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

Forrest G. Hall and David E. Knapp, Editors

Volume 119

BORESAS AES READAC
Surface Meteorological Data

G. Barrie Atkinson and Barry Funk
Environment Canada, Winnipeg, Manitoba, Canada

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

September 2000
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G. Barrie Atkinson, Barry Funk

Summary

Canadian AES personnel collected and processed data related to surface atmospheric meteorological conditions over the BOREAS region. This data set contains 15-minute meteorological data from one READAC meteorology station in Hudson Bay, Saskatchewan. Parameters include day, time, type of report, sky condition, visibility, mean sea level pressure, temperature, dewpoint, wind, altimeter, opacity, minimum and maximum visibility, station pressure, minimum and maximum air temperature, a wind group, precipitation, and precipitation in the last hour. The data were collected non-continuously from 24-May-1994 to 20-Sep-1994. 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 READAC Surface Meteorological Data

1.2 Data Set Introduction
This data set contains 15-minute meteorological data from one Remote Environmental Automated Data Acquisition Concept (READAC) meteorology station in the Boreal Ecosystem-Atmosphere Study (BOREAS) region in Canada. Parameters include day, time, type of report, sky condition, visibility, mean sea level pressure, temperature, dewpoint, wind, altimeter, opacity, minimum and maximum visibility, station pressure, minimum and maximum air temperature, a wind group, precipitation, and precipitation in the last hour.
1.3 Objective/Purpose
These monitoring sites were established by Environment 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 observation was increased to 15 minutes at the request of BOREAS. Data collection for BOREAS occurred during Intensive Field Campaigns (IFCs) 1, 2, and 3.

1.4 Summary of Parameters
Included parameters are day, time, type of report, sky condition, visibility, mean sea level pressure, temperature, dewpoint, wind, altimeter, opacity, minimum and maximum visibility, station pressure, minimum and maximum air temperature, wind group, precipitation, and precipitation in the last hour.

1.5 Discussion
This station was installed before BOREAS began in order to meet the goals of Environment Canada, and it conforms to Environment Canada's criteria for accuracy and exposure.

1.6 Related Data Sets
BOREAS AFM-07 SRC Surface Meteorological Data
BOREAS AES MARSII Surface Meteorological Data
BOREAS AES Campbell Scientific 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)
Barry.Funk@gc.ec.ca
3. Theory of Measurements

None given.

4. Equipment

4.1 Sensor/Instrument Description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Instrumentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>Sentra 270 (2) -- the two are compared for each reading.</td>
</tr>
<tr>
<td>Cloud</td>
<td>Model 8329A Qualimetrics laser ceilometer</td>
</tr>
<tr>
<td>Visibility</td>
<td>Belfort 6200</td>
</tr>
<tr>
<td>Temperature</td>
<td>YSI READAC thermister</td>
</tr>
<tr>
<td>Dewcel Probe</td>
<td>AES type E</td>
</tr>
<tr>
<td>Radiation Shield</td>
<td>Wooden Stevenson screen with wooden stand</td>
</tr>
<tr>
<td>Precipitation</td>
<td>Weighting gauge (Fisher and Porter)</td>
</tr>
<tr>
<td>Wind</td>
<td>Direction 78D</td>
</tr>
<tr>
<td></td>
<td>Speed detector 78D</td>
</tr>
<tr>
<td></td>
<td>Cupwheel height 10 m -- tower tilting</td>
</tr>
</tbody>
</table>

4.1.1 Collection Environment

The instruments operated during the summer of 1994 in the environmental conditions shown in the data.

4.1.2 Source/Platform

None given.

4.1.3 Source/Platform Mission Objectives

None given.

4.1.4 Key Variables

Temperature, pressure, humidity, wind.

4.1.5 Principles of Operation

None given.

4.1.6 Sensor/Instrument Measurement Geometry

None given.
4.1.7 Manufacturer of Sensor/Instrument
None given.

4.2 Calibration

4.2.1 Specifications
None given.

4.2.1.1 Tolerance
None given.

4.2.2 Frequency of Calibration
None given.

4.2.3 Other Calibration Information
None given.

5. Data Acquisition Methods
Since there is no provision for onboard storage of observations, the station was telephoned approximately every 15 minutes from a computer in Winnipeg and the data were downloaded.

6. Observations

6.1 Data Notes
None given.

6.2 Field Notes

<table>
<thead>
<tr>
<th>Location</th>
<th>Date of Visit</th>
<th>Actions During Visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZHB Hudson Bay, Saskatchewan (SK)</td>
<td>Installation 21-Jun-1992</td>
<td>All instruments were verified after installation. The average differences from the inspection were: barometer was -0.01 mb for 10 readings; dry bulb temperature, -0.1 degrees C for 10 readings; dewpoint +0.46 degrees C for 10 readings. The Fisher and Porter weighing gauge was tested at 25-mm increments over the range 0-300 mm. The difference ranged from +1.2 mm to -0.8 mm with an average of +0.05 mm.</td>
</tr>
</tbody>
</table>

7. Data Description

7.1 Spatial Characteristics

7.1.1 Spatial Coverage
The following description of the Hudson Bay site gives latitude and longitude coordinates as degrees and minutes under the North American Datum of 1983 (NAD83).
ZHB Hudson Bay SK
The Hudson Bay site (ZHB) is located at a latitude of 52 degrees, 49 minutes N; at a longitude of 102 degrees, 19 minutes W; and at an elevation of 358.1 meters. The site is located at the Hudson Bay airport, approximately 5 km south of the town of Hudson Bay, SK. The instruments are located in the 75-m (northwest to southeast) by 60-m (southwest to northeast) instrument area of the formerly manned weather station. The instrument area is level and grassed, with open exposure in all directions. The surrounding countryside is generally flat and forested. The Red Deer River is located approximately 0.7 km to the south. The airport is located in the shallow valley of the Red Deer River, which runs generally southwest to northeast. The valley is paralleled to the south by the Porcupine Hills, which rise to a height of 760 m above sea level approximately 48 km southeast, and to the north by the Pasquia Hills, which achieve a height of 817 m approximately 48 km northwest.

7.1.2 Spatial Coverage Map
Not available.

7.1.3 Spatial Resolution
These data were collected at a point location.

7.1.4 Projection
Not applicable.

7.1.5 Grid Description
Not applicable.

7.2 Temporal Characteristics

7.2.1 Temporal Coverage

7.2.2 Temporal Coverage Map
Not available.

7.2.3 Temporal Resolution
Data were collected approximately every 15 minutes.

7.3 Data Characteristics

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

<table>
<thead>
<tr>
<th>Column Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE_NAME</td>
</tr>
<tr>
<td>SUB_SITE</td>
</tr>
<tr>
<td>DATE_OBS</td>
</tr>
<tr>
<td>TIME_OBS</td>
</tr>
<tr>
<td>REPORT</td>
</tr>
<tr>
<td>SKY_COVER</td>
</tr>
<tr>
<td>VISIBILITY</td>
</tr>
<tr>
<td>AIR_TEMP_1_5M</td>
</tr>
<tr>
<td>DEW_TEMP_1_5M</td>
</tr>
<tr>
<td>MEAN_WIND_10M_2MIN</td>
</tr>
<tr>
<td>ALTIMETER</td>
</tr>
<tr>
<td>OPACITY</td>
</tr>
</tbody>
</table>
### 7.3.2 Variable Description/Definition

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

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE_NAME</td>
<td>The identifier assigned to the site by BOREAS, in the format SSS-TTT-CCCCC, where SSS identifies the portion of the study area: NSA, SSA, REG, TRN, and TTT identifies the cover type for the site, 999 if unknown, and CCCCC is the identifier for site, exactly what it means will vary with site type.</td>
</tr>
<tr>
<td>SUB_SITE</td>
<td>The identifier assigned to the sub-site by BOREAS, in the format GGGGG-IIIII, where GGGGG is the group associated with the sub-site instrument, e.g. HYD06 or STAFF, and IIIII is the identifier for sub-site, often this will refer to an instrument.</td>
</tr>
<tr>
<td>DATE_OBS</td>
<td>The date on which the data were collected.</td>
</tr>
<tr>
<td>TIME_OBS</td>
<td>The Greenwich Mean Time (GMT) when the data were collected.</td>
</tr>
<tr>
<td>REPORT</td>
<td>The report type. Regular (SA) or special (SP).</td>
</tr>
<tr>
<td>SKY_COVER</td>
<td>The sky condition in hundreds of feet, up to four cloud layers and up to one surface layer.</td>
</tr>
<tr>
<td>VISIBILITY</td>
<td>The Meteorological Optical Range. A V may be appended if visibility is variable.</td>
</tr>
<tr>
<td>AIR_TEMP_1_5M</td>
<td>The instantaneous air temperature at a height of 1.5 meters above the surface.</td>
</tr>
<tr>
<td>DEW_TEMP_1_5M</td>
<td>The instantaneous dewpoint temperature at a height of 1.5 meters above the surface.</td>
</tr>
<tr>
<td>MEAN_WIND_10M_2MIN</td>
<td>The first two digits denote the two minute mean true wind direction in tens of degrees at a height of ten meters above the surface. The next two or three digits denote the two minute mean wind speed in knots at a height of ten meters above the surface.</td>
</tr>
<tr>
<td>ALTIMETER</td>
<td>The altimeter reading.</td>
</tr>
<tr>
<td>OPACITY</td>
<td>The summation (cumulative) opacity. Percentage in each layer reported. For example, 1246 means ten percent for first layer, twenty percent for first two layers, forty percent for first three layers, and sixty percent for first four layers. An 'E' indicates that the values are estimated.</td>
</tr>
<tr>
<td>VISIBILITY_MIN_MAX</td>
<td>The first group is the minimum visibility over the surface.</td>
</tr>
</tbody>
</table>
the last ten minutes in tenths of nautical miles except where greater than nine when it will show 9+. A V in between means visibility is variable. The second group is the maximum visibility over the last ten minutes in tenths of nautical miles except where greater than nine when it will show 9+.

STN_PRESS
The measured instantaneous atmospheric pressure at station level.

AIR_TEMP_MIN
The minimum air temperature over the last sixty minutes.

AIR_TEMP_MAX
The maximum air temperature over the last sixty minutes.

WIND_GROUP_10M
The first two digits denote the ten minute mean true wind direction in tens of degrees at a height of ten meters above the surface. The next three digits denote the ten minute mean wind speed in knots at a height of ten meters above the surface. The G denotes gust; the next three digits denote the five second mean wind speed in knots over ten minutes at a height of ten meters above the surface. The next two digits denote the peak wind speed direction in tens of degrees over sixty minutes at a height of ten meters above the surface. The next three digits denote the maximum five second mean wind speed in knots over sixty minutes at a height of ten meters above the surface. The last digit denotes the units digit from the two minute mean wind direction in degrees.

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.

PRECIP_LAST_HOUR
The accumulated precipitation (liquid water equivalent of liquid or solid precipitation) over the last sixty minutes.

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

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

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

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE_NAME</td>
<td>[none]</td>
</tr>
<tr>
<td>SUB_SITE</td>
<td>[none]</td>
</tr>
<tr>
<td>DATE_OBS</td>
<td>[DD-MON-YY]</td>
</tr>
<tr>
<td>TIME_OBS</td>
<td>[HHMM GMT]</td>
</tr>
<tr>
<td>REPORT</td>
<td>[none]</td>
</tr>
</tbody>
</table>
7.3.4 Data Source

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

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE_NAME</td>
<td>Assigned by BORIS</td>
</tr>
<tr>
<td>SUB_SITE</td>
<td>Assigned by BORIS</td>
</tr>
<tr>
<td>DATE_OBS</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>TIME_OBS</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>REPORT</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>SKY_COVER</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>VISIBILITY</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>AIR_TEMP_1_5M</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>DEW_TEMP_1_5M</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>MEAN_WIND_10M_2MIN</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>ALTIMETER</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>OPACITY</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>VISIBILITY_MIN_MAX</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>STN_PRESS</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>AIR_TEMP_MIN</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>AIR_TEMP_MAX</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>WIND_GROUP_10M</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>ACCUM_PRECIP</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>PRECIP_LAST_HOUR</td>
<td>Supplied by Investigator</td>
</tr>
<tr>
<td>CRTFCN_CODE</td>
<td>Assigned by BORIS</td>
</tr>
<tr>
<td>REVISION_DATE</td>
<td>Assigned by BORIS</td>
</tr>
</tbody>
</table>

7.3.5 Data Range

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

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Minimum Data Value</th>
<th>Maximum Data Value</th>
<th>Missng Data Value</th>
<th>Unrel Data Value</th>
<th>Below Data Value</th>
<th>Detect Limit</th>
<th>Cllctd</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE_NAME</td>
<td>REG-999-ZHB03</td>
<td>REG-999-ZHB03</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>SUB_SITE</td>
<td>STAFF-AES03</td>
<td>STAFF-AES03</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Parameter</td>
<td>20-SEP-94</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>22-JAN-96</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>DATE_OBS</td>
<td>24-MAY-94</td>
<td>20-SEP-94</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>22-JAN-96</td>
</tr>
<tr>
<td>TIME_OBS</td>
<td>2</td>
<td>2348</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>REPORT</td>
<td>SA</td>
<td>SP</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>SKY_COVER</td>
<td>N/A</td>
<td>N/A</td>
<td>-999</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>VISIBILITY</td>
<td>-999</td>
<td>9.4</td>
<td>-999</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>AIR_TEMP_1_5M</td>
<td>.3</td>
<td>30.1</td>
<td>-999</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>DEW_TEMP_1_5M</td>
<td>-.2</td>
<td>19.9</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>MEAN_WIND_10M_2MIN</td>
<td>0</td>
<td>914</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>ALTIMETER</td>
<td>29.18</td>
<td>30.34</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>OPACITY</td>
<td>-999</td>
<td>E6</td>
<td>-999</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>VISIBILITY_MIN_MAX</td>
<td>-999</td>
<td>90</td>
<td>9+</td>
<td>-999</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>STN_PRESS</td>
<td>94.67</td>
<td>98.48</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>AIR_TEMP_MIN</td>
<td>.2</td>
<td>29.5</td>
<td>-999</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>AIR_TEMP_MAX</td>
<td>.9</td>
<td>30.8</td>
<td>-999</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>WIND_GROUP_10M</td>
<td>N/A</td>
<td>N/A</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>ACCUM_PRECIP</td>
<td>37</td>
<td>244.1</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>PRECIP_LAST_HOUR</td>
<td>0</td>
<td>10.4</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>CRTFCN_CODE</td>
<td>CPI</td>
<td>CPI</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>REVISION_DATE</td>
<td>22-JAN-96</td>
<td>22-JAN-96</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

Minimum Data Value -- The minimum value found in the column.
Maximum Data Value -- The maximum value found in the column.
Missing Data Value -- The value that indicates missing data. This is used to indicate that an attempt was made to determine the parameter value, but the attempt was unsuccessful.
Unrel Data Value -- The value that indicates unreliable data. This is used to indicate an attempt was made to determine the parameter value, but the value was deemed to be unreliable by the analysis personnel.
Below Detect Limit -- The value that indicates parameter values below the instruments detection limits. This is used to indicate that an attempt was made to determine the parameter value, but the analysis personnel determined that the parameter value was below the detection limit of the instrumentation.
Data Not Collected -- This value indicates that no attempt was made to determine the parameter value. This usually indicates that BORIS combined several similar but not identical data sets into the same data base table but this particular science team did not measure that parameter.
Blank -- Indicates that blank spaces are used to denote that type of value.
N/A -- Indicates that the value is not applicable to the respective column.
None -- Indicates that no values of that sort were found in the column.
7.4 Sample Data Record
The following are wrapped versions of data records from a sample data file on the CD-ROM.

<table>
<thead>
<tr>
<th>SITE_NAME</th>
<th>SUB_SITE</th>
<th>DATE_OBS</th>
<th>TIME_OBS</th>
<th>REPORT</th>
<th>SKYCOVER</th>
<th>VISIBILITY</th>
<th>AIR_TEMP_1_5M</th>
<th>DEW_TEMP_1_5M</th>
<th>MEAN_WIND_10M_2MIN</th>
<th>ALTIMETER</th>
<th>OPACITY</th>
<th>VISIBILITY_MIN_MAX</th>
<th>STN_PRESS</th>
<th>AIR_TEMP_MIN</th>
<th>AIR_TEMP_MAX</th>
<th>WIND_GROUP_10M</th>
<th>ACCUM_PRECIP</th>
<th>PRECIP_LAST_HOUR</th>
<th>CRTFCN_CODE</th>
<th>REVISION_DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>REG-999-ZHB03</td>
<td>STAFF-AES03</td>
<td>19-JUL-94</td>
<td>503</td>
<td>'SA'</td>
<td>'CLR BLO 100'</td>
<td>'9+'</td>
<td>22.2</td>
<td>19.3</td>
<td>703</td>
<td>29.55</td>
<td>0</td>
<td>9+ 9+</td>
<td>95.88</td>
<td>21.8</td>
<td>22.4</td>
<td>'07004G0000000008'</td>
<td>180.8</td>
<td>0.0</td>
<td>'CPI'</td>
<td>22-JAN-96</td>
</tr>
<tr>
<td>REG-999-ZHB03</td>
<td>STAFF-AES03</td>
<td>19-JUL-94</td>
<td>531</td>
<td>'SA'</td>
<td>'CLR BLO 100'</td>
<td>'9+'</td>
<td>22.0</td>
<td>19.4</td>
<td>605</td>
<td>29.54</td>
<td>0</td>
<td>9+ 9+</td>
<td>95.84</td>
<td>22.0</td>
<td>22.4</td>
<td>'06004G000000005'</td>
<td>180.8</td>
<td>0.0</td>
<td>'CPI'</td>
<td>22-JAN-96</td>
</tr>
</tbody>
</table>

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
None given.

9.2.2 Processing Changes
'RAW' data have many extraneous characters, which were removed. Each record was checked for completeness.

9.3 Calculations
No calculations were performed on the data.
9.3.1 Special Corrections/Adjustments
None given.

9.3.2 Calculated Variables
None given.

9.4 Graphs and Plots
None.

10. Errors

10.1 Sources of Error
None given.

10.2 Quality Assessment

10.2.1 Data Validation by Source
None given.

10.2.2 Confidence Level/Accuracy Judgment
None given.

10.2.3 Measurement Error for Parameters
None given.

10.2.4 Additional Quality Assessments
None given.

10.2.5 Data Verification by Data Center
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 BOREAS Information System (BORIS) processing.

11. Notes

11.1 Limitations of the Data
None given.

11.2 Known Problems with the Data
Weighing gauges are known to give readings of poorer quality than tipping bucket gauges. However, they do work in winter.

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. The 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.

REPORT
Because this column contains character data, no quantitative assessment was done. The data appear to be correct.
SKY COVER
Because this column contains character data, no quantitative assessment was done. The data appear to be correct.

VISIBILITY
Because this column contains character data, no quantitative assessment was done. The data appear to be correct.

AIR_TEMP_1_5_M
No problems were identified.

DEW_TEMP_1_5M
No problems were identified.

MEAN_WIND_10M_2MIN
Because this column contains character data, no quantitative assessment was done. The data appear to be correct.

ALTIMETER
These data appear to be reasonable.

OPACITY
Because this column contains character data, no quantitative assessment was done. The data appear to be correct.

VISIBILITY_MIN_MAX
Because this column contains character data, no quantitative assessment was done. The data appear to be correct.

STN_PRESS
No anomalies were identified.

AIR_TEMP_MIN
No serious anomalies were identified, but some questionable values were found that could not be verified for accuracy.

AIR_TEMP_MAX
No serious anomalies were identified, but some questionable values were found that could not be verified for accuracy.

WIND_GROUP_10M
Because this column contains character data, no quantitative assessment was done. The data appear to be correct.

ACCUM_PRECIP
No serious anomalies were identified.

PRECIP_LAST_HOUR
No serious anomalies were identified.

11.3 Usage Guidance
None given.
11.4 Other Relevant Information
None given.

12. Application of the Data Set
These data in conjunction with other surface meteorological data can be used to monitor and model the near-surface conditions on a diurnal and seasonal basis.

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 READAC 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

17.2 Journal Articles and Study Reports


17.3 Archive/DBMS Usage Documentation

None.

18. Glossary of Terms

None.

19. List of Acronyms

AES  - Atmospheric and Environment Service
AFM  - Airborne Fluxes and Meteorology
ASCII - American Standard Code for Information Interchange
BOREAS - BOREal Ecosystem-Atmosphere Study
BORIS - BOREAS Information System
CD-ROM - Compact Disk-Read-Only Memory
CGR  - Certified by Group
CPI  - Checked by PI
CPI-??? - CPI but questionable
DAAC - Distributed Active Archive Center
EOS  - Earth Observing System
EOSDIS - EOS Data and Information System
GIS  - Geographic Information System
GMT  - Greenwich Mean Time
GSFC - Goddard Space Flight Center
HTML - HyperText Markup Language
IFC  - Intensive Field Campaign
MARS II - 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
TB RG - Tipping Bucket Rain Gauge
URL  - Uniform Resource Locator
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20.2 Document Review Date(s)
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20.4 Citation
When using these data, please include the following acknowledgment as well as citations of relevant papers in Section 17.2:

These data were collected by the Atmospheric Environment Service of Environment Canada. Their efforts to make these data available are greatly appreciated.

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


Also, cite the BOREAS CD-ROM set as:


20.5 Document Curator

20.6 Document URL
**Technical Report Series on the Boreal Ecosystem-Atmosphere Study (BOREAS)**

BOREAS AES READAC Surface Meteorological Data

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**ABSTRACT**

Canadian AES personnel collected and processed data related to surface atmospheric meteorological conditions over the BOREAS region. This data set contains 15-minute meteorological data from one READAC meteorology station in Hudson Bay, Saskatchewan. Parameters include day, time, type of report, sky condition, visibility, mean sea level pressure, temperature, dewpoint, wind, altimeter, opacity, minimum and maximum visibility, station pressure, minimum and maximum air temperature, a wind group, precipitation, and precipitation in the last hour. The data were collected non-continuously from 24-May-1994 to 20-Sep-1994. The data are provided in tabular ASCII files, and are classified as AFM-Staff data.