Timber Measurements (OTTER)

Summary:

Height, crown width, DBH, and height-to-crown distance collected using variable-radius plot sampling with a steel tape and a hand held compass to locate points along a transect.

Table of Contents:

1. Data Set Overview 2. Investigator(s) 3. Theory of Measurements 4. Equipment 5. Data Acquistion 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:

Data Set Identification:

Timber Measurements (OTTER)

Data Set Introduction:

The Oregon Transect Ecosystem Research (OTTER) Project was a cooperative effort between NASA and several universities to discern the ecology of western coniferous forests using remote sensing technology supported by ground observations. OTTER is an interdisciplinary project that tested a model that estimated the major fluxes of carbon, nitrogen, and water through a temperate forest region.

Six Oregon sites across an elevational and climatic gradient were intensively studied. The transect began at the Pacific coast at the site called Cascade Head, passed through the outskirts of Corvallis, through a dense Douglas fir forest at Scio, through a mountain hemlock/subalpine fir community at Santiam Pass, through a Ponderosa pine community near Metolius, and ended at a site east of Sisters called Juniper. In all, the transect stretched some 300 kilometers west to east.

Goals of the project were to simulate and predict ecosystem processes such as photosynthesis, transpiration, above-ground production, nitrogen transformation, respiration, decomposition, and hydrologic processes; combine field, lab, and remote sensing techniques to estimate key vegetation and environmental parameters; construct a "geo-referenced" database for extrapolation and testing of principles, techniques, and prediction; and verify the predictions through direct measurements of process rates or controls on processes.

Objective/Purpose:

The objective was to select 20 trees at each of five different sites for random sampling, and collect physical characteristics of the trees by using variable-radius sampling.

Summary of Parameters:

Five parameters were investigated: Height from ground to tree top, crown width, the diameter at breast height, height-to-crown distance, and the number of trees per acre.

Discussion:

Information not available.

Related DataSets:

Canopy Chemistry Forest-BGC Model Leaf Area Index Data Leaf Reflectances: LICOR Leaf Reflectances: Perkin-Elmer Meteorology Optical Thickness Data: Aircraft Optical Thickness Data: Ground Reflectance Reference Targets SE-590 Field-Measured Reflectances SE-590 Lab-Measured Reflectances SE-590 Landscape Reflectances SE-590 Low Altitude Reflectances

2. Investigator(s):

Investigator(s) Name and Title:

Names: Alan H. Strahler, Professor Department of Geography for Remote Sensing

Addresses: Boston University U.S.A.

Telephone Numbers: 1-(617)-353-5984

Electronic Mail Address: alan@bucrsb.bu.edu

Title of Investigation:

OTTER Timber Measurements

Contact (for Data Production Information):

Name: ORNL DAAC User Services Office

Address: Oak Ridge National Laboratory U.S.A.

Telephone Numbers: 1-(865)-241-3952

Electronic Mail Address: ornldaac@ornl.gov

3. Theory of Measurements:

The objective of the sampling was to select 20 trees at each stand for measurement of height, crown width, DBH, height-to-crown distance, and trees per acre. The general procedure was to lay out a transect through the stand using steel tape and hand-held compass and locate "points" along the transect. Each point is the center of a variable-radius plot. The points are separated by 100-150 feet, depending on the size of the stand and the prism factor. This distance is chosen before data are collected.

A prism factor (square feet per acre) was selected in advance that would require about 4 points to attain a sample of 20 trees. If the last point took the tree total beyond 20, only DBH measurements were made of such trees. Each tree that was counted using the prism represented a fixed contribution to the DBH per acre. For example, if 8 trees are in at a point with a 20 prism, the stand basal area is 8*20=160 square feet DBH per acre.

4. Equipment:

Sensor/Instrument Description:

- Steel Measuring Tape: An instrument for measuring length.
- Clinometer: Any of the various instruments used for measuring angles of elevation of inclination.
- Human Observer: A human being who observes, measures, and records scientific data in the absence of more precise or automated means.

Collection Environment:

Open-air forest.

Source/Platform:

Field investigation.

Source/Platform Mission Objectives:

Determine height, crown width, DBH, height-to-crown distance, and the number of trees per acre in the Oregon Transect.

Key Variables:

Height, crown width, DBH, height-to-crown distance, and trees/acre.

Principles of Operation:

Information not available.

Sensor/Instrument Measurement Geometry:

Spheroid-on-a-stick

Manufacturer of Sensor/Instrument:

Information not available.

Calibration:

Calibration information is not available.

5. Data Acquisition Methods:

The data were collected using variable-radius plot sampling. The general procedure was to lay out a transect through the stand using steel tape and hand-held compass and locate points along the transect.

6. Observations:

Data Notes:

For the Cascade Head Site, the data are collected from the site that we are referring to as the "old growth site." This is actually a heterogeneous site, with one portion containing younger (but still pretty big) trees and another portion with a number of old-growth trees. The data were collected from the younger portion.

Field Notes:

Information not available.

7. Data Description:

Spatial Characteristics:

Spatial Coverage:

Site 1OG: Cascade Head - Old Growth Latitude 45.05 N, Longitude 123.92 W Site 2: Warings Woods Latitude 44.60 N, Longitude 123.27 W Site 3IF: Scio - Intensively Fertilized Latitude 44.67 N, Longitude 122.61 W Site 5: Metolius Latitude 44.38 N, Longitude 121.68 W Site 6: Juniper Latitude 44.29 N, Longitude 121.68 W

Spatial Coverage Map:

Not applicable.

Spatial Resolution:

Not applicable.

Projection:

Not applicable.

Grid Description:

Not applicable.

Temporal Characteristics:

Temporal Coverage:

01 August 1990.

Temporal Coverage Map:

Not applicable.

Temporal Resolution:

Not applicable.

Data Characteristics:

Parameter/Variable:

DBH Height Crown width Height-to-crown distance Trees/Acre

Variable Description/Definition:

DBH: The diameter of a tree at an average human breast height.. Height: The height of the tree. Crown width: The diameter of the tree top. Height-to-crown distance: Distance from the base of the tree to the bottom of the crown. Trees/Acre: The number of trees per acre.

Unit of Measurement:

DBH: Inches Height: Feet Crown width: Feet Height-to-crown: Feet Trees/Acre: Trees/acre

Data Source:

Field investigation.

Data Range:

DBH: 2.5 <--> 54.2 Height: 11 <--> 200 Crown width: 5 <--> 33 Height-to-crown: 0 <--> 123 Trees/Acre: 2.9 <--> 130.4

Sample Data Record:

DBH: 23.1 19.5 18.7 15.5 12.1 12.4 15.4 11.6 15.8 21.1 20.7 Height: 115 90 102 99 77 89 91 92 108 102 95 Crown Width: 20 16 20 16 15 15 21 14 18 24 26 Height-to-crown: 49 61 51 36 45 48 40 56 61 49 49 Trees/Acre: 13.7 19.3 21 30.5 50.1 47.7 30.9 54.5 29.4 16.5 17.1

8. Data Organization:

Data Granularity:

Each file in the data set contains 16 fields of data. The first four fields give such physical characteristics about the collection and site as the point number, the prism factor, the tree number, and the species code. The next six fields contain the parameter data. The remaining six fields give such calculation data as the crown height, the height to center of the crown (h), half of the crown height (b), the horizontal radius (r), the ratio of b to r (b/r), and the ratio of b to h (b/h).

Data Format:

Five ASCII data sets are available: cascadeheadog.timber, juniper.timber, metolius.timber, scioif.timber, and waringswoods.timber. In addition, a data set companion file: timber.doc, is included with the complete data set.

9. Data Manipulations:

Formulae:

Derivation Techniques and Algorithms:

At the bottom of the table are some summary statistics used in the geometric-optical modeling. The mean is the mean value for all trees measured. The same is true for the standard deviation and the coefficient of variation.

Data Processing Sequence:

Data processing information is not available.

Calculations:

Special Corrections/Adjustments:

If the unweighted mean is desired, it will be necessary to "un-weight" them by weighting them by the trees per acre value and then normalizing by the sum of the weights.

The selection of trees is with a probability proportional to their DBH, so the simple mean of these values is not a true mean, but rather a basal-area weighted mean. The basal-area weighted statistics are used in the model since they are better descriptors of the upper canopy layer.

Calculated Variables:

Crown Height: Difference between tree height and height-to-crown in feet. h: Height to center of the crown in feet. b: Half of crown height in feet. r: Horizontal radius of crown at widest part, or half of crown width in feet. b/r: Ratio of b to r. b/h: Ratio of b to h.

Graphs and Plots:

Information not available.

10. Errors:

No information is available on the possible errors that were encountered during the timber measurements.

11. Notes:

No notes about the data are available.

12. Application of the Data Set:

The timber measurements are key in the goals of the OTTER project. They give hard, physical data about the sites in the study. The combination of this field study with laboratory work and remote sensing techniques will help to simulate and predict ecosystem processes.

13. Future Modifications and Plans:

No future plans, the OTTER campaign is complete.

14. Software:

Software Description:

The public domain software package, Imdisp, is provided for image display on IBM compatibles. The popular shareware program, Stuffit, is necessary to extract the execution file for the Macintosh image display program, Image4pds.

Software Access:

Software to display most of the OTTER image data (except Aviris and Asas data) on Macintosh and IBM personal computers (and compatibles) is provided on the CD-Rom disc containing the data sets.

15. Data Access:

Contacts for Archive/Data Access Information:

Name: ORNL DAAC User Services Office

Address: ORNL DAAC User Services Office Oak Ridge National Laboratory U.S.A.

Telephone Number: 1-(865)-241-3952

Electronic Mail Address: ornldaac@ornl.gov

Data Center Identification:

ORNL DAAC

Procedures for Obtaining Data:

Contact the ORNL DAAC User Services Office Oak Ridge National Laboratory U.S.A.

Telephone: 1-(865)-241-3952 FAX: 1-(865)-574-4665 Internet: ornldaac@ornl.gov

Data Center Status/Plans:

Information not available.

16. Output Products and Availability:

Available via FTP file or on CD-ROM.

Also available online via the World Wide Web at http://daac.ornl.gov.

17. References:

Information not available.

18. Glossary of Terms:

Glossary terms can be found in the Glossary list.

19. List of Acronyms:

Additional acronyms can be found in the Acronyms list.

DBH Diameter at breast height

ESD Environmental Sciences Division (Oak Ridge National Laboratory)

FTP File Transfer Protocol

NASA National Aeronautics and Space Administration

ORNL Oak Ridge National Laboratories Oak Ridge, Tennessee, U.S.A.

OTTER Oregon Transect Ecosystem Research

20. Document Information:

30 July 1996 (data set citation revised on 19 November 2002)

Document Review Date:

30 July 1996

Document ID:

ORNL-OTTER-014

Citation:

Please cite this data set as follows (citation revised on 19 November 2002):

Strahler, A. H. 1994. Timber Measurements (OTTER). [Timber Measurements (Oregon Transect Ecosystem Research)]. Data set. Available on-line [http://www.daac.ornl.gov] from Oak Ridge

National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/125.

Curator:

DAAC Staff

Document URL:

http://daac.ornl.gov