LBA-ECO ND-01 Fractional Land Cover Images, Rondonia, Brazil: 1984-2000

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Revision Date: September 6, 2013

Summary:

This data set provides fractional land cover type images for shade, green vegetation (GV), non-photosynthetic vegetation (NPV), and soil for the regions of JiParana, PortoVelho, Luiza, Ariquemes, and Cacoal in the state of Rondonia, Brazil, for the period 1984 to 2000. The images were derived with a spectral mixture analysis (SMA) of Landsat Thematic Mapper (TM) time series scenes for each of these areas. There were 249 TM scenes and one Landsat Multispectral Scanner (MSS) scene acquired for these analyses. The images are 30-m Landsat resolution and were georectified to the Brazilian space agency 1998 and 1999 PRODES imagery.

There are 250 GeoTIIF image files (*.tif) in this data set. Files are grouped by region and year/month/day scene was taken.

Data Citation:

Cite this data set as follows:

Roberts, D.A., I. Numata, K.W. Holmes, G.T. Batista, T. Krug, A.L. Monteiro, R.L. Powell, and O.A. Chadwick. 2013. LBA-ECO ND-01 Fractional Land Cover Images, Rondonia, Brazil: 1984-2000. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, USA. http://dx.doi.org/10.3334/ORNLDAAC/1188

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This data set was archived in September 2013. Users who download the data between September 2013 and August 2018 must comply with the LBA Data and Publication Policy.

Data users should use the investigator contact information in this document to communicate with the data provider.

Data users should use the data set citation and other applicable references provided in this document to acknowledge use of the data.

Table of Contents:

1. Data Set Overview:

Project: LBA (Large-Scale Biosphere-Atmosphere Experiment in the Amazon)

Activity: LBA-ECO

LBA Science Component: Land Use and Land Cover

Team ID: ND-01 (Roberts / Barreto / Soares)

The investigators were Roberts, Dar A.; Batista, Getulio T.; Soares, Joao Vianei; Barreto, Paulo Goncalves; Biggs, Trent W.; Chadwick, Oliver A.; Gessler, Paul E.; Holmes, Karen W.; Monteiro, Andre L.; Numata, Izaya; Nunes, Samia Serra; Powell, Rebecca Lynn; Renno, Camilo Daleles; Souza Jr., Carlos Moreira de and Tomasella, Javier . You may contact Roberts, Dar A. (dar@geog.ucsb.edu).

LBA Data Set Inventory ID: ND01_Spectra_Mixture_Models

This data set provides fractional land cover type images for shade, green vegetation (GV), non-photosynthetic vegetation (NPV), and soil for the regions of JiParana, PortoVelho, Luiza, Ariquemes, and Cacoal in the state of Rondonia, Brazil, for the period 1984 to 2000. The images were derived with a spectral mixture analysis (SMA) of Landsat Thematic Mapper (TM) time series scenes for each of these areas. There were 249 TM scenes and one Landsat Multispectral Scanner (MSS) scene acquired for these analyses. The images are 30-m Landsat resolution and were georectified to the Brazilian space agency 1998 and 1999 PRODES imagery.

Related Data Set:

LBA-ECO ND-01 Primary Forests Land Cover Transition Maps, Rondonia, Brazil: 1975-1999 (images from this data set were classified into age transition maps)

2. Data Characteristics:

There are 250 GeoTIIF image files (*.tif) in this data set. Files are grouped by region and year/month/day scene was taken. The images are of JiParana, PortoVelho, Luiza, Ariquemes and Cacoal, Rondonia, Brazil, for the period 1984 to 2000.

There are five files for each Landsat TM scene including end-member information for shade, NPV, GV, soil, and a Root Means Squared Error (RMS) error image file. Note: there are two 1986 scenes for Luiza, one from Landsat TM, and one from the Landsat MSS.

Each scene has four files named according to the following:

XXYYMMDD_em#.tif

where:

XX= one of the five the regions:
lu=Luiza
ar=Ariquemes
ca=Cacoal
ji=JiParana
pv=PortoVel

YY=year, MM=month, and DD=day

em=endmember

=
0 -- fraction image for endmember 0 (shade)
1 -- fraction image for endmember 1 (non-photosynthetic vegetation, NPV)
2 -- fraction image for endmember 2 (green vegetation, GV)
3 -- fraction image for endmember 3 (soil)

The is also one file of the following type with each scene:

XXYYMMDD_rms.pic -- RMS error image

Example file names for the Ariquemes location: **ar000628_em0.tif** and **ar000628_rms.tif**

Image Projection Information:

- Projection: Transverse_Mercator
- Resolution: 30 meters
- False_Easting: 500000.000000
- False_Northing: 10000000.000000
- Central_Meridian: -63.000000
- Scale_Factor: 0.999600
- Latitude_of_Origin: 0.000000
- Linear_Unit: Meter
- Geographic Coordinate System: GCS_WGS_1984, Datum: D_WGS_1984
- Projected Coordinate System: WGS_1984_UTM_Zone_20S
- Prime Meridian: Greenwich
- Angular Unit: Degree

Locations and Landsat path/row utilized:

Porto Velho (P232, R66)

Ariquemes (P232, R67)
Ji-Parana (P231, R67)
Luiza (P231, R68)
Cacoal (P230, R68)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Rondonia - Ariquemes (Rondonia)	-64.64056	-62.69722	-9.18083	-11.07528	South-American Datum, 1969 (SAD-69)
Rondonia - Ji Parana (Rondonia)	-63.06833	-61.18167	-9.36861	-10.93583	South-American Datum, 1969 (SAD-69)
Rondonia - Luiza (Rondonia)	-63.40667	-61.48278	-10.6975	-12.43111	South-American Datum, 1969 (SAD-69)
Rondonia - PortoVelho (Rondonia)	-64.28306	-62.44778	-7.8275	-9.51889	South-American Datum, 1969 (SAD-69)
Rondonia - Cacoal (Rondonia)	-61.88907	-59.85667	-10.65794	-12.49684	South-American Datum, 1969 (SAD-69)

Time period:

- The data set covers the period 1984/06/24 to 2000/06/28.
- Temporal Resolution: Daily

Platform/Sensor/Parameters measured include:

- LANDSAT-5 (LAND REMOTE-SENSING SATELLITE-5) / LANDSAT TM (LANDSAT THEMATIC MAPPER) / LAND COVER

3. Data Application and Derivation:

Many of these images were used to develop land cover transition age maps, determination of rates of deforestation, changes in forest area, forest edge, and spatial and temporal patterns in land-cover.

4. Quality Assessment:

From Roberts et al., 2002:

Ideally, an image end-member can be represented as a mixture of one or more spectrally pure, identifiable reference end-members. When selecting candidate reference end-members for each image end-member, the objective is to locate library spectra that are more extreme than the image end-members, provide a good fit (as measured by RMS), and have fractions that match expected values based on field measurements or aerial photo interpretation (Roberts et al., 1998). Reference end-members were selected from the same spectral library used to retrieve surface reflectance.

5. Data Acquisition Materials and Methods:

Site Description

The images covered five areas of Rondonia, Brazil: JiParana, PortoVelho, Luiza, Ariquemes, and Cacoal. The regions provide a gradient in deforestation rates and pasture ages from low rates and young pastures in Ariquemes to higher initial deforestation and older pastures in Ji-Paraná and Luiza. Natural vegetation is dominated by dense tropical forests with locally abundant savanna, transitional forest, and infrequent patches of more open, shorter forests (RADAMBRASIL, 1978). Anthropogenic land cover includes pastures, second-growth forest, annual crops, perennial crops, bare soil, and urbanized areas (Browder, 1994).

Landsat TM Images

Fifty Landsat TM scenes were assembled into a comprehensive time series:

- 14 scenes were acquired for Ariquemes: one for the year 1984, and for each year 1988 to 2000.
- 10 scenes were acquired for Ji-Paraná: one each for the years 1986, 1988, 1989, 1990, 1993, 1997, 1998, and 1999 and two for 1996.
- 10 scenes were acquired for Luiza: one each for the years 1988,1989, 1990, 1992, 1995, 1996, 1997, and 1999 and two for 1986 (one from Landsat TM and one from the Landsat MSS).
- 8 scenes were acquired for Porto Velho: one each for the years 1986, 1988, 1992, 1993, 1996, 1997, 1998, and 2000.
- 8 scenes were acquired for Cacoal: one each for the years 1988, 1989, 1992, 1994, 1998, 1999 and two for 1996.

All Landsat images were coregistered to 1998 or 1999 digital PRODES.

Derivation of Fraction Images (Roberts et al. (1998, 2002):

1. Image End-Member Selection: Using SMA, a spectrum consisting of radiance reflected off of multiple materials within the field of view was decomposed into fractions of several unmixed spectra, called end-members (Adams et al., 1993). The final product was five images, one for each end-member and an RMSE image.

2. Reflectance Retrieval: Encoded radiance was converted to apparent surface reflectance through absolute calibration (Kaufman, 1989) or relative reflectance retrievals (Elvidge and Portigal, 1990) to identify surface materials and compare satellite observations to laboratory or field measured spectra. The quality of retrieved surface reflectance for Rondonia was evaluated by comparison to surface reflectance measured over similar targets in Manaus,

retrieved using multiple ground reflectance measured in the field during the summer the Manaus Landsat TM data were acquired.

3. Reference End-Member Selection: Reference end-members are spectra of known materials (Adams et al., 1993). Reference end-members were selected from the same spectral library used to retrieve surface reflectance.

4. Intercalibration: Following step three, remaining data sets were standardized to the reference scene using relative radiometric calibration techniques (Schott et al., 1988; Hall et al., 1991).

5. Spectral Mixture Analysis: Once the entire time series was intercalibrated and reference end-members selected, the same model was applied to the entire data set. This generated four fraction images for each scene (GV, NPV, soil, and shade) and an RMSE image.

6. Data Access:

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Data Archive Center:

Contact for Data Center Access Information:
E-mail: uso@daac.ornl.gov
Telephone: +1 (865) 241-3952

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