GENERATION OF LAI & FPAR FROM GIMMS3g NDVI DATA

README FILE AND SCRIPTS

by

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Data Set Version 1

Period: July 1981 to December 2011

Temporal Frequency: 15 days

Spatial Resolution: 1/12 degree

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CONTENTS

1. DATA DESCRIPTION

AVHRR GIMMS LAI3g and FPAR3g datasets were generated from AVHRR GIMMS NDVI3g using an Artificial Neural Network (ANN) derived model. The characteristic of the datasets can be found in Table 1.

Table 1 Data description of AVHRR BU LAI and AVHRR BU FPAR data sets.

Data Name	GIMMS LAI3g	GIMMS FPAR3g
Area	Global	Global
Projection	Geographic	Geographic
Spatial Resolution	1/12 degree	1/12 degree
Temporal Frequency	15 days	15 days
Temporal Coverage	July 1981 to December 2011	July 1981 to December 2011
Bands	1	1
Image Dimension	Rows: 2160 Columns: 4320	Rows: 2160 Columns: 4320
Units	m^2(plant)/m^2(ground)	Percent
Data Type	8-bit unsigned integer	8-bit unsigned integer
Fill Value	250	250
Valid Range	0-70	0-100
Multiply by	0.1	0.01
Byte Order	ieee-be	ieee-be
File Format	.abl	.abf
Version	1.0	1.0

2. FILE NAMING CONVENTION

AVHRRBUVI[version].[year][month][period].[format]

Words in brackets are optional. Table 2 lists their format and usage.

Table 2 Description of file naming convention.

Variable	**Width-Type**	**Description**
AVHRRBUVI	9-char	Abbreviation of AVHRR Boston University Vegeation Indices • Constant
Version	2-int	Version number • From 01 (version 1) to 99 (version 99)
Year	4-int	Digit year of the data • From 1981 to 2011
Month	3-char	Abbreviated lower case month name • From jan to dec
Period	1-char	Alphanumeric period for bimonthly datasets • a: first half month • b: second half month
format	3-char	Format of the data • abl: AVHRR BU LAI • abf: AVHRR BU FPAR

For example, AVHRRBUVI01.1985feba.abl is the file name of AVHRR BU LAI image in the first half month of February in 1985.

3. HOW TO DOWNLOAD THE DATA

1. The paper describing the generation and validation of the LAI3g and FPAR3g data sets has been published by Remote Sensing. You can download the paper from: http://www.mdpi.com/2072-4292/5/2/927. Please make sure to download both manuscript and supporting material.

2. How to cite the paper:

Zhu, Z.; Bi, J.; Pan, Y.; Ganguly, S.; Anav, A.; Xu, L.; Samanta, A.; Piao, S.; Nemani, R.R.; Myneni, R.B. Global Data Sets of Vegetation Leaf Area Index (LAI)3g and Fraction of Photosynthetically Active Radiation (FPAR)3g Derived from Global Inventory Modeling and Mapping Studies (GIMMS) Normalized Difference Vegetation Index (NDVI3g) for the Period 1981 to 2011. *Remote Sens.* 2013, 5, 927-948.

3. How to download the data sets:

A. The LAI3g and FPAR3g data sets can be obtained freely from the NASA Earth Exchange (NEX) website.

B. Through Boston University FTP site: ftp://crsftp.bu.edu/cliveg/

C. Through Drop Box:

GIMMS LAI3g

GIMMS FPAR3g

Technical Document

4. HOW TO USE THE DATASETS IN MATLAB

Reading AVHRR-BU-LAI/FPAR datasets in Matlab may require the following steps:

1. Read data from the file.
2. Read subset of the data.
3. Scale the data.
4. Visually check the data.

Step 1 shows how to read the entire image in Matlab. Step 2 shows how to read a subset from an image in Matlab. Step 3 shows how to scale the data you have read from file. Step 4 introduces a simple way to check the data in a visual way.

1. Read data from the file

Assuming the file path that you want to use is 'filepath', you can read data from the file in the following two ways:

(1) Read data using fopen() and fread() function

a. Open the file and assign it a file ID

```
fid = fopen(filepath, 'r');
```

The 'fid' is the file ID of the 'filepath'. You can check the fid to check if you open the file successfully in this way:

```
if fid == -1
error('Can't open the file, please check the filepath and your authority!');
else
% do your things here…
End
```

b. Read data from file

```
data = fread(fid,[2160,4320],'uint8',0,'ieee-be');
```

c. Close the file and release file ID.

```
fclose(fid);
```

(2) Read data using multibandread() function

```
data = multibandread('filepath', [2160,4320], 'uint8', 0, 'bsq', 'ieee-be');
```

2. Read subset of the data

   (1) Define the subset

```
subset = {dim, method, index} );
```

Here dim, method and index are optional. Table 3 lists their description and usage.

Table 3 Description of subset.

Variable	Description
dim	Text string specifying the dimension to subset along. It can have any of these values: • 'Row' • 'Column'
method	Text string specifying the subsetting method. It can have either of these values: • 'Direct' • 'Range'
index	If method is 'Direct', index is a vector specifying the indices to read along the Band dimension. If method is 'Range', index is a three-element vector of [start, increment, stop] specifying the range and step size to read along the dimension specified in dim.

Type *'help multibandread'* in the command window of Matlab for more information.

(2) Read the subset

```
data = multibandread(filepath, [2160,4320,1], 'uint8', 0, 'bsq', ...
                                                'ieee-be', subset);
```

3. Scale the data.

```
data = data.*scale_factor;
```

4. Visually check the data

```
imagesc(data);
```

Here are two examples:

Example 1:

```
% Open the file and assign it a file ID
fid = fopen('AVHRRBUVI01.1985feba.abl','r');
% Check if the file is successfully opened
if fid == -1 % Open unsuccessfully
    error('Can't open the file, please check the filepath and your authority!');
else % Open successfully
% Read data
data = fread(fid, [2160,4320], 'uint8', 0, 'ieee-be');
% Scale data
data = data.*0.1;
% Visually check the data
imagesc(data);
end
```

Example 2:

```
% Define the subset

subset = {'Row', 'Range', [500,1,1000]};

% Read the subset

data = multibandread('AVHRRBUVI01.2005jana.abf', [2160,4320,1], ...
                                'uint8', 0, 'bsq', 'ieee-be', subset);

% Scale the data

data = data.*0.01;

% Visually check the data

imagesc(data);
```