



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

Forrest G. Hall, Editors

Volume 94

BOREAS Hardcopy Maps

Elizabeth Nelson, SSAI, NASA Goddard Space Flight Center, Greenbelt, Maryland

Jeffrey A. Newcomer, Raytheon ITSS, NASA Goddard Space Flight Center, Greenbelt, Maryland

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

The NASA STI Program Office ... in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA Scientific and Technical Information (STI) Program Office plays a key part in helping NASA maintain this important role.

The NASA STI Program Office is operated by Langley Research Center, the lead center for NASA's scientific and technical information. The NASA STI Program Office provides access to the NASA STI Database, the largest collection of aeronautical and space science STI in the world. The Program Office is also NASA's institutional mechanism for disseminating the results of its research and development activities. These results are published by NASA in the NASA STI Report Series, which includes the following report types:

- **TECHNICAL PUBLICATION.** Reports of completed research or a major significant phase of research that present the results of NASA programs and include extensive data or theoretical analysis. Includes compilations of significant scientific and technical data and information deemed to be of continuing reference value. NASA's counterpart of peer-reviewed formal professional papers but has less stringent limitations on manuscript length and extent of graphic presentations.
- **TECHNICAL MEMORANDUM.** Scientific and technical findings that are preliminary or of specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.
- **CONTRACTOR REPORT.** Scientific and technical findings by NASA-sponsored contractors and grantees.
- **CONFERENCE PUBLICATION.** Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or cosponsored by NASA.
- **SPECIAL PUBLICATION.** Scientific, technical, or historical information from NASA programs, projects, and mission, often concerned with subjects having substantial public interest.
- **TECHNICAL TRANSLATION.** English-language translations of foreign scientific and technical material pertinent to NASA's mission.

Specialized services that complement the STI Program Office's diverse offerings include creating custom thesauri, building customized databases, organizing and publishing research results . . . even providing videos.

For more information about the NASA STI Program Office, see the following:

- Access the NASA STI Program Home Page at <http://www.sti.nasa.gov/STI-homepage.html>
- E-mail your question via the Internet to help@sti.nasa.gov
- Fax your question to the NASA Access Help Desk at (301) 621-0134
- Telephone the NASA Access Help Desk at (301) 621-0390
- Write to:
NASA Access Help Desk
NASA Center for AeroSpace Information
7121 Standard Drive
Hanover, MD 21076-1320



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

Forrest G. Hall, Editors

Volume 94

BOREAS Hardcopy Maps

Elizabeth Nelson, SSAI, NASA Goddard Space Flight Center, Greenbelt, Maryland

Jeffrey A. Newcomer, Raytheon ITSS, NASA Goddard Space Flight Center, Greenbelt, Maryland

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

Available from:

NASA Center for AeroSpace Information
7121 Standard Drive
Hanover, MD 21076-1320
Price Code: A17

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Price Code: A10

BOREAS Hardcopy Maps

Elizabeth Nelson, Jeffrey A. Newcomer

Summary

BOREAS hardcopy maps are a collection of approximately 1,000 hardcopy maps representing the physical, climatological, and historical attributes of areas covering primarily the Manitoba and Saskatchewan provinces of Canada. These maps were collected by BORIS and CCRS staff to provide basic information about site positions, manmade features, topography, geology, hydrology, land cover types, fire history, climate, and soils of the BOREAS study region. These maps are not available for distribution through the BOREAS project but may be used as an onsite resource. Information is provided within this document for individuals who want to order copies of these maps from the original map source.

Note that the maps are not contained on the BOREAS CD-ROM set. An inventory listing file is supplied on the CD-ROM to inform users of the maps that are available.

Table of Contents

- 1) Data Set Overview
- 2) Investigator(s)
- 3) Theory of Measurements
- 4) Equipment
- 5) Data Acquisition Methods
- 6) Observations
- 7) Data Description
- 8) Data Organization
- 9) Data Manipulations
- 10) Errors
- 11) Notes
- 12) Application of the Data Set
- 13) Future Modifications and Plans
- 14) Software
- 15) Data Access
- 16) Output Products and Availability
- 17) References
- 18) Glossary of Terms
- 19) List of Acronyms
- 20) Document Information

1. Data Set Overview

1.1 Data Set Identification

BOREAS Hardcopy Maps

1.2 Data Set Introduction

BOReal Ecosystem-Atmosphere Study (BOREAS) hardcopy maps are a collection of approximately 1,000 hardcopy maps representing the physical, climatological, and historical attributes of areas covering primarily the Manitoba and Saskatchewan provinces of Canada. These maps were collected by BOREAS Information System (BORIS) and Canada Centre for Remote Sensing (CCRS) staff to provide basic information about site positions, manmade features, topography, geology, hydrology, land cover types, fire history, climate, and soils of the BOREAS study region. These maps

are not available for distribution through the BOREAS project but may be used as an onsite resource. Information is provided within this document for individuals who want to order copies of these maps from the original map source.

1.3 Objective/Purpose

The BOREAS Staff Science effort covered project-level activities requiring uniform data collection procedures across sites and time. Locating and acquiring various map-based information over the BOREAS study areas was included in this undertaking. The maps were acquired to provide basic information about the geographic position of manmade features and potential sites, topography, geology, hydrology, land cover types, fire history records, climate, and soils of the BOREAS study area. The maps were used in the planning and execution stages of the experiment in site selection and use, in aircraft mission planning, and for providing baseline information to investigators about the historical and physical characteristics of the area.

1.4 Summary of Parameters

The map types found in the BOREAS collection include Bedrock, Climate, Fire History, Forest Cover, Geochemistry, Soils, Surficial Geology, Topography, and Water Resources, primarily of the Manitoba and Saskatchewan provinces.

1.5 Discussion

BOREAS staff interacted with numerous scientists and agency representatives in finding the maps that exist in this collection. The maps in the collection were purchased with project funds and are copyrighted. Because this is copyrighted information, BORIS cannot copy or distribute the maps. Contact information about the various maps is provided in Section 7.3.4 of this document.

1.6 Related Data Sets

BOREAS Forest Cover Data Layers of the NSA in Raster Format
BOREAS Elevation Contours over the NSA and SSA in ARC/Info Generate Format
BOREAS HYD-08 DEM Data over the NSA-MSA and SSA-MSA in the UTM Projection
BOREAS Regional DEM in Raster Format and AEAC Projection

2. Investigator

2.1 Investigator Name and Title

BOREAS Staff Science

2.2 Title of Investigation

BOREAS Staff Science GIS Data Collection Program

2.3 Contact Information

Contact 1:

Beth Nelson
SSAI
Code 923
NASA GSFC
Greenbelt, MD 20771
(301) 286-4005
(301) 286-0239 (fax)
Elizabeth.Nelson@gsfc.nasa.gov

Contact 2:

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

The maps in the BOREAS collection were obtained from various sources. Map types and the original map sources are listed in detail in Section 7.3.4. Overall, the maps were derived and updated from interpretation of aerial photography and from ground surveys. Any details on the compilation and derivation for a particular map may be obtained by contacting the original map source.

4. Equipment

4.1 Sensor/Instrument Description

Unknown.

4.1.1 Collection Environment

Unknown.

4.1.2 Source/Platform

Unknown.

4.1.3 Source/Platform Mission Objectives

Unknown.

4.1.4 Key Variables

Bedrock, Climate, Fire History, Forest Cover, Geochemistry, Soils, Surficial Geology, Topography, and Water Resources.

4.1.5 Principles of Operation

Unknown.

4.1.6 Sensor/Instrument Measurement Geometry

Unknown.

4.1.7 Manufacturer of Sensor/Instrument

Unknown.

4.2 Calibration

4.2.1 Specifications

Unknown.

4.2.1.1 Tolerance

Unknown.

4.2.2 Frequency of Calibration

Unknown.

4.2.3 Other Calibration Information

Unknown.

5. Data Acquisition Methods

The BOREAS hardcopy maps were located and acquired from various sources by BOREAS staff at National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) and CCRS. Details on the map sources are given in Section 7.3.4 of this document.

6. Observations

6.1 Data Notes

None.

6.2 Field Notes

None.

7. Data Description

7.1 Spatial Characteristics

7.1.1 Spatial Coverage

The BOREAS map collection covers various portions of the Saskatchewan and Manitoba provinces as well as the entire Canadian region for some parameters. Details on specific coverage can be obtained by contacting the designated persons in Section 2.3 or by contacting the map sources given in Section 7.3.4.

The climatic map data cover the entire region of Canada, as does the topographic map index. All other maps cover areas in Universal Transverse Mercator (UTM) zone 13 and/or 14.

The North American Datum of 1983 (NAD83) corner coordinates of the overall BOREAS region, which includes both the Southern Study Area (SSA) and the Northern Study Area (NSA), are:

	Latitude	Longitude
	-----	-----
Northwest	58.979 N	111.000 W
Northeast	58.844 N	93.502 W
Southwest	51.000 N	111.000 W
Southeast	50.089 N	96.969 W

The NAD83 corner coordinates of the BOREAS SSA are:

	Latitude	Longitude
	-----	-----
Northwest	54.321 N	106.228 W
Northeast	54.225 N	104.237 W
Southwest	53.515 N	106.321 W
Southeast	53.420 N	104.368 W

The NAD83 corner coordinates of the NSA are:

	Latitude	Longitude
	-----	-----
Northwest	56.249 N	98.825 W
Northeast	56.083 N	97.234 W
Southwest	55.542 N	99.045 W
Southeast	55.379 N	97.489 W

7.1.2 Spatial Coverage Map

Not available.

7.1.3 Spatial Resolution

The spatial resolution is specific to the scale of the individual maps.

7.1.4 Projection

The maps are in various projections and need to be referenced specifically for this information.

7.1.5 Grid Description

Not available.

7.2 Temporal Characteristics

7.2.1 Temporal Coverage

The original compilation and revision dates of the maps are specific to the individual map sheets.

7.2.2 Temporal Coverage Map

Not available.

7.2.3 Temporal Resolution

Not available.

7.3 Data Characteristics

7.3.1 Parameter/Variable

The maps in the collection provide information on the following features:

CLIMATE
FIRE HISTORY
FOREST COVER
GEOLOGY - BEDROCK
GEOLOGY - CHEMISTRY
GEOLOGY - PHOTOGRAPHY
GEOLOGY - QUATERNARY
GEOLOGY - SURFICIAL
FORESTRY - HYPSONETRY
LAND CAPACITY
LAND COVER
LAND TYPE
OBSERVING STATIONS
PLANT COMMUNITY
RADIATION NETWORK
SOILS
SOIL CAPACITY

SOIL LANDSCAPE
 SUNSHINE NETWORK
 SYNOPTIC AND HOURLY STATIONS
 TOPOGRAPHY INDEXES
 TOPOGRAPHY
 WATER RESOURCES

The parameters contained in the map inventory listing file on the CD-ROM are:

Column Name

 PROVINCE
 MAP_NAME
 MAP_SUBJECT
 SCALE
 MAP_FORM
 MAP_SOURCE
 NW_LONGITUDE
 NE_LONGITUDE
 SE_LONGITUDE
 SW_LONGITUDE
 NW_LATITUDE
 NE_LATITUDE
 SE_LATITUDE
 SW_LATITUDE

7.3.2 Variable Description/Definition

The descriptions of the parameters contained in the inventory listing file on the CD-ROM are:

Column Name	Description
-----	-----
PROVINCE	The Canadian province covered by the map. Examples include SASKATCHEWAN and MANITOBA.
MAP_NAME	The name of the map.
MAP_SUBJECT	The subject material covered by the map. Examples include GEOLOGY, FIRE, HISTORY, and FOREST COVER.
SCALE	The scale of the map. Examples include 1:24,000, 1:100,000, and 1:250,000.
MAP_FORM	The form in which the map data are stored. Examples include PAPER and DIGITAL
MAP_SOURCE	The source from which the map is available.
NW_LONGITUDE	The NAD83 based longitude coordinate of the northwest corner of the minimum bounding rectangle for the data.
NE_LONGITUDE	The NAD83 based longitude coordinate of the northeast corner of the minimum bounding rectangle for the data.
SE_LONGITUDE	The NAD83 based longitude coordinate of the southeast corner of the minimum bounding rectangle for the data.
SW_LONGITUDE	The NAD83 based longitude coordinate of the southwest corner of the minimum bounding rectangle for the data.

NW_LATITUDE	The NAD83 based latitude coordinate of the northwest corner of the minimum bounding rectangle for the data.
NE_LATITUDE	The NAD83 based latitude coordinate of the northeast corner of the minimum bounding rectangle for the data.
SE_LATITUDE	The NAD83 based latitude coordinate of the southeast corner of the minimum bounding rectangle for the data.
SW_LATITUDE	The NAD83 based latitude coordinate of the southwest corner of the minimum bounding rectangle for the data.

7.3.3 Unit of Measurement

The measurement units for the parameters contained in the inventory listing file on the CD-ROM are:

Column Name	Units
PROVINCE	[none]
MAP_NAME	[none]
MAP_SUBJECT	[none]
SCALE	[none]
MAP_FORM	[none]
MAP_SOURCE	[none]
NW_LONGITUDE	[degrees]
NE_LONGITUDE	[degrees]
SE_LONGITUDE	[degrees]
SW_LONGITUDE	[degrees]
NW_LATITUDE	[degrees]
NE_LATITUDE	[degrees]
SE_LATITUDE	[degrees]
SW_LATITUDE	[degrees]

7.3.4 Data Source

The source of the parameter values contained in the inventory listing file on the CD-ROM are:

Column Name	Data Source
PROVINCE	[Determined by BORIS staff from map information]
MAP_NAME	[Taken from the map sheet or derived by BORIS staff based on map content]
MAP_SUBJECT	[Determined by BORIS staff from map information]
SCALE	[Determined by BORIS staff from map information]
MAP_FORM	[Determined by BORIS staff]
MAP_SOURCE	[Determined by BORIS staff from map information]
NW_LONGITUDE	[Determined by BORIS staff from map information]
NE_LONGITUDE	[Determined by BORIS staff from map information]
SE_LONGITUDE	[Determined by BORIS staff from map information]
SW_LONGITUDE	[Determined by BORIS staff from map information]
NW_LATITUDE	[Determined by BORIS staff from map information]
NE_LATITUDE	[Determined by BORIS staff from map information]
SE_LATITUDE	[Determined by BORIS staff from map information]
SW_LATITUDE	[Determined by BORIS staff from map information]

The original sources for the various maps are:

Map Theme -----	Scale(s) -----	Source -----
Climate (All Canada)	Unknown	Atmospheric Environment Service Information Branch 4905 Dufferin Street Downsview, Ontario CANADA M3H 5T4
Forestry Canada (Manitoba)	1:15,840	Forestry Branch Manitoba Natural Resources 300-530 Kenaston Boulevard Winnipeg, Manitoba CANADA R3N 1Z4
Forestry Canada (Saskatchewan)	1:12,500	Saskatchewan Environment & Resource Management Forest Inventory Forests and Lands Branch Box 3003, McIntosh Mall Prince Albert, Saskatchewan CANADA S6V 6G1
Fire History	1:250,000	Forestry Branch Manitoba Natural Resources 300-530 Kenaston Boulevard Winnipeg, Manitoba CANADA R3N 1Z4
Forest Cover (Manitoba)	1:15,840	Forestry Branch Manitoba Natural Resources 300-530 Kenaston Boulevard Winnipeg, Manitoba CANADA R3N 1Z4
Forest Cover (Manitoba)	1:31,680	Forestry Branch Manitoba Natural Resources 300-530 Kenaston Boulevard Winnipeg, Manitoba CANADA R3N 1Z4
Forest Cover (Saskatchewan)	1:12,500 1:1,000,000	Saskatchewan Environment & Resource Management Forest Inventory Forests and Lands Branch Box 3003, McIntosh Mall Prince Albert, Saskatchewan CANADA S6V 6G1
Forest Cover (Saskatchewan)	1:50,000 1:125,000 1:300,000	Agriculture Canada Land Resources Research Centre K.W. Neatby Building Central Experimental Farm Ottawa, Ontario CANADA K1A 0C6

Geology - Bedrock (Manitoba)	1:1,000,000	Manitoba Energy and Mines Publication and Information 555-330 Graham Avenue Winnipeg, Manitoba CANADA R3C 4E3
Geology - Bedrock (Saskatchewan)	1:250,000	Saskatchewan Research Council Resources Division 15 Innovation Boulevard Saskatoon, Saskatchewan CANADA S7N 2X8
Geology - Bedrock (Saskatchewan)	1:1,000,000	Saskatchewan Energy and Mines Marketing and Publications 1914 Hamilton Street, 3rd Floor Regina, Saskatchewan CANADA S4P 4V4
Geology - Bedrock (Saskatchewan)	1:1,267,200	Saskatchewan Research Council Geological Division 15 Innovation Boulevard Saskatoon, Saskatchewan CANADA S7N 2X8
Geology-Chemistry (Manitoba)	1:250,000	Energy, Mines, and Resources Geological Survey of Canada Publications Office 601 Booth Street Ottawa, Ontario CANADA K1A 0E8
Geology-Photography (Manitoba)	1:125,000	Energy, Mines, and Resources Geological Survey of Canada Publications Office 601 Booth Street Ottawa, Ontario CANADA K1A 0E8
Geology-Quaternary (Saskatchewan)	1:250,000	Saskatchewan Energy and Mines Marketing and Publications 1914 Hamilton Street, 3rd Floor Regina, Saskatchewan CANADA S4P 4V4
Geology-Surficial (Manitoba)	1:250,000	Energy, Mines, and Resources, Canada Geological Survey of Canada Publications Office 601 Booth Street Ottawa, Ontario CANADA K1A 0E8
Geology-Surficial (Manitoba)	1:1,000,000	Manitoba Energy and Mines Publication and Information 555-330 Graham Avenue Winnipeg, Manitoba CANADA R3C 4E3

Geology-Surficial (Saskatchewan)	1:250,000	Saskatchewan Research Council Resources Division 15 Innovation Boulevard Saskatoon, Saskatchewan CANADA S7N 2X8
Geology-Surficial (Saskatchewan)	1:300,000	Agriculture Canada Land Resources Research Centre K.W. Neatby Building Central Experimental Farm Ottawa, Ontario CANADA K1A 0C6
Forestry-Hypsometry (Saskatchewan)	1:1,000,000	Energy, Mines, and Resources, Canada Surveys and Mapping Branch Canada Map Office 615 Booth Street Ottawa, Ontario CANADA K1A 0E9
Land Capacity (Forested) (Saskatchewan)	1:250,000	Information Canada Ottawa, Ontario CANADA K1A 0S9
Land Capacity (Forested) (Saskatchewan)	1:250,000	F.R.S.C. Queen's Printer and Controller of Stationery Ottawa, Ontario CANADA
Land Capacity (Forested) (Saskatchewan)	1:250,000	Energy, Mines, and Resources, Canada Surveys and Mapping Branch Canada Map Office 615 Booth Street Ottawa, Ontario CANADA K1A 0E9
Land Capacity (Wilderness) (Saskatchewan)	1:250,000	Energy, Mines, and Resources, Canada Surveys and Mapping Branch Canada Map Office 615 Booth Street Ottawa, Ontario CANADA K1A 0E9
Land Capacity (Wilderness) (Saskatchewan)	1:250,000	Information Canada Ottawa, Ontario CANADA K1A 0S9
Land Cover (AVHRR image based) (Saskatchewan) (Manitoba)	1:1,000,000	Surveys and Mapping Branch Manitoba Natural Resources 1007 Century Street Winnipeg, Manitoba CANADA R3H 0W4

Land Type (Manitoba)	1:250,000	Office of Canada Manitoba Soil Survey Department of Soil Science Ellis Building University of Manitoba Winnipeg, Manitoba CANADA R3T 2N2
Observing Stations	Unknown	Atmospheric Environment Service Information Branch 4905 Dufferin Street Downsview, Ontario CANADA M3H 5T4
Radiation Network	Unknown	Atmospheric Environment Service Information Branch 4905 Dufferin Street Downsview, Ontario CANADA M3H 5T4
Plant Community (Saskatchewan)	1:50,000	Agriculture Canada Land Resources Research Centre K.W. Neatby Building Central Experimental Farm Ottawa, Ontario CANADA K1A 0C6
Soils (Saskatchewan)	1:50,000 1:300,000	Agriculture Canada Land Resources Research Centre K.W. Neatby Building Central Experimental Farm Ottawa, Ontario CANADA K1A 0C6
Soils (Saskatchewan)	1:125,000 1:126,720	Saskatchewan Soil Survey 5C26 Agriculture Building University of Saskatchewan Saskatoon, Saskatchewan CANADA S7N 0W0
Soil Capacity (Agriculture) (Saskatchewan)	1:250,000	Saskatchewan Soil Survey 5C26 Agriculture Building University of Saskatchewan Saskatoon, Saskatchewan CANADA S7N 0W0
Soil Landscape (Saskatchewan) (Manitoba)	1:1,000,000	Agriculture Canada Land Resources Research Centre K.W. Neatby Building Central Experimental Farm Ottawa, Ontario CANADA K1A 0C6

Sunshine Network (All Canada)	Unknown	Atmospheric Environment Service Information Branch 4905 Dufferin Street Downsview, Ontario CANADA M3H 5T4
Synoptic and Hourly Stations (All Canada)	Unknown	Atmospheric Environment Service Information Branch 4905 Dufferin Street Downsview, Ontario CANADA M3H 5T4
Topography Indexes All		Energy, Mines, and Resources, Canada Surveys and Mapping Branch Canada Map Office 615 Booth Street Ottawa, Ontario CANADA K1A 0E9
Topography Maps (Saskatchewan) (Manitoba)	1:50,000 1:125,000 1:250,000	Energy, Mines, and Resources, Canada Surveys and Mapping Branch Canada Map Office 615 Booth Street Ottawa, Ontario CANADA K1A 0E9
Water Resources (Saskatchewan)	1:250,000 1:1,000,000	Environment Canada Water Resources Branch 75 Farquhar Street Guelph, Ontario CANADA N1H 3N4

7.3.5 Data Range

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

Column Name	Minimum Data Value	Maximum Data Value	Missng Data Value	Unrel Data Value	Below Detect Limit	Data Not Cllctd
PROVINCE	ALBERTA	SASKATCHEWAN	None	None	None	None
MAP_NAME	N/A	N/A	None	None	None	None
MAP_SUBJECT	N/A	N/A	None	None	None	None
SCALE	1:1,000,000	1:12,500	None	None	None	None
MAP_FORM	N/A	N/A	None	None	None	None
MAP_SOURCE	N/A	N/A	None	None	None	None
NW_LONGITUDE	-112.00002	-96.00016	None	None	None	None
NE_LONGITUDE	-110.00099	-90.00001	None	None	None	None
SE_LONGITUDE	-110.0009	-90.00006	None	None	None	None
SW_LONGITUDE	-112.00003	-96.00016	None	None	None	None
NW_LATITUDE	50.00000	60.00022	None	None	None	None
NE_LATITUDE	49.25003	60.00022	None	None	None	None
SE_LATITUDE	48.99998	59.00019	None	None	None	None
SW_LATITUDE	48.99998	59.0002	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

A sample data record for the hardcopy maps is not applicable. The following are wrapped versions of the first few records from the hardcopy maps inventory table on the CD-ROM:

```
PROVINCE, MAP_NAME, MAP_SUBJECT, SCALE, MAP_FORM, MAP_SOURCE, NW_LONGITUDE,
NE_LONGITUDE, SE_LONGITUDE, SW_LONGITUDE, NW_LATITUDE, NE_LATITUDE, SE_LATITUDE,
SW_LATITUDE
'MANITOBA', 'T 75 R04 W', 'FC AUX', '15840', 'PAPER', 'MNR-FB', -98.08332, -97.92575,
-97.92809, -98.08531, 55.54781, 55.54653, 55.46055, 55.46182
'MANITOBA', 'T 75 R05 W', 'FC AUX', '15840', 'PAPER', 'MNR-FB', -98.23855, -98.08131,
-98.08332, -98.24021, 55.5478, 55.54672, 55.46055, 55.46162
'MANITOBA', 'T 76 R04 W', 'FC AUX', '15840', 'PAPER', 'MNR-FB', -98.08331, -97.92573,
-97.92808, -98.08532, 55.63508, 55.6338, 55.54781, 55.54908
```

8. Data Organization

8.1 Data Granularity

The maps can be obtained singly or in groups by contacting the sources indicated in Section 7.3.4.

8.2 Data Format

Each map varies in its size, format, and projection.

The CD-ROM inventory listing file consists of 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.

9. Data Manipulations

9.1 Formulae

9.1.1 Derivation Techniques and Algorithms

Not available.

9.2 Data Processing Sequence

9.2.1 Processing Steps

BORIS staff processed the maps by:

- Extracting geographic coordinate, scale, and thematic information from the maps and placing it in an American Standard Code for Information Interchange (ASCII) file on disk
- Reading the ASCII information in the disk file and loading the online data base with needed information

9.2.2 Processing Changes

None.

9.3 Calculations

9.3.1 Special Corrections/Adjustments

None.

9.3.2 Calculated Variables

None.

9.4 Graphs and Plots

None.

10. Errors

10.1 Sources of Error

Each of the map suppliers should be contacted regarding any errors in the maps.

10.2 Quality Assessment

Each of the map suppliers should be contacted regarding any quality information.

10.2.1 Data Validation by Source

Unknown.

10.2.2 Confidence Level/Accuracy Judgment

Unknown.

10.2.3 Measurement Error for Parameters

Unknown.

10.2.4 Additional Quality Assessments

Unknown.

10.2.5 Data Verification by Data Center

BORIS staff visually inspected the maps to assess that they did in fact seem to depict the parameters listed but did not perform any ground checks of the accuracy. The inventory and description of the maps was deemed accurate.

11. Notes

11.1 Limitations of the Data

Individuals desiring to use the maps must acquire their own copies through the sources provided in Section 7.3.4.

11.2 Known Problems with the Data

None.

11.3 Usage Guidance

None.

11.4 Other Relevant Information

Not available.

12. Application of the Data Set

The maps can be used as visual references or can be digitized to create digital data sets for computer analyses.

13. Future Modifications and Plans

None.

14. Software

14.1 Software Description

BORIS staff tabulated the needed information in Microsoft Excel spreadsheet files and used the output spreadsheets to load the data base tables.

14.2 Software Access

Microsoft Excel is commercially available.

15. Data Access

Note that the maps are not contained on the BOREAS CD-ROM set. An inventory listing file is supplied on the CD-ROM to inform users of the maps that are available. This inventory listing is available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC). For hardcopies of the individual maps, contact the sources provided in Section 7.3.4.

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: ornl daac@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

The maps referenced here exist in hardcopy form.

17. References

17.1 Platform/Sensor/Instrument/Data Processing Documentation

None.

17.2 Journal Articles and Study Reports

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

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

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

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

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

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

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

17.3 Archive/DBMS Usage Documentation

None.

18. Glossary of Terms

None.

19. List of Acronyms

ASCII	- American Standard Code for Information Interchange
BOREAS	- BOReal Ecosystem-Atmosphere Study
BORIS	- BOREAS Information System
CCRS	- Canada Centre for Remote Sensing
DAAC	- Distributed Active Archive Center
EOS	- Earth Observing System
EOSDIS	- EOS Data and Information System
GIS	- Geographic Information System
GSFC	- Goddard Space Flight Center
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
SSA	- Southern Study Area
URL	- Uniform Resource Locator
UTM	- Universal Transverse Mercator

20. Document Information

20.1 Document Revision Date

Written: 10-Aug-1995

Last Updated: 05-Feb-1999

20.2 Document Review Date(s)

BORIS Review: 23-Jan-1997

Science Review: 03-Feb-1997

20.3 Document ID

20.4 Citation

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

The BOREAS hardcopy maps were located and acquired from various sources by BORIS staff at NASA GSFC and CCRS. Their conscientious effort in finding the maps is greatly appreciated.

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. CD-ROM. NASA, 2000.

20.5 Document Curator

20.6 Document URL

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE September 2000		3. REPORT TYPE AND DATES COVERED Technical Memorandum
4. TITLE AND SUBTITLE Technical Report Series on the Boreal Ecosystem-Atmosphere Study (BOREAS) BOREAS Hardcopy Maps			5. FUNDING NUMBERS 923 RTOP: 923-462-33-01	
6. AUTHOR(S) Elizabeth Nelson and Jeffrey A. Newcomer Forrest G. Hall, Editor				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS (ES) Goddard Space Flight Center Greenbelt, Maryland 20771			8. PERFORMING ORGANIZATION REPORT NUMBER 2000-03136-0	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS (ES) National Aeronautics and Space Administration Washington, DC 20546-0001			10. SPONSORING / MONITORING AGENCY REPORT NUMBER TM—2000—209891 Vol. 94	
11. SUPPLEMENTARY NOTES E. Nelson: SSAI, NASA Goddard Space Flight Center, Greenbelt, Maryland; J.A. Newcomer: Raytheon ITSS, NASA Goddard Space Flight Center, Greenbelt, Maryland				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Unclassified—Unlimited Subject Category: 43 Report available from the NASA Center for AeroSpace Information, 7121 Standard Drive, Hanover, MD 21076-1320. (301) 621-0390.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) BOREAS hardcopy maps are a collection of approximately 1,000 hardcopy maps representing the physical, climatological, and historical attributes of areas covering primarily the Manitoba and Saskatchewan provinces of Canada. These maps were collected by BORIS and CCRS staff to provide basic information about site positions, manmade features, topography, geology, hydrology, land cover types, fire history, climate, and soils of the BOREAS study region. These maps are not available for distribution through the BOREAS project but may be used as an onsite resource. Information is provided within this document for individuals who want to order copies of these maps from the original map source.				
14. SUBJECT TERMS BOREAS, remote sensing science, maps.			15. NUMBER OF PAGES 18	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

