

Amazon Basin Subset of the 8 km x 8 km Resolution Global Pathfinder Advanced Very High Resolution (AVHRR) Land FTP Data

Summary:

This data set, a subset of that produced as part of the NOAA/NASA Pathfinder AVHRR Land (PAL) program, contains the Northern half of the South American continent in a 10-day composite of Normalized Difference Vegetation Index (NDVI) at 8 km resolution. The data, derived from the Advanced Very High Resolution Radiometers (AVHRR) on the "afternoon" NOAA operational meteorological satellites (NOAA-7, -9, -11), cover the period from 1982 to 1992. The Pathfinder Program produces long-term data sets processed in a consistent manner for global change research.

1. Data Set Overview

Data Set Identification:

Amazon Basin Subset of the 8 km x 8 km Resolution Global Pathfinder Advanced Very High Resolution (AVHRR) Land FTP Data

Data Set Introduction:

This data set, a subset of that produced as part of the NOAA/NASA Pathfinder AVHRR Land (PAL) program, contains the northern portion of the South American continent in a monthly composite of Normalized Difference Vegetation Index (NDVI) at 8 km resolution. The data, derived from the Advanced Very High Resolution Radiometers (AVHRR) on the "afternoon" NOAA operational meteorological satellites (NOAA-7, -9,-11), cover the period from 1982 to 1992. The Pathfinder Program produces long-term data sets processed in a consistent manner for global change research.

Objective/Purpose: Not Available

Summary of Parameters:

The Normalized Difference Vegetation Index (NDVI) is derived from the visible and near-infrared channel reflectances (0.58 to 0.68 um and 0.73 to 1.10 um, respectively)

Discussion: Not Available

Related Data Sets: Not Available

2. Investigator(s)

Investigator(s) Name and Title:

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Title of Investigation:

Source Data Title: Pathfinder AVHRR Land Data

Data Preparation Title:

Land-use in Amazonia and the Cerrado of Brazil: State of Knowledge and GIS Database

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3. Theory of Measurements

Spectral Wavelengths

On the NOAA-7, NOAA-9, and NOAA-11 satellites, the AVHRR sensor measures emitted and reflected radiation in five channels (bands) of the electromagnetic spectrum: a visible (0.58 to 0.68 micrometer) band that is used for daytime cloud and surface mapping; a near-infrared (0.725 to 1.1 micrometer) band used for surface water delineation and vegetation cover mapping; a mid-infrared (3.55 to 3.93 micrometer) band used for sea surface temperature and nighttime cloud mapping; a thermal infrared (10.5 to 11.5 micrometer) band used for surface temperature and day and night cloud mapping; and another thermal infrared (11.5 to 12.5 micrometer) band used for surface temperature mapping (Kidwell 1991).

Vegetation Index

The first AVHRR channel is in a part of the spectrum where chlorophyll causes considerable absorption of incoming radiation, and the second channel is in a spectral region where spongy mesophyll leaf structure leads to considerable reflectance. This contrast between responses of the two bands can be shown by a ratio transform; i.e., dividing one band by the other. Several ratio transforms have been proposed for studying different land surfaces (Tucker, 1979). The Normalized Difference Vegetation Index (NDVI) is one such ratio, which has been shown to be highly correlated with vegetation parameters such as green-leaf biomass and green-leaf area and, hence, is of considerable value for vegetation discrimination (Justice et al. 1985).

NDVI Relationships With Geophysical Variables

A ratio between bands is of considerable use in reducing variations caused by surface topography (Holben and Justice 1981). It compensates for variations in radiance as a function of Sun elevation for different parts of an image. The ratios do not eliminate additive effects caused by atmospheric attenuation, but the basis for the NDVI and vegetation relationship holds generally. The soil background contributes a reflected signal apart from the vegetation, and interacts with the overlying vegetation through multiple scattering of radiant energy. Huete (1988) found the NDVI to be as sensitive to soil darkening (moisture and soil type) as to plant density over partially vegetated areas.

4. Equipment

Sensor/Instrument Description: Not Available

Collection Environment: Not Available

Source/Platform: Not Available

Source/Platform Mission Objectives: Not Available

Key Variables: Not Available

Principles of Operation: Not Available

Sensor/Instrument Measurement Geometry: Not Available

Manufacturer of Sensor/Instrument: Not Available

Calibration:

Specifications: Not Available

Tolerance: Not Available

Frequency of Calibration: Not Available

Other Calibration Information: Not Available

5. Data Acquisition Methods

The source data for these subsets were acquired by Anonymous FTP from the site: daac.gsfc.nasa.gov, in the directory `/data/avhrr/global_8km/`

6. Observations

Data Notes: Not Available

Field Notes: Not Available

7. Data Description

Spatial Characteristics:

Spatial Coverage:

Location

Min X -9047548.000

Max X -3879806.250

Min Y -2224256.500

Max Y 1408162.375

In decimal degrees of Longitude and Latitude

Spatial Coverage Map: Not Available

Spatial Resolution: 8 km x 8 km

Projection: Goode Interrupted Homolosine Projection

Grid Description: 646 columns by 454 rows

Temporal Characteristics:

Temporal Coverage: January 1982 to December 1992

Temporal Coverage Map: Not Available

Temporal Resolution: 10-day and monthly composites

Data Characteristics:

Parameter/Variable:

The NDVI in this subset are scaled to an 8-bit unsigned byte value in the range of 3 to 253. An offset of 128 must be applied via a gain of 0.008 to derive the original ndvi value within the range of -1 to +1. For example, to solve for the ndvi value of the binned 8-bit value of 100, the following equation is used:

$NDVI = ((100 * 0.008) - (128 * 0.008))$ or -0.224.

Variable Description/Definition: Not Available

Unit of Measurement: Unitless

Data Source: The original data were collected by the Advanced Very High Resolution Radiometer (AVHRR) flown on the NOAA-series satellites. The data for this subset were downloaded via WWW from the URL <ftp://daac.gsfc.nasa.gov/data/avhrr>.

A detailed, comprehensive description of the NOAA series satellites, the AVHRR instrument, and the AVHRR GAC 1B data can be found in the NOAA Polar Orbiter Data User's Guide (Kidwell 1991), which can be obtained from NOAA's National Environmental Satellite Data and Information Service (NESDIS).

Data Range: 0-253

Sample Data Record: Not Applicable

8. Data Organization

Data Granularity: A general description of data granularity as it applies to the IMS appears in the EOSDIS Glossary.

Each of the 158 granules of this dataset consists of a single tarred and GNU-gzipped file. Each of the tarred and GNU-gzipped files in this dataset contains a single flat binary raster image file and an ASCII documentation file.

Data Format: Each of the flat binary raster image files in this dataset consists of 454 rows by 646 columns, comprising 293,284 bytes (8-bit unsigned). There are no headers, trailers, or delimiters.

The structure of the ASCII documentation files is as follows (portions have been copied directly from the IDRISI for Windows v. 2.0 Help System, with the permission of the IDRISI Project, Clark University, Worcester, MA):

ITEM	DESCRIPTION
Title	A descriptive name of the file.
data type	The type of numbers stored in the file. Allowable entries are byte, integer and real.
file type	The format in which the Image file is stored.
Columns	The number of columns in the image.
Rows	The number of rows in the image.
ref. system	The name of the geographic referencing system used with the file.
ref. units	The unit of measure used in the specified reference system. Allowable entries are m, ft, mi, km, deg and radians.
unit dist	The scaling factor between the given coordinates and actual measurements on the ground.
min X	The minimum X coordinate (left edge) of the image.
max X	The maximum X coordinate (right edge) of the image.
min Y	The minimum Y coordinate (bottom edge) of the image.
max Y	The maximum Y coordinate (top edge) of the image.
pos'n error	A measure of the accuracy of the positions in the image.
Resolution	The inherent resolution of the image. In most cases, this should correspond to the result of dividing the range of reference coordinates in X by the number of columns in the image.
min value	The minimum value in the image.
max value	The maximum value in the image.
value units	The unit of measure of the values in the image. The term classes is used for all qualitative data sets, and that whenever standard

linear units are appropriate, that the same abbreviations that are used for reference units should also be used (m, ft, mi, km, deg, rad).

value error	This field records the error in the data values that appear in image cells. For qualitative data, this should be recorded as a proportional error. For quantitative data, the value here should be an RMS error figure.
flag value	Any value in the image that is not a data value, but rather has a special meaning. If there is no flag value, this entry should remain blank.
flag def'n	Definition of the above flag value. The most common data flags are those used to indicate background cells and missing data cells.
legend cats	The number of legend categories present.
Lineage	Description of the history by which the values were recorded/derived.
Completeness	The degree to which the values describe the subject matter indicated.
Consistency	The logical consistency of the file.

There are three fill values in each image: 0 is Missing Data Over Land, 1 is Ocean, 2 is Goode's Interrupted Space. Orientation is North to South.

9. Data Manipulations

Formulae:

Derivation Techniques and Algorithms: Not Available

Data Processing Sequence:

Processing Steps:

Each of the monthly datafiles in this dataset were subset from the source data using the IDRISI for Windows geographic analysis system (Eastman, 1997) to include only the columns 1371-2016 and rows 908-1361 [where the column/row coordinate of the upper left is (0,0)].

Processing Changes: Not Applicable

Calculations:

Special Corrections/Adjustments: Not Available

Calculated Variables: Not Available

Graphs and Plots: Not Available

10. Errors

Sources of Error: Not Available

Quality Assessment:

Data Validation by Source: Not Available

Confidence Level/Accuracy Judgement: Not Available

Measurement Error for Parameters: Not Available

Additional Quality Assessments: Not Available

Data Verification by Data Center: Not Available

11. Notes

Limitations of the Data: Not Available

Known Problems with the Data: Not Available

Usage Guidance: Not Available

Any Other Relevant Information about the Study: Not Available

12. Application of the Data Set

The NDVI has been correlated with such physical measurements as total standing biomass, green leaf-area index (LAI) and per cent vegetation cover, but is probably best described as a relative measure of vegetation vigor and photosynthetic activity. It is most often used among other applications as a tool for monitoring temporal changes in vegetation.

13. Future Modifications and Plans

Not Available

14. Software

Software Description:

Two softwares are required to read the files in this dataset:

the shareware tar program tar.exe

the GNU compression utility gzip.exe

Software Access:

The GNU-gzip program (gzip.exe) and shareware tar program (tar.exe) are available via Anonymous FTP from the following site: wuarchive.wustl.edu, in the directory, /systems/msdos/gnuish, files: gzip124x.zip and gnutar.zip

15. Data Access

Contact Information:

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Data Center Identification: Not Applicable

Procedures for Obtaining Data: Not Applicable

Data Center Status/Plans: Not Applicable

16. Output Products and Availability

Not Applicable

17. References

The material for this set of metadata were adapted largely and portions copied directly from the on-line document at: http://daac.gsfc.nasa.gov/CAMPAIGN_DOCS/FTP_SITE/readmes/pal.html

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The original data set from which this subset is derived is part of the Pathfinder Land data set archived at the Goddard DAAC. It is derived from the PAL 8 km Daily data. The Daily data are derived from the NOAA AVHRR Global Area Coverage (GAC) 1B data, available from NOAA's Satellite Active Archive.

Metadata References:

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18. Glossary of Terms

Not Available

19. List of Acronyms

Acronym	Definition
ASCII	American Standard Code for Information Interchange
AVHRR	Advanced Very High Resolution Radiometer
DAAC	Distribute Active Archive Center
EOS	Earth Observing System
FTP	File Transfer Protocol
GAC	Global Area Coverage
GNU	GNU's not UNIX
NASA	National Aeronautics and Space Administration
NDVI	Normalized Difference Vegetation Index
NESDIS	National Environmental Satellite Data and Information Service
NOAA	National Oceanic and Atmospheric Administration
PAL	Pathfinder AVHRR Land program
RMS	Root Mean Square

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