SNF Forest Understory Cover Data (Table)

Summary:

The purpose of the SNF study was to improve our understanding of the relationship between remotely sensed observations and important biophysical parameters in the boreal forest. A key element of the experiment was the development of methodologies to measure forest stand characteristics to determine values of importance to both remote sensing and ecology. Parameters studied were biomass, leaf area index, above ground net primary productivity, bark area index, and ground coverage by vegetation. Thirty-two quaking aspen and thirty-one black spruce sites were studied.

Sites were chosen in uniform stands of aspen or spruce. The dominant species in the site constituted over 80 percent, and usually over 95 percent, of the total tree density and basal area. Aspen stands were chosen to represent the full range of age and stem density of essentially pure aspen, of nearly complete canopy closure, and greater than two meters in height. Spruce stands ranged from very sparse stands on bog sites, to dense, closed stands on more productive peatlands. Use of multiple plots within each site allowed estimation of the importance of spatial variation in stand parameters.

Within each plot, all woody stems greater than two meters in height were recorded by species and the following dimensions were measured: diameter breast height, height of the tree, height of the first live branch, and depth of crown. For each plot, a two-meter diameter subplot was defined at the center of each plot. Within this subplot, the percent of ground coverage by plants under one meter in height was determined by species. These data, averaged for the five plots in each site, are presented in this data set [i.e., SNF Forest Understory Cover Data (Table)] in tabular format (e.g., plant species with a count for that species at each site). The same data are presented in the *SNF Forest Understory Cover Data* data set but are arranged with a row for each species and site and a percent ground coverage for each combination.

Table of Contents:

1. Data Set Overview:

Data Set Identification:

SNF Forest Understory Cover Data (Table).

Data Set Introduction:

Percent ground coverage for vegetation less than 1 meter high at each study site are presented by vegetation species. Each value of percent ground coverage is an average of five two-meter subplots.

Objective/Purpose:

The purpose of the SNF study was to improve our understanding of the relationship between remotely sensed observations and important biophysical parameters in the boreal forest. A key element of the experiment was the development of methodologies to measure forest stand characteristics to determine values of importance to both remote sensing and ecology. Parameters studied were biomass, leaf area index, above ground net primary productivity, bark area index, and ground coverage by vegetation. Thirty-two quaking aspen and thirty-one black spruce sites were studied.

Summary of Parameters:

Canopy and subcanopy phenology, percent ground coverage.

Discussion:

Sites were chosen in uniform stands of aspen or spruce. The dominant species in the site constituted over 80 percent, and usually over 95 percent, of the total tree density and basal area. Aspen stands were chosen to represent the full range of age and stem density of essentially pure aspen, of nearly complete canopy closure, and greater than two meters in height. Spruce stands ranged from very sparse stands on bog sites, to dense, closed stands on more productive peatlands.

In each stand a uniform site 60 meters in diameter was laid out. Within this site, five circular plots, 16 meters in diameter, were positioned. One plot was at the center of the site and four were

tangent to the center plot, one each in the cardinal directions. In very dense stands, plot radii were decreased so that stem count for the five plots remained around 200 stems. Use of multiple plots within each site allowed estimation of the importance of spatial variation in stand parameters.

Within each plot, all woody stems greater than two meters in height were recorded by species and relevant dimensions were measured. Diameter breast height (dbh) was measured directly. Height of the tree and height of the first live branch were determined by triangulation. The difference between these two heights was used as the depth of crown. The distances between trees and observer were such that no angle exceeded 65 degrees. Most plots were level, small slopes were ignored in calculating heights. Similar measurements were made for shrubs between one and two meters tall in the aspen sites. The *Forest Canopy Composition (SNF)* data set provides the counts of canopy (over two meters tall) tree species and subcanopy (between one and two meters tall) tree species.

For each plot, a two meter diameter subplot was defined at the center of each plot. Within this subplot, the percent of ground coverage by plants under one meter in height was determined by species. These data, averaged for the five plots in each site, are presented in this data set [i.e., SNF Forest Understory Cover Data (Table)] in tabular format (e.g., plant species with a count for that species at each site). The same data are presented in the *SNF Forest Understory Cover Data* data set but are arranged with a row for each species and site and a percent ground coverage for each combination.

In addition, these data sets: canopy, subcanopy, and understory counts have been combined into a *SNF Forest Cover by Species/Strata* data set.

Also related, for the aspen sites, in each plot a visual estimation of the percent coverage of the canopy, subcanopy, and understory vegetation was made. The site averages of these coverage estimates are presented in the *Aspen Forest Cover by Stratum/Plot (SNF)* data set.

Related Data Sets:

- Forest Canopy Composition (SNF)
- SNF Forest Understory Cover Data
- SNF Forest Cover by Species/Strata
- Aspen Forest Cover by Stratum/Plot (SNF)

2. Investigator(s):

Investigator(s) Name and Title:

Dr. Forrest G. Hall
NASA Goddard Space Flight Center

Dr. K. Fred Huemmrich
NASA Goddard Space Flight Center

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Versar, Inc.

Dr. Scott J. Goetz
University of Maryland

Ms. Jamie E. Nickeson
NASA Goddard Space Flight Center

Ms. K. D. Woods
NASA Goddard Space Flight Center

Dr. Celeste Jarvis
NASA Headquarters

Title of Investigation:

Biophysical, Morphological, Canopy Optical Property, and Productivity Data on the Superior National Forest.

Contact Information:

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3. Theory of Measurements:

Not available.

4. Equipment:

Sensor/Instrument Description:

Collection Environment:

Ground-based.

Source/Platform:

Field investigation.

Source/Platform Mission Objectives:

Not available.

Key Variables:

Parameters studied were biomass, leaf area index, above ground net primary productivity, bark area index, and ground coverage by vegetation.

Principles of Operation:

Not available.

Sensor/Instrument Measurement Geometry:

Not available.

Manufacturer of Sensor/Instrument:

Not available.

Calibration:

Not available.

5. Data Acquisition Methods:

Not available.

6. Observations:

Data/Field Notes:

Not available.

7. Data Description:

Spatial Characteristics:

The study area covered a 50 x 50 km area centered at approximately 48 degrees North latitude and 92 degrees West longitude in northeastern Minnesota at the southern edge of the North American boreal forest.

Temporal Characteristics:

This data set was collected during the summers of 1983 and 1984 in a portion of the Superior National Forest (SNF) near Ely, Minnesota, U.S.A.

Data Characteristics:

Variable Name/ Long Name Description	SAS Type	Generic Type
1 speccode SPECIES_CODE "Plant species code [see speccomm (Common Name) and spec_sci (Latin Name)]"	$ 10	CHAR(5)
2 speccomm COMMON_NAME "Plant species common name"	$ 36	CHAR(20)
3 spec_sci LATIN_NAME "The Latin (botanical) name of the species"	$ 36	CHAR(25)
4 can_layr "Canopy layer"	$ 12	
5 _2 "% ground coverage for site ID 2 for named species (% is average of five 2-meter-diameter subsamples in each site)"	8	
6 _3 "% ground coverage for site ID 3 for named species(% is average of five 2-meter-diameter subsamples in each site)"	8	
7 _12 "% ground coverage for site ID 12 for named species(% is average of five 2-meter-diameter subsamples in each site)"	8	
8 _14	8	

"% ground coverage for site ID 14
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

9 _15   8
"% ground coverage for site ID 15
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

10 _16   8
"% ground coverage for site ID 16
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

11 _18   8
"% ground coverage for site ID 18
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

12 _19   8
"% ground coverage for site ID 19
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

13 _20   8
"% ground coverage for site ID 20
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

14 _21   8
"% ground coverage for site ID 21
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

15 _36   8
"% ground coverage for site ID 36
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

16 _38   8
"% ground coverage for site ID 38

for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

17 _39   8
"% ground coverage for site ID 39
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

18 _41   8
"% ground coverage for site ID 41
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

19 _42   8
"% ground coverage for site ID 42
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

20 _43   8
"% ground coverage for site ID 43
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

21 _45   8
"% ground coverage for site ID 45
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

22 _47   8
"% ground coverage for site ID 47
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

23 _48   8
"% ground coverage for site ID 48
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

24 _49   8
"% ground coverage for site ID 49
for named species (% is average of

five 2-meter-diameter subsamples
in each site)"

---

25 _50   8
"% ground coverage for site ID 50
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

26 _51   8
"% ground coverage for site ID 51
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

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27 _52   8
"% ground coverage for site ID 52
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

28 _54   8
"% ground coverage for site ID 54
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

29 _55   8
"% ground coverage for site ID 55
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

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30 _56   8
"% ground coverage for site ID 56
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

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31 _57   8
"% ground coverage for site ID 57
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

---

32 _62   8
"% ground coverage for site ID 62
for named species (% is average of
five 2-meter-diameter subsamples

in each site)"

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33 _63
"% ground coverage for site ID 63
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

---

34 _64
"% ground coverage for site ID 64
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

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35 _68
"% ground coverage for site ID 68
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

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36 _69
"% ground coverage for site ID 69
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

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37 _71
"% ground coverage for site ID 71
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

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38 _72
"% ground coverage for site ID 72
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

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39 _73
"% ground coverage for site ID 73
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

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40 _74
"% ground coverage for site ID 74
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"   8

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41 _75                                                8
"% ground coverage for site ID 75
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
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42 _77                                                8
"% ground coverage for site ID 77
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
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43 _79                                                8
"% ground coverage for site ID 79
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
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44 _80                                                8
"% ground coverage for site ID 80
for named species(% is average of
five 2-meter-diameter subsamples
in each site)"
```

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45 _81                                                8
"% ground coverage for site ID 81
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
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46 _82                                                8
"% ground coverage for site ID 82
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

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47 _83                                                8
"% ground coverage for site ID 83
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
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```
48 _84                                                8
"% ground coverage for site ID 84
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
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49 _85
"% ground coverage for site ID 85
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

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50 _86
"% ground coverage for site ID 86
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

---

51 _87
"% ground coverage for site ID 87
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

---

52 _88
"% ground coverage for site ID 88
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

---

53 _89
"% ground coverage for site ID 89
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

---

54 _90
"% ground coverage for site ID 90
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

---

55 _92
"% ground coverage for site ID 92
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

---

56 _93
"% ground coverage for site ID 93
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"

8

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57 _94                                            8
"% ground coverage for site ID 94
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
58 _95                                            8
"% ground coverage for site ID 95
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
59 _96                                            8
"% ground coverage for site ID 96
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
60 _97                                            8
"% ground coverage for site ID 97
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
61 _98                                            8
"% ground coverage for site ID 98
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
62 _99                                            8
"% ground coverage for site ID 99
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
63 _100                                           8
"% ground coverage for site ID 100
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
64 _101                                           8
"% ground coverage for site ID 101
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
65 _102                                           8
```

```
"% ground coverage for site ID 102
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
66 _103                                    8
"% ground coverage for site ID 103
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

```
67 _105                                    8
"% ground coverage for site ID 105
for named species (% is average of
five 2-meter-diameter subsamples
in each site)"
```

Sample Data Record:

```
speccode  speccomm              spec_sci                      can_layr
_2        _3           _12      _14        _15      _16       _18        _19     _20


"ABBA"    "Fir, Balsam"         "Abies Balsamea"              "Understory"
0         0            0        0          0        0         0          0       3
"ACRU"    "Maple, Red"          "Acer Rubrum"                 "Understory"
0         2            0        0          0        10        0          0       1
"ACSP"    "Maple, Mountain"     "Acer Spicatum"               "Understory"
0         2            0        0          0        17        0          0       1
"ACTA"    "Baneberry"           "Actaea Spp.  "               "Understory"
.         .            .        .          .        .         .          .       .
"ALRU"    "Alder, Speckled"     "Alnus Rubra  "               "Understory"
0         0            0        0          0        0         0          0       0
"AMEL"    "Juneberry"           "Amelanchier Spp.  "          "Understory"
0         0            0        0          0        0         0          0       0
"ANGL"    "Bog Rosemary"        "Andromeda Glaucophylla"      "Understory"
0         0            4        0          0        0         3          1       0
"ANQU"    "Wood Anemone"        "Anemonequinquefolia"         "Understory"
0         1            0        0          0        3         0          0       0
"ARNU"    "Wild Sarsaparilla"   "Aralia Nudicaulis"           "Understory"
0         7            0        0          0        2         0          0       0
```

Footnote:

> For presentation in this document, some padding blanks may have been eliminated between columns in the Sample Data Record. Due to the many fields in this data file, these columns will wrap while viewing. The actual data files, however, are column delimited with an adequate record length to prevent wrapping. See the *Data Format Section* for conventions used for missing data values in the data file.

8. Data Organization:

The data file is sorted by species code (speccode). Columns beginning with an underscore and a number (e.g., _2) indicate the percent coverage for that study site, (e.g., Site 2).

Data Granularity:

This data set consists of a single ASCII file containing average percent ground coverage for all species measured at all sites.

A general description of data granularity as it applies to the IMS appears in the [EOSDIS Glossary](#).

Data Format:

The data files associated with this data set consist of numeric and character fields of varying lengths aligned in columns. The first row of each data file contains the 8 character SAS variable name that links to the data format definition file. Character fields are enclosed in double quotes and numeric fields are listed without quotes.

Missing data values can be of two varieties:

1. Values that were identified as missing in the original data files. Missing numeric values of this type are identified in these data as -999.
2. Those holes that were created as a result of combining files that contained a slightly different variable set. Missing values of this type are identified in these data files as empty double quotes for character fields and a single period, '.' for numeric fields.

9. Data Manipulations:

Not available.

10. Errors:

Sources of Error:

Not available.

Quality Assessment:

Data Validation by Source:

Not available.

Confidence Level/Accuracy Judgment:

Not available.

Measurement Error for Parameters:

Not available.

Additional Quality Assessments:

Not available.

Data Verification by Data Center:

The Superior National Forest data were received from the Goddard Space Flight Center in three media:

- As data dumps from the original Oracle SNF database maintained by GSFC, transferred electronically from the GSFC system to the ORNL system;
- As ASCII files that mirrored the tables published in the Tech Memo; and
- As hard copy (Tech Memo).

Data from both electronic sources were input into SAS by ORNL DAAC data management staff and compared using computer code developed to process the SNF data. In many cases, the data values from both sources were found to be identical. In some cases, however, differences were identified and the providers of the data were consulted to resolve inconsistencies.

Additionally, some variable columns were available in one source, but not the other for various reasons. For example, some calculated variables/columns were provided in the ASCII files (reflecting the Tech Memo tables) that were not stored in the Oracle database for purposes of space conservation.

For similar reasons, coded values were used for many of the site and species identifier variables. A separate reference table was provided to link the coded variable with its definition (e.g., the SPECIES_REF file and the SITE_REF file).

The database produced by the ORNL DAAC is a hybrid product that is a composite of data and information extracted from all three source media. In data sets where coded variables were included, the code definition variables have been added to improve usability of the data set as a stand-alone product.

Therefore the ASCII files that are available through the ORNL DAAC on-line search and order systems are output from a data set that is a product of the essential core of numeric data provided by the data source (GSFC), augmented with additional descriptive information provided by GSFC and reorganized by the ORNL DAAC into a data structure consistent with other similar data sets maintained by the ORNL DAAC.

11. Notes:

Limitations of the Data:

Not available.

Known Problems with the Data:

None known at this revision.

Usage Guidance:

Not available.

Any Other Relevant Information about the Study:

None.

12. Application of the Data Set:

This data set can be used to improve our understanding of the relationship between remotely sensed observations and important biophysical parameters in the boreal forest.

13. Future Modifications and Plans:

None known at this revision.

14. Software:

Not available.

15. Data Access:

Contact Information:

ORNL DAAC User Services
Oak Ridge National Laboratory
Telephone: (865) 241-3952
Fax: (865) 574-4665
E-mail: ornldaac@ornl.gov

Data Center Identification:

ORNL Distributed Active Archive Center
Oak Ridge National Laboratory
Telephone: (865) 241-3952
Fax: (865) 574-4665
E-mail: ornldaac@ornl.gov

Procedures for Obtaining Data:

Users may order data by telephone, electronic mail, or fax. Data are available via FTP or on CD-ROM. Data are also available via the World Wide Web at http://daac.ornl.gov.

Data Center Status/Plans:

The Superior National Forest Data are available from the ORNL DAAC. Please contact the ORNL DAAC User Services Office for the most current information about these data.

16. Output Products and Availability:

Available via FTP or on CD-ROM.

17. References:

Not available.

Archive/DBMS Usage Documentation.

Contact the ORNL DAAC, Oak Ridge, Tennessee (see the *Data Center Identification Section*).

18. Glossary of Terms:

A general glossary is located at EOSDIS Glossary.

19. List of Acronyms:

URL Uniform Resource Locator

A general list of acronymsis available at http://cdiac.ornl.gov/pns/acronyms.html.

20. Document Information:

October 10, 1996 (citation revised September 23, 2002).

Document Review Date:

February 17, 1997.

Document ID:

ORNL-SNF_TAB3_3T.

Citation:

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