height. A 56-m-high grain elevator is located 445 m to the northeast of the instrument area. Local pilots have reported wind effects extending for up to 0.5 km downwind of this obstruction. The surrounding countryside is flat, open cropland.

WJH Southend, SK

The station is situated in the northeast portion of Central Saskatchewan. The site is 180 km northeast of the town of La Ronge, and approximately 5 km west of the village of Southend. The immediate surrounding area is generally evergreen forest with some small areas of mixed deciduous growth. Topography is best described as a series of forest covered ridges and hills interspersed with rivers and lakes. The site lies approximately 0.5 km to the south and west of the southern end of Numabin Bay of Reindeer Lake. Under a northeast wind, one may expect the water body to exert some minor influence on "normal" data. A tree covered ridge running east to west lies approximately 1.0 km to the south. Ten-meter-high evergreens begin about 20 m south of the site. Short brush and bush predominate to the immediate east, slowly giving way to the evergreens father east.

WSR Spiritwood West, SK

The station is located 2.6 km west of the town of Spiritwood, SK. The instruments are located on a level grassed area adjacent to Highway #3. Exposure is open in all directions, with the only obstruction being a bluff of 8-m trees 120 m to the southwest. The surrounding countryside is open, flat cropland with frequent bluffs of trees. Witchekon Lake lies 3 km to the north.

WLV Waskesiu Lake, SK

The station is located on the grounds of the Parks Canada Maintenance compound. The instruments are located on a 22- by 12-m conditioned plot, open to the west, south, and east. To the north sheltering can be expected due to large fir trees 15 to 17 m high. The Parks building and paved equipment yard are situated to the southeast about 50 m. Open areas to the west and south are slightly lower in elevation. With the exception of the north quadrant, exposure is fair to good. General topography is rolling forest country. Waskesiu Lake lies 1.4 km to the northwest.

WIW Watrous East, SK

The station is located approximately 4 km east of the town of Watrous, SK, at the Saskatchewan Wheat Pool Product Development Farm. To locate the station, travel north 1.3 km from the junction of Highways #2 and #365 to Grid road 668. Go east on 668 3.2 km to a small white church and the Product Development Farm sign. Travel south 1.2 km, drive through the farm yard, and the station is approximately 200 m east of the office complex. The instruments are located on a level grassed area with open exposure in all directions. A low area of ground that may hold water in the spring or during wet periods is just to the west of the instruments. The surrounding countryside is flat, open cropland. Little Manitou Lake lies in a valley approximately 4.5 km north.

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

```
WBL Bachelors Island      03-AUG-1993 through 31-DEC-1996
WFO (FFN) Flin Flon       03-AUG-1993 through 31-DEC-1996
WGX Gillam                03-AUG-1993 through 31-DEC-1996
WHH Hunters Point         03-AUG-1993 through 31-DEC-1996
WWC Collins Bay           03-AUG-1993 through 31-DEC-1996
WLE Lucky Lake            03-AUG-1993 through 28-AUG-1996 **
WLJ Meadow Lake           03-AUG-1993 through 31-DEC-1996
WFF Melfort               03-AUG-1993 through 31-DEC-1996
WBU Nipawin               03-AUG-1993 through 31-DEC-1996
WRJ Rosetown East         03-AUG-1993 through 19-AUG-1996 **
WJH Southend              03-AUG-1993 through 31-DEC-1996
WSR Spiritwood West       03-AUG-1993 through 31-DEC-1996
WLV Waskesiu Lake         03-AUG-1993 through 31-DEC-1996
WIW Watrous East          03-AUG-1993 through 31-DEC-1996
```

All stations are missing data from 01-MAR-1995 through 17-MAR-1995. All stations are missing data from 01-FEB-1996 into March 1996 except for Rosetown East (WRJ) (These dates may vary slightly with each station.)

** Two stations (WLE Lucky Lake, SK, and WRJ Rosetown East, SK) do not have data through the end of 1996 because of a raw data format change that occurred in August. It was deemed not necessary to include these reformatted data.

7.2.2 Temporal Coverage Map

Not available

7.2.3 Temporal Resolution

BOREAS received data recorded at 15-minute intervals from August 1993 through December 1996. The only exception to this is WRJ, which began reporting hourly on 28-JUN-1995.

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
STN_PRESS
MSL_PRESS
PRESS_TEND
AIR_TEMP_1_5M
DEW_TEMP_1_5M
REL_HUM
MEAN_WIND_SPEED_10M_2MIN
RT_MEAN_WIND_SPEED_10M_2MIN
RT_MEAN_WIND_DIR_10M_2MIN
SDEV_RT_MEAN_WIND_DIR_10M_2MIN
GUST_10M_10MIN
RAINFALL_LAST_HOUR
SNOW_DEPTH
TEMP_MAX_LAST_SYNOPTIC
TEMP_MIN_LAST_SYNOPTIC
RAINFALL_LAST_SYNOPTIC_HOUR
ACCUM_PRECIP
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 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.
STN_PRESS	The measured instantaneous atmospheric pressure at station level.
MSL_PRESS	The calculated instantaneous mean sea level pressure.
PRESS_TEND	The three hour pressure tendency valid only at minute 00 but given every fifteen minutes.
AIR_TEMP_1_5M	The instantaneous air temperature at a height of 1.5 meters above the surface.
DEW_TEMP_1_5M	The instantaneous dew point temperature at a height of 1.5 meters above the surface.
REL_HUM	The calculated relative humidity of the air.
MEAN_WIND_SPEED_10M_2MIN	The two-minute mean scalar wind speed at ten meters above the surface based on measurements taken every six seconds during the two minutes prior to the given time.
RT_MEAN_WIND_SPEED_10M_2MIN	The two-minute resultant mean wind speed at ten meters above the surface based on measurements taken every six seconds during the two minutes prior to the given time.
RT_MEAN_WIND_DIR_10M_2MIN	The two-minute resultant mean wind direction at ten meters above the surface based on measurements taken every six seconds during the two minutes prior to the given time.
SDEV_RT_MEAN_WIND_DIR_10M_2MIN	The standard deviation of the resultant mean wind direction using the equation from Campbell Scientific,SDEV=81*(SQRT(1-U/N)). U is the resultant mean wind speed and N is the number of samples.
GUST_10M_10MIN	The peak wind speed over the past ten minutes at ten meters above the surface.
RAINFALL_LAST_HOUR	The total amount of liquid precipitation that has fallen since the last hour (minute 00).
SNOW_DEPTH	The depth of snow on the ground.
TEMP_MAX_LAST_SYNOPTIC	The maximum temperature at 1.5 meters above the surface since the last synoptic hour (0Z, 6Z, 12Z, ...) based on measurements taken every second.
TEMP_MIN_LAST_SYNOPTIC	The minimum temperature at 1.5 meters above the surface since the last synoptic hour (0Z, 6Z, 12Z, ...) based on measurements taken every second.
RAINFALL_LAST_SYNOPTIC_HOUR	The amount of liquid precipitation fallen since the last synoptic hour (0Z, 6Z, 12Z, ...).
ACCUM_PRECIP	The total amount of precipitation that has fallen since a relative date. This variable is

	measured at the start of every hour but given for every fifteen-minute time period.
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 onthe CD-ROM are:

Column Name	Units
SITE_NAME	[none]
SUB_SITE	[none]
DATE_OBS	[DD-MON-YY]
TIME_OBS	[HHMM GMT]
STN_PRESS	[kiloPascals]
MSL_PRESS	[kiloPascals]
PRESS_TEND	[kiloPascals]
AIR_TEMP_1_5M	[degrees Celsius]
DEW_TEMP_1_5M	[degrees Celsius]
REL_HUM	[percent]
MEAN_WIND_SPEED_10M_2MIN	[meters][second^-1]
RT_MEAN_WIND_SPEED_10M_2MIN	[meters][second^-1]
RT_MEAN_WIND_DIR_10M_2MIN	[degrees]
SDEV_RT_MEAN_WIND_DIR_10M_2MIN	[degrees]
GUST_10M_10MIN	[meters][second^-1]
RAINFALL_LAST_HOUR	[millimeters]
SNOW_DEPTH	[millimeters]
TEMP_MAX_LAST_SYNOPTIC	[degrees Celsius]
TEMP_MIN_LAST_SYNOPTIC	[degrees Celsius]
RAINFALL_LAST_SYNOPTIC_HOUR	[millimeters]
ACCUM_PRECIP	[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 onthe 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]
STN_PRESS	[Supplied by AES]
MSL_PRESS	[Supplied by AES]
PRESS_TEND	[Supplied by AES]
AIR_TEMP_1_5M	[Supplied by AES]
DEW_TEMP_1_5M	[Supplied by AES]
REL_HUM	[Supplied by AES]
MEAN_WIND_SPEED_10M_2MIN	[Supplied by AES]

```
RT_MEAN_WIND_SPEED_10M_2MIN    [Supplied by AES]
RT_MEAN_WIND_DIR_10M_2MIN      [Supplied by AES]
SDEV_RT_MEAN_WIND_DIR_10M_2MIN [Supplied by AES]
GUST_10M_10MIN                 [Supplied by AES]
RAINFALL_LAST_HOUR             [Supplied by AES]
SNOW_DEPTH                     [Supplied by AES]
TEMP_MAX_LAST_SYNOPTIC         [Supplied by AES]
TEMP_MIN_LAST_SYNOPTIC         [Supplied by AES]
RAINFALL_LAST_SYNOPTIC_HOUR    [Supplied by AES]
ACCUM_PRECIP                   [Supplied by AES]
CRTFCN_CODE                    [Assigned by BORIS]
REVISION_DATE                  [Assigned by BORIS]
```

7.3.5 Data Range

The actual ranges for the various parameters were not determined due to the large amount of data in this data set. Please note that some of these values are quite unreasonable. See Section 11.2 for summary information.

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,STN_PRESS,MSL_PRESS,PRESS_TEND,
AIR_TEMP_1_5M,DEW_TEMP_1_5M,REL_HUM,MEAN_WIND_SPEED_10M_2MIN,
RT_MEAN_WIND_SPEED_10M_2MIN,RT_MEAN_WIND_DIR_10M_2MIN,
SDEV_RT_MEAN_WIND_DIR_10M_2MIN,GUST_10M_10MIN,RAINFALL_LAST_HOUR,SNOW_DEPTH,
TEMP_MAX_LAST_SYNOPTIC,TEMP_MIN_LAST_SYNOPTIC,RAINFALL_LAST_SYNOPTIC_HOUR,
ACCUM_PRECIP,CRTFCN_CODE,REVISION_DATE
'REG-999-WFF01','STAFF-AES01',01-OCT-95,0,95.473,101.25,-.0467,13.55,4.091,52.7,
2.429,2.423,149.2,4.178,3.068,0.0,-999.0,16.07,12.91,0.0,-999.0,'CPI',31-JAN-96
'REG-999-WFF01','STAFF-AES01',01-OCT-95,15,95.481,101.26,-.0467,12.64,3.841,55.0,
2.558,2.543,144.7,6.207,3.1,0.0,-999.0,13.55,12.61,0.0,-999.0,'CPI',31-JAN-96
```

8. Data Organization

8.1 Data Granularity

The smallest unit of data is a monthly set of 15-minute 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
Data were received by BOREAS in raw form with 1 month's worth of data per station contained in each raw file. Data were extracted from the files using a C program provided by AES. The output of this program was a tab-delimited file that contained 1 month's worth of processed data for one station. BOREAS Information System (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
This data set has been quality assessed (see Section 11.2). There are some areas where data are not consistent and/or intuitive. The user should be aware of inconsistencies in the 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

An automated quality assurance program was run on this data set to identify anomalies, including sudden jumps or drops ("spikes") in the data. Some of these problems 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 measurements (Fisher & Porter weight gauge and snow depth) are known to be poor. Some automated quality assessment was done to identify spikes and other anomalies in the data. These anomalies are also present in the original data and are not due to BORIS processing. Following are a few examples of some anomalies that were detected for the various columns of data. This is not meant to be a comprehensive list.

STN_PRESS:
In 1993, spikes of 7 or 8 kiloPascals in a 15-minute period were observed in the data. In 1994, some larger spikes were seen, such as the following 13-kPa change:

```
                                    |   From    |    To     |
Prob  |SITE_NAME     |SUB_SITE     | DATE_OBS | DATE_OBS | Data
-----------------------------------------------------------------------------
Spike |REG-999-WLE01 |STAFF-AES01 |14-APR-94 |14-APR-94 | 79.613 - 92.99
```

MSL_PRESS:
In the 1994 data, some anomalous values of -99.9 were identified at the WWC site:

```
Low   |REG-999-WWC01 |STAFF-AES01 |22-OCT-94 |22-OCT-94 | -99.9
```

PRESS_TEND:
In this data set, some spikes of 6 kPa were observed, but in general most values were less than 1. In the 1993 and 1994 data, there are some very high values over 97.8 kPa. Most of these problems were with the WJH, WLE, and WWC sites. In 1995 and 1996, some very high spikes were found in the data from the WRJ site.

AIR_TEMP_1_5M:
In 1993, some spikes of 5 degrees are not uncommon. In addition, some physically impossible values were found.

```
High  |TRN-999-FFN01 |STAFF-AES01 |24-NOV-93 |24-NOV-93 | 341.27
```

DEW_TEMP_1_5M:
In 1993, some spikes greater than 700 degrees C were observed.

```
Spike |REG-999-WFF01 |STAFF-AES01 |04-AUG-93 |04-AUG-93 | 16.88 - 716.09
Spike |REG-999-WFF01 |STAFF-AES01 |04-AUG-93 |04-AUG-93 | 716.09 - 15.69
High  |REG-999-WFF01 |STAFF-AES01 |04-AUG-93 |04-AUG-93 | 716.09
Spike |REG-999-WFF01 |STAFF-AES01 |10-AUG-93 |10-AUG-93 | 13.21 - 713.37
Spike |REG-999-WFF01 |STAFF-AES01 |10-AUG-93 |10-AUG-93 | 713.37 - 13.37
High  |REG-999-WFF01 |STAFF-AES01 |10-AUG-93 |10-AUG-93 | 713.37
```

These kinds of anomalies were seen at the WFF and WIW sites. Anomalous values were not observed in 1994. Some very large spikes were found in the 1995 data for the FFN site.

```
Spike |TRN-999-FFN01 |STAFF-AES01 |06-SEP-95 |06-SEP-95 | 13.03 - 34.22
Spike |TRN-999-FFN01 |STAFF-AES01 |06-SEP-95 |06-SEP-95 | 34.73 - 38.36
Spike |TRN-999-FFN01 |STAFF-AES01 |06-SEP-95 |06-SEP-95 | 38.42 - 12.94
Spike |TRN-999-FFN01 |STAFF-AES01 |11-SEP-95 |11-SEP-95 | 10.91 - 46.35
Spike |TRN-999-FFN01 |STAFF-AES01 |11-SEP-95 |11-SEP-95 | 46.35 - 10.98
```

In 1996, there were some extremely low values at the WBL and FFN sites:

```
Spike |REG-999-WBL01 |STAFF-AES01 |30-OCT-96 |30-OCT-96 | -237.3 - .116
Spike |TRN-999-FFN01 |STAFF-AES01 |08-JUL-96 |08-JUL-96 | -237.3 - 12.32
Low   |TRN-999-FFN01 |STAFF-AES01 |08-JUL-96 |08-JUL-96 | -237.3
```

REL_HUM:
Very large changes (~20%) in relative humidity were observed in the 1993 and 1994 data, although no values were observed outside of the range of 0 to 100.

MEAN_WIND_SPEED_10M_2MIN:
In 1993, the wind speed data had some spikes where the wind speed jumped to greater than 400 meters/sec. These particular values are obviously not correct. An example:

```
Spike |REG-999-WFF01 |STAFF-AES01 |20-AUG-93 |20-AUG-93 | 417.648 - 4.491
```

These kinds of anomalies were seen at the WFF and WIW site. In the 1994 data, some negative wind speeds were identified.

RT_MEAN_WIND_SPEED_10M_2MIN:
In the 1993 data, large anomalies similar to those seen in the previous column were observed from the WFF and WIW sites.

```
Spike |REG-999-WIW01 |STAFF-AES01 |17-AUG-93 |17-AUG-93 | 7.369 - 467.839
```

In the 1994 data, no serious anomalies were identified.

RT_MEAN_WIND_DIR_10M_2MIN:
All values ranged between 0 and 360. No anomalous values were found.

SDEV_RT_MEAN_WIND_DIR_10M_2MIN:
All values seemed to be within an acceptable range.

GUST_10M_10MIN:
There were some very high values at the WFF and WIW sites in 1993.

```
Spike |REG-999-WFF01 |STAFF-AES01 |04-AUG-93 |04-AUG-93 | 107.362 - 5.648
```

RAINFALL_LAST_HOUR:
It was difficult to judge spikes because the data in this column accumulate during each hour. There were some negative values in 1993 and 1994 data:

```
Low   |REG-999-WWC01 |STAFF-AES01 |26-DEC-93 |26-DEC-93 | -35.72
Low   |TRN-999-FFN01 |STAFF-AES01 |29-NOV-93 |29-NOV-93 | -12.1
```

In 1994, some very high values were recorded, especially for site WLV.

```
High  |SSA-999-WLV01 |STAFF-AES01 |06-FEB-94 |06-FEB-94 | 100
```

SNOW_DEPTH:
A number of negative snow depths were observed in 1993 and 1994 at the WLV site:

```
Low   |SSA-999-WLV01 |STAFF-AES01 |10-NOV-93 |10-NOV-93 | -5145
Low   |SSA-999-WLV01 |STAFF-AES01 |11-NOV-93 |11-NOV-93 | -4588
Spike |SSA-999-WLV01 |STAFF-AES01 |03-NOV-94 |03-NOV-94 | -115.2 - 329.4
Spike |SSA-999-WLV01 |STAFF-AES01 |03-NOV-94 |03-NOV-94 | 326.4 - -108.5
```

Some very large spikes were also observed:

```
Spike |SSA-999-WLV01 |STAFF-AES01 |17-NOV-93 |17-NOV-93 | 2116 - 106.9
```

Some large negative values were observed in the 1995 data at the WLV site.

```
Low   |SSA-999-WLV01 |STAFF-AES01 |05-JUN-95 |05-JUN-95 | -4234
Spike |SSA-999-WLV01 |STAFF-AES01 |05-JUN-95 |05-JUN-95 | -4234 - -32.63
```

There were some small negative values in the 1996 data for the WLV site:

```
Spike |SSA-999-WLV01 |STAFF-AES01 |15-APR-96 |15-APR-96 | -11.8 - 2.63
```

TEMP_MAX_LAST_SYNOPTIC:
Some physically unbelievable temperatures were seen at the WFF and WIW sites in the 1993 data:

```
Spike |REG-999-WFF01 |STAFF-AES01 |04-AUG-93 |04-AUG-93 | 420.97 - 20.97
```

Some very large temperatures were observed at the FFN site in 1995:

```
Spike |TRN-999-FFN01 |STAFF-AES01 |11-SEP-95 |11-SEP-95 | 24.27 - 38.02
Spike |TRN-999-FFN01 |STAFF-AES01 |11-SEP-95 |11-SEP-95 | 38.02 - 46.82
Spike |TRN-999-FFN01 |STAFF-AES01 |11-SEP-95 |11-SEP-95 | 47.34 - 15.65
```

TEMP_MIN_LAST_SYNOPTIC:
In 1993, very large temperatures were seen in this column at the WFF, WIW, and FFN sites:

```
Spike |REG-999-WIW01 |STAFF-AES01 |12-AUG-93 |12-AUG-93 | 512.41 - 12.26
```

RAINFALL_LAST_SYNOPTIC_HOUR:
Large anomalies were seen in the 1993 data from the WFF and WIW sites.

```
High  |REG-999-WFF01 |STAFF-AES01 |26-AUG-93 |26-AUG-93 | 90
```

For 1995, some extremely large values were seen in the WLV data:

```
Spike |SSA-999-WLV01 |STAFF-AES01 |21-SEP-95 |21-SEP-95 | 0 - 285
Spike |SSA-999-WLV01 |STAFF-AES01 |21-SEP-95 |21-SEP-95 | 285 - 0
High  |SSA-999-WLV01 |STAFF-AES01 |21-SEP-95 |21-SEP-95 | 285
```

ACCUM_PRECIP:
There is a spike in the 1993 data for the WJH site:

```
Spike |REG-999-WJH01 |STAFF-AES01 |23-OCT-93 |23-OCT-93 | 117.4 - 205.8
```

Some oddities were noticed in these data in 1994, 1995, and 1996 for the WJH and WLV sites:

```
Prob  |SITE_NAME     |SUB_SITE    | DATE_OBS | DATE_OBS |ACCUM_PRECIP
-----------------------------------------------------------------------------
Spike |REG-999-WJH01 |STAFF-AES01 |29-MAY-95 |29-MAY-95 | 220.4 - 524.5
Spike |REG-999-WJH01 |STAFF-AES01 |29-MAY-95 |29-MAY-95 | 524.5 - 571.5
Spike |REG-999-WJH01 |STAFF-AES01 |29-MAY-95 |29-MAY-95 | 571.5 - 13.85
Spike |REG-999-WJH01 |STAFF-AES01 |29-MAY-95 |29-MAY-95 | 13.85 - 345.9
Spike |REG-999-WJH01 |STAFF-AES01 |29-MAY-95 |29-MAY-95 | 345.9 - 93.9
Spike |SSA-999-WLV01 |STAFF-AES01 |31-MAY-95 |31-MAY-95 | 431 - 105
High  |SSA-999-WLV01 |STAFF-AES01 |22-FEB-94 |22-FEB-94 | 1665
Spike |SSA-999-WLV01 |STAFF-AES01 |22-FEB-94 |22-FEB-94 | 1665 - 20
High  |SSA-999-WLV01 |STAFF-AES01 |22-FEB-94 |22-FEB-94 | 1665
Spike |REG-999-WJH01 |STAFF-AES01 |28-MAY-96 |28-MAY-96 | 214.5 - 421.9
Spike |REG-999-WJH01 |STAFF-AES01 |28-MAY-96 |28-MAY-96 | 421.9 - 111
```

11.3 Usage Guidance

Based on the anomalies reported in Section 11.2, users are advised to check the data further before using them.

11.4 Other Relevant Information

None given.

12. Application of the Data Set

These data along with other surface meteorological station data can be used to characterize the local and/or regional weather conditions and/or patterns. They are also useful for creating climate condition data sets that are used for various modeling purposes.

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 AES Campbell Scientific 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/ [Internet Link].

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

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).

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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

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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
NAD83   - North American Datum of 1983
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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13. ABSTRACT *(Maximum 200 words)*

Canadian AES personnel collected data related to surface and atmospheric meteorological conditions over the BOREAS region. This data set contains 15-minute meteorological data from 14 automated meteorology stations located across the BOREAS region. Included in this data are parameters of date, time, mean sea level pressure, station pressure, temperature, dew point, wind speed, resultant wind speed, resultant wind direction, peak wind, precipitation, maximum temperature in the last hour, minimum temperature in the last hour, pressure tendency, liquid precipitation in the last hour, relative humidity, precipitation from a weighing gauge, and snow depth. Temporally, the data cover the period of August 1993 to December 1996. The data are provided in tabular ASCII files, and are classified as AFM-Staff data.

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