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NASA Forest Cover Data Layers
in Raster Format

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

Forrest G. Hall, Editor

Volume 113

BOREAS Forest Cover Data Layers over the SSA-MSA in Raster Format

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Greenbelt, Maryland 20771

September 2000
BOREAS Forest Cover Data Layers over the SSA-MSA in Raster Format

Jaime Nickeson, Fern Gruszka

Summary

This data set, originally provided as vector polygons with attributes, has been processed by BORIS staff to provide raster files that can be used for modeling or for comparison purposes. The original data were received as ARC/INFO coverages or as export files from SERM. The data include information on forest parameters for the BOREAS SSA-MSA. Most of the data used for this product were acquired by BORIS in 1993; the maps were produced from aerial photography taken as recently as 1988. The data are stored in binary, image format files.

Note that the binary files of this data set on the BOREAS CD-ROMs have been compressed using the Gzip program. See Section 8.2 for details.

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1. Data Set Overview

1.1 Data Set Identification
BORAES Forest Cover Data Layers over the SSA-MSA in Raster Format

1.2 Data Set Introduction
The forest cover data layers were created in raster form from the vector polygon forest cover data provided by Saskatchewan Environment and Resource Management, Forestry Branch - Inventory Unit (SERM-FBUI). The forest cover data layers created for this product are species cover, canopy closure, height, and year.
1.3 Objective/Purpose
These data are provided as part of the BOReal Ecosystem-Atmosphere Study (BOREAS) Staff Science Geographical Information system (GIS) Data Collection Program, which included the collection of pertinent map data in both hardcopy and digital form. This data set, originally provided as vector polygons with attributes, has been processed to provide raster files that can be used for modeling or for comparison purposes.

1.4 Summary of Parameters
The parameters that are in the raster data include species association (cover type), crown closure, height class, and decadal year of stand origin or disturbance.

1.5 Discussion
Based on a review of the data and discussions with SERM personnel and BOREAS scientists, BOREAS Information System (BORIS) staff processed the original vector data into raster data layers. A full description of the data layer derivations is given in Section 9.

1.6 Related Data Sets
BOREAS Forest Cover Data Layers of the NSA-MSA in Raster Format
SERM Forest Cover Data Layers of the SSA in Vector Format
SERM Forest Fire Chronology of Saskatchewan in Vector Format
SERM Forest Cover Data of Saskatchewan in Vector Format
Prince Albert National Park Forest Cover Data in Vector Format

2. Investigator(s)

2.1 Investigator(s) Name and Title
BOREAS Staff Science

2.2 Title of Investigation
BOREAS Staff Science GIS Data Collection Program

2.3 Contact Information

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Greenbelt, MD 20771
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(301) 286-0239 (fax)
Jaime.Nickeson@gsfc.nasa.gov
3. Theory of Measurements

SERM-FBIU maintains in its inventory unit a GIS of forest inventory information for Saskatchewan. This inventory is maintained primarily for use by forest managers for silvicultural purposes, and it contains a wealth of information that can be of use in Earth resources analyses and ecosystem modeling either in its raw form or as a derived product such as this one.

4. Equipment

4.1 Sensor/Instrument Description

The original polygon data were digitized from 1:12,500-scale forest cover maps. The maps were derived from black-and-white 1:12,500-scale infrared aerial photography and field reconnaissance notes. No information is known about the original digitizing equipment or procedures and criteria used in the digitizing process.

4.1.1 Collection Environment

These original vector data were acquired as ARC/INFO vector coverages or in ARC/INFO export format. The data were produced by SERM-FBIU. No specific information other than the scale of the resulting photography is known about the aircraft flights or the equipment that was used to collect the aerial photography.

4.1.2 Source/Platform

Unknown.

4.1.3 Source/Platform Mission Objectives

Unknown.

4.1.4 Key Variables

The key variables of this data set are species cover, crown closure, height class, and decadal year of stand origin or disturbance.

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

Unknown.

4.2.1 Specifications

Unknown.

4.2.1.1 Tolerance

Unknown.

4.2.2 Frequency of Calibration

Unknown.
4.2.3 Other Calibration Information
None.

5. Data Acquisition Methods
SERM personnel created the forest cover maps by transcribing information from photo-interpreted 1:12,500-scale black-and-white infrared aerial photography and field reconnaissance notes.

6. Observations
6.1 Data Notes
None.

6.2 Field Notes
The field notes used in compiling the original forest cover data are available from SERM-FBIU. See Section 2.3.

7. Data Description
7.1 Spatial Characteristics
7.1.1 Spatial Coverage
This data set covers a portion of the BOREAS Southern Study Area (SSA) and encompasses most of the associated SSA-Modeling Sub-Area (MSA). The corners of the actual raster data files are:

<table>
<thead>
<tr>
<th>Point</th>
<th>BOREAS X (km)</th>
<th>BOREAS Y (km)</th>
<th>West Longitude</th>
<th>North Latitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Right</td>
<td>425.160</td>
<td>360.840</td>
<td>104.49043</td>
<td>54.06416</td>
</tr>
<tr>
<td>Upper Left</td>
<td>381.870</td>
<td>360.840</td>
<td>105.14995</td>
<td>54.09860</td>
</tr>
<tr>
<td>Lower Left</td>
<td>381.870</td>
<td>326.490</td>
<td>105.19373</td>
<td>53.79137</td>
</tr>
<tr>
<td>Lower Right</td>
<td>425.160</td>
<td>326.490</td>
<td>104.53910</td>
<td>53.75717</td>
</tr>
</tbody>
</table>

These locations represent the outside corners of the corner pixels.

7.1.2 Spatial Coverage Map
Not available.

7.1.3 Spatial Resolution
These data were gridded to a cell size of 30 m.
The area mapped is projected in the BOREAS grid projection, which is based on the ellipsoidal version of the Albers Equal-Area Conic (AEAC) projection. The projection has the following parameters:

Datum: North American Datum of 1983 (NAD83)
Ellipsoid: Geodetic Reference System GRS80 or WGS84
Origin: 111.000° West Longitude
51.000° North Latitude
Standard Parallels: 52° 30' 00" N
58° 30' 00" N
Units of Measure: kilometers

The data are gridded in 30-m intervals based on the ellipsoidal version of the AEAC projection with standard parallels of 52° 30' N and 58° 30' N and a lower left origin of 51° N and 111° W.

Most of the data used for this product were acquired by BORIS in 1993. The maps from which the data are derived are completely reinventoried on a 10- to 20-year cycle by SERM, except for disturbed areas, which are updated annually. BORIS acquired the data in 1993; the forest cover layers have not yet had any inventory updates.

These maps were produced from aerial photography taken as recently as 1988. The data base maintained by SERM is updated as needed based on fires, cutting, or other disturbances.

Not available.

As noted, the original maps are completely reinventoried by SERM personnel on a 10- to 20-year cycle, except for disturbed areas, which are updated annually. The photographs and other information used to create the original vector data set most likely covered the 10- to 20-year period prior to 1988 and any updates made from then to 1993, when the data were acquired.

Species Association (cover type)
Crown Closure
Height Class
Year of Stand Origin or Disturbance

Species Association - The vegetative species association covering the given area as derived by BORIS personnel. See Section 9 for derivation details.
Crown Closure: The crown closure category specified in the original data set. See Section 9 for derivation details.
Height Class: The height class of the vegetation covering the area. See Section 9 for class details.
Year of Stand Origin or Disturbance: The decade in which the vegetation in the area originated or the year it was last disturbed. See Section 9 for coding details.
7.3.3 Unit of Measurement
The values in each of the data layers are described as follows:

**SPECIES ASSOCIATION (COVER TYPE)**

<table>
<thead>
<tr>
<th>Binary value</th>
<th>Number in file</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>317185</td>
<td>border pixels</td>
</tr>
<tr>
<td>11</td>
<td>3415</td>
<td>White Spruce (WS)</td>
</tr>
<tr>
<td>12</td>
<td>169411</td>
<td>Black Spruce (BS)</td>
</tr>
<tr>
<td>13</td>
<td>171532</td>
<td>Jack Pine (JP)</td>
</tr>
<tr>
<td>14</td>
<td>10126</td>
<td>Tamarack (TL)</td>
</tr>
<tr>
<td>21</td>
<td>202620</td>
<td>Spruce/Pine</td>
</tr>
<tr>
<td>31</td>
<td>24728</td>
<td>Mix Spruce Fir/Broadleaf</td>
</tr>
<tr>
<td>32</td>
<td>156003</td>
<td>Mix Jack Pine/Broadleaf</td>
</tr>
<tr>
<td>51</td>
<td>23902</td>
<td>Mix Broadleaf/ Spruce-Fir</td>
</tr>
<tr>
<td>52</td>
<td>48546</td>
<td>Mix Broadleaf/ Jack Pine</td>
</tr>
<tr>
<td>71</td>
<td>12079</td>
<td>Aspen</td>
</tr>
<tr>
<td>101</td>
<td>322405</td>
<td>treed muskeg</td>
</tr>
<tr>
<td>103</td>
<td>58898</td>
<td>clear muskeg</td>
</tr>
<tr>
<td>105</td>
<td>26976</td>
<td>brushland</td>
</tr>
<tr>
<td>107</td>
<td>12180</td>
<td>clearing</td>
</tr>
<tr>
<td>109</td>
<td>23129</td>
<td>burn-over (nonprod)</td>
</tr>
<tr>
<td>112</td>
<td>17638</td>
<td>disturb, cut or burn</td>
</tr>
<tr>
<td>113</td>
<td>1100</td>
<td>disturb, JP regeneration</td>
</tr>
<tr>
<td>118</td>
<td>30</td>
<td>experimental area</td>
</tr>
<tr>
<td>121</td>
<td>959</td>
<td>flooded land</td>
</tr>
<tr>
<td>122</td>
<td>49373</td>
<td>water</td>
</tr>
</tbody>
</table>

**CROWN CLOSURE (DENSITY)**

<table>
<thead>
<tr>
<th>Binary value</th>
<th>Number in file</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>830069</td>
<td>nonproductive or border pixels</td>
</tr>
<tr>
<td>61</td>
<td>11080</td>
<td>10% &lt; CC &lt;= 30%</td>
</tr>
<tr>
<td>62</td>
<td>93651</td>
<td>30% &lt; CC &lt;= 55%</td>
</tr>
<tr>
<td>63</td>
<td>403725</td>
<td>55% &lt; CC &lt;= 80%</td>
</tr>
<tr>
<td>64</td>
<td>313710</td>
<td>80% &lt; CC</td>
</tr>
</tbody>
</table>

**HEIGHT CLASS**

<table>
<thead>
<tr>
<th>Binary value</th>
<th>npixels number</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>830088</td>
<td>nonproductive or border pixels</td>
</tr>
<tr>
<td>5</td>
<td>176609</td>
<td>2.5 m &lt; hgt &lt;= 7.5 m</td>
</tr>
<tr>
<td>10</td>
<td>248422</td>
<td>7.5 m &lt; hgt &lt;= 12.5 m</td>
</tr>
<tr>
<td>15</td>
<td>310962</td>
<td>12.5 m &lt; hgt &lt;= 17.5 m</td>
</tr>
<tr>
<td>20</td>
<td>68612</td>
<td>17.5 m &lt; hgt &lt;= 22.5 m</td>
</tr>
<tr>
<td>25</td>
<td>17542</td>
<td>22.5 m &lt; hgt</td>
</tr>
</tbody>
</table>
### YEAR OF STAND ORIGIN or DISTURBANCE

<table>
<thead>
<tr>
<th>value</th>
<th>npixels</th>
<th>definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>811127</td>
<td>nonproductive or border pixels</td>
</tr>
<tr>
<td>82</td>
<td>33</td>
<td>1815-1825 Year of stand origin</td>
</tr>
<tr>
<td>83</td>
<td>1378</td>
<td>1825-1835</td>
</tr>
<tr>
<td>84</td>
<td>2496</td>
<td>1835-1845</td>
</tr>
<tr>
<td>85</td>
<td>18158</td>
<td>1845-1855</td>
</tr>
<tr>
<td>86</td>
<td>30086</td>
<td>1855-1865</td>
</tr>
<tr>
<td>87</td>
<td>12824</td>
<td>1865-1875</td>
</tr>
<tr>
<td>88</td>
<td>62706</td>
<td>1875-1885</td>
</tr>
<tr>
<td>89</td>
<td>90075</td>
<td>1885-1895</td>
</tr>
<tr>
<td>90</td>
<td>104530</td>
<td>1895-1905</td>
</tr>
<tr>
<td>91</td>
<td>75163</td>
<td>1905-1915</td>
</tr>
<tr>
<td>92</td>
<td>116326</td>
<td>1915-1925</td>
</tr>
<tr>
<td>93</td>
<td>30494</td>
<td>1925-1935</td>
</tr>
<tr>
<td>94</td>
<td>112734</td>
<td>1935-1945</td>
</tr>
<tr>
<td>95</td>
<td>10165</td>
<td>1945-1955</td>
</tr>
<tr>
<td>96</td>
<td>2283</td>
<td>1955-1965</td>
</tr>
<tr>
<td>97</td>
<td>39688</td>
<td>1965-1975</td>
</tr>
<tr>
<td>98</td>
<td>113392</td>
<td>1975-1985</td>
</tr>
<tr>
<td>176</td>
<td>103</td>
<td>1976 Year of disturbance</td>
</tr>
<tr>
<td>177</td>
<td>51</td>
<td>1977</td>
</tr>
<tr>
<td>180</td>
<td>51</td>
<td>1980</td>
</tr>
<tr>
<td>183</td>
<td>8</td>
<td>1983</td>
</tr>
<tr>
<td>184</td>
<td>7232</td>
<td>1984</td>
</tr>
<tr>
<td>185</td>
<td>4951</td>
<td>1985</td>
</tr>
<tr>
<td>186</td>
<td>6181</td>
<td>1986</td>
</tr>
</tbody>
</table>

#### 7.3.4 Data Source
The original data were acquired in ARC/INFO format from:

Saskatchewan Environment and Resource Management
Forestry Branch - Inventory Unit
800 Central Ave.
Prince Albert, Saskatchewan
Canada S6V 6G1

The original data were gridded into a binary image format for the SSA-MSA by BORIS personnel.

#### 7.3.5 Data Range
- Species Association: 0 - 122
- Crown Closure: 0 - 64
- Height Class: 0 - 25
- Year of Stand Origin or Disturbance: 0 - 186

#### 7.4 Sample Data Record
Not applicable.
8. Data Organization

8.1 Data Granularity

The smallest amount of obtainable data is the entire data set containing the four raster layers and other supporting files.

8.2 Data Format(s)

The raster data are stored on tape as single-byte band-sequential binary files.

8.2.1 Uncompressed Data Files

The data files include:

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
<th>Record Size (Bytes)</th>
<th>Number of Records</th>
<th>Bytes/Pixel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Header File</td>
<td>80</td>
<td>19</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>SPECIES COVER</td>
<td>1443</td>
<td>1145</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>CROWN CLOSURE</td>
<td>1443</td>
<td>1145</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>HEIGHT</td>
<td>1443</td>
<td>1145</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>YEAR</td>
<td>1443</td>
<td>1145</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>AML 1 (calc cover, year)</td>
<td>80</td>
<td>79</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>AML 2 (create grid, combine)</td>
<td>80</td>
<td>129</td>
<td>N/A</td>
</tr>
<tr>
<td>8</td>
<td>AML 3 (reprojection info)</td>
<td>80</td>
<td>10</td>
<td>N/A</td>
</tr>
</tbody>
</table>

The data set consists of eight files. The first file is the header file, which contains 80-byte records of American Standard Code for Information Interchange (ASCII) characters that describe the general content of the data set.

Files 2 through 5 contain the binary raster data layers. Each raster layer contains 1,443 8-bit (1-byte) values in each of 1,145 lines.

Files 6 through 8 contain ASCII files that provide examples of the type of ARC Macro Language (AML) files used to create this data set from the original vector data. These files were not intended to be used directly; they are merely examples of the process undertaken to produce the provided data set.

8.2.2 Compressed CD-ROM Files

On the BOREAS CD-ROMs, files 1, 6, 7, and 8 listed above are stored as ASCII text files; however, files 2 - 4 have been compressed with the Gzip compression program (file name *.gz). These data have been compressed using gzip version 1.2.4 and the high compression (-9) option (Copyright (C) 1992-1993 Jean-loup Gailly). Gzip (GNU zip) uses the Lempel-Ziv algorithm (Welch, 1994) used in the zip and PKZIP programs. The compressed files may be uncompressed using gzip (-d option) or gunzip. Gzip is available from many Web sites (for example, ftp site prep.ai.mit.edu/pub/gnu/gzip-*.*) for a variety of operating systems in both executable and source code form. Versions of the decompression software for various systems are included on the CD-ROMs.

9. Data Manipulations

9.1 Formulae

The original data were acquired as ARC/INFO export files, one file per 10-km x 10-km area. The data were imported into ARC, and attributes of the coverage polygons were manipulated within AML scripts to produce new attributes. The new attributes were used as lookup tables for gridding the data, and the separate maps were then mosaicked together into one map for each layer/attribute. The relevant attributes (items) associated with each polygon in the vector data are as follows:
Item Description
SPI0 Primary Species #1 (one of 13 possible tree species)
SPII Primary Species #2 (same as SPI0)
SPI2 Primary Species #3 (same as SPI0)
SP20 Secondary Species #1 (same as SPI0)
HGT Height Class (one of 5 classes in 5-m intervals)
D Density (crown closure, see below)
YOO Decadal Year of Stand Origin
MLEVEL Management Level (12 rarely used codes for nonforested polygons)
SYR Year of Source (year source info. for a polygon was obtained)
YSP Year of Silvicultural Activity (also rarely used)
R1 Regenerating Species 1 (as in SPI0, but may not be tree species)
DIST Disturbance Type (cut-over or partial cut, by season, or burn-over)
DYR Year of Disturbance
NP Nonproductive Type (codes to identify all nonforested polygons)

The data layers created for this product were derived from the above attributes as follows:

<table>
<thead>
<tr>
<th>Raster Layer</th>
<th>Input Vector Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVER</td>
<td>SA, SPI0, SPI1, SPI2, SP20, MLEVEL, R1, DIST, NP</td>
</tr>
<tr>
<td>CROWN CLOSURE</td>
<td>D</td>
</tr>
<tr>
<td>HEIGHT</td>
<td>HGT</td>
</tr>
<tr>
<td>YEAR</td>
<td>YOO, YSP, DIST, SA, SYR, DYR, NP</td>
</tr>
</tbody>
</table>

9.1.1 Derivation Techniques and Algorithms

The species association data use the items listed above to select one of the 18 species associations as defined by SERM, who provided the data. The minimum size for homogeneous forest stands varies from 1-4 hectares depending upon the size (HGT) and economic value of the species.

The crown closure data were created using the D item within the coverages. This item is the average percent crown closure of the forest stand and is assigned to one of four classes. The boundaries of these classes are given in the table in Section 8.2. Values for item D exist only for forested polygons.

The height class data were created from the HGT item within the coverages. The average height of all living trees in the main canopy of the stand is assigned to one of five height classes. The limits of the height classes are given in Section 8.2. Values for item HGT exist only for forested polygons.

The decadal year of origin or disturbance data were derived from a combination of the items listed above. In the table in Section 8.2, year of silvicultural treatment and year of disturbance are coded similarly. The ages of productive polygons were assigned to decadal classes. When ages overlap two or more classes, the older class is usually chosen. Values for the year-associated items exist only for forested or disturbed polygons.

9.2 Data Processing Sequence

9.2.1 Processing Steps
Most of the following processing steps were performed in ARC/INFO.

- New attribute items were added to the attribute files of each coverage to store the value that would represent cover, crown closure, and year of stand origin
- HGT was already a numeric item and could be used directly as a lookup table for gridding the height layer.
- Crown closure was not numeric, but levels were easily converted to a numeric item that was used to grid the height layer.
- New values were assigned to the new cover item using the SERM definition of species association, which assigns one of 18 common boreal associations from the many possible
combinations of the SP10, SP11, and SP12 (only 10 different species associations show up in this data set).

- Management level, regenerating species, disturbance type, and nonproductive code were used to assign cover values for nonforested polygons.
- To calculate the year item, the year of stand origin item was used for forested polygons, and year of disturbance or source year was used for nonforested polygons.
- The numeric items created for cover and year were then used to grid the polygons for those layers.
- The individual maps that had been gridded were mosaicked using the ARC function GRIDINSERT.
- The resulting Universal Transverse Mercator (UTM) layer maps were reprojected in ARC to create the raster images in the BOREAS grid projection.
- The gridded layers and other information files were written to tape for distribution.
- BORIS staff copied the ASCII and compressed the binary files for release on CD-ROM.

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
  There is the possibility of coding errors in the attributes, transcription errors from original sample data, and photo-interpretation errors.

10.2 Quality Assessment

10.2.1 Data Validation by Source
  Unknown.

10.2.2 Confidence Level/Accuracy Judgment
  The accuracy of the gridding procedure is high. Some consideration should be given to the scale of the data and what will be inferred from it.

10.2.3 Measurement Error for Parameters
  Unknown.

10.2.4 Additional Quality Assessments
  None.
10.2.5 Data Verification by Data Center
   Each gridded image was checked visually to make sure that the gridding procedure assigned a
digital number (DN) to each attribute value. The data were also checked for gaps of "no data" along the
seams of the 10-km x 10-km coverages used to compile this product.

11. Notes

11.1 Limitations of the Data
   BORIS acquired these data in 1993; therefore, areas subjected to logging activity or other
disturbance, such as fire, will appear much different today as compared to the forest cover data.

11.2 Known Problems with the Data
   None.

11.3 Usage Guidance
   Saskatchewan Parks and Renewable Resources does not accept any liability for decisions or action
taken on the basis of these data.
   Before uncompressing the Gzip files on CD-ROM, be sure that you have enough disk space to
hold the uncompressed data files. Then use the appropriate decompression program provided on the
CD-ROM for your specific system.

11.4 Other Relevant Information
   Saskatchewan Parks and Renewable Resources also maintains stand and stock tables, 3P plots,
and possibly some permanent sample plots in this area. Aerial photographic prints and negatives are
also available. Contact the agency directly if you are interested in such information or if you wish to
acquire those data.

12. Application of the Data Set
   This data set would provide good reference information for assessing spectral image data classification
techniques over the area and serve as an initial baseline data set for analyzing land cover and vegetation
change.

13. Future Modifications and Plans
   None.

14. Software

14.1 Software Description
   The Environmental Systems Research Institute (ESRI) ARC/INFO (Version 7.0) package was
used to perform the data manipulation and processing. Questions about the software should be directed
to ESRI. Gzip (GNU zip) uses the Lempel-Ziv algorithm (Welch, 1994) used in the zip and PKZIP
commands.

14.2 Software Access
   ARC/INFO is proprietary software with copyright protection. Contact ESRI for details:
Gzip is available from many Web sites across the Internet (for example, ftp site prep.ai.mit.edu/pub/gnu/gzip-*.* ) for a variety of operating systems in both executable and source code form. Versions of the decompression software for various systems are included on the CD-ROMs.

15. Data Access

The BOREAS forest cover data layers over the SSA-MSA in raster format are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

15.1 Contact Information

For BOREAS data and documentation please contact:

ORNL DAAC User Services
Oak Ridge National Laboratory
P.O. Box 2008 MS-6407
Oak Ridge, TN 37831-6407
Phone: (423) 241-3952
Fax: (423) 574-4665
E-mail: ornldaac@ornl.gov or ornl@eos.nasa.gov

15.2 Data Center Identification

Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) for Biogeochemical Dynamics http://www-eosdis.ornl.gov/.

15.3 Procedures for Obtaining Data

Users may obtain data directly through the ORNL DAAC online search and order system [http://www-eosdis.ornl.gov/] and the anonymous FTP site [ftp://www-eosdis.ornl.gov/data/] or by contacting User Services by electronic mail, telephone, fax, letter, or personal visit using the contact information in Section 15.1.

15.4 Data Center Status/Plans

The ORNL DAAC is the primary source for BOREAS field measurement, image, GIS, and hardcopy data products. The BOREAS CD-ROM and data referenced or listed in inventories on the CD-ROM are available from the ORNL DAAC.

16. Output Products and Availability

16.1 Tape Products
None.

16.2 Film Products
None.
16.3 Other Products
These data are available on the BOREAS CD-ROM series.

17. References

17.1 Platform/Sensor/Instrument/Data Processing Documentation


17.2 Journal Articles and Study Reports


17.3 Archive/DBMS Usage Documentation
None.

18. Glossary of Terms
None.
19. List of Acronyms

AEAC - Albers Equal-Area Conic
AML - ARC Macro Language
ASCII - American Standard Code for Information Interchange
BOREAS - BOReal Ecosystem-Atmosphere Study
BORIS - BOREAS Information System
BS - Black Spruce
CD-ROM - Compact Disk - Read-Only Memory
DAAC - Distributed Active Archive Center
DN - Digital Number
EOS - Earth Observing System
EOSDIS - EOS Data and Information System
ESRI - Environmental Systems Research Institute
GIS - Geographic Information System
GSFC - Goddard Space Flight Center
JP - Jack Pine
NASA - National Aeronautics and Space Administration
NSA - Northern Study Area
ORNL - Oak Ridge National Laboratory
PANP - Prince Albert National Park
SERM - Saskatchewan Environment and Resource Management
SSA - Southern Study Area
TL - Tamarack
URL - Uniform Resource Locator
WS - White Spruce

20. Document Information

20.1 Document Revision Dates
Written: 01-Aug-1994
Last Updated: 03-Feb-1999

20.2 Document Review Dates
BORIS Review: 15-May-1997
Science Review:

20.3 Document ID

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

The original data were provided by SERM-FBIU. The vector data were processed and gridded by BORIS staff. The contribution of the vector data by SERM and the processing of the data by BORIS staff 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:

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

20.5 Document Curator

20.6 Document URL
This data set, originally provided as vector polygons with attributes, has been processed by BORIS staff to provide raster files that can be used for modeling or for comparison purposes. The original data were received as ARC/INFO coverages or as export files from SERM. The data include information on forest parameters for the BOREAS SSA-MSA. Most of the data used for this product were acquired by BORIS in 1993; the maps were produced from aerial photography taken as recently as 1988. The data are stored in binary, image format files.