

LBA-ECO LC-15 JERS-1 Synthetic Aperture Radar, 1- km Mosaic, Amazon Basin: 1995-1996

Revision date: August 11, 2011

Summary

This data set contains two image mosaics of L-band radar backscatter and two image mosaics of first order texture. The two backscatter images are mosaics of L-band Radar Backscatter at Horizontal-Horizontal (HH) Polarization created from 1,500 images collected by the Japanese Earth Resources Satellite-1 (JERS-1) Synthetic Aperture Radar (SAR) over the Amazon River Basin as part of the Global Rainforest Mapping Project (GRMP). These backscatter image mosaics were developed using data collected over 62 days from August to November of 1995 for the peak of the dry season and for 62 days from May to June of 1996 during the peak of the wet season. The two image mosaics are at 3 arc-sec resolution. Data provided under this project are resampled images at 30 arc-sec resolution (or about 1 km resolution). For each radar backscatter image, first order texture statistical information was derived and is distributed along with the image mosaic.

This data set contains four images each in both geotiff and ENVI formats, provided in eight zip files. The four files in ENVI file format contain “_envi” in their file name and when extrapolated contain an envi image (*_envi.dat) and an envi image header file (_envi.hdr). The four files in geotiff format contain “_geotiff” in their file name and when extrapolated contain *.tif and *.tiff file pairs. See Section 2 for more information about the characteristics of these data files.

Data Citation:

Cite this data set as follows:

Saatchi, S.S., B. Nelson, E. Podest, and J. Holt. 2011. LBA-ECO LC-15 JERS-1 Synthetic Aperture Radar, 1- km Mosaic, Amazon Basin: 1995-1996. Data set. Available on-line [<http://daac.ornl.gov>] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. <http://dx.doi.org/10.3334/ORNLDAAC/1024>

Implementation of the LBA Data and Publication Policy by Data Users:

The LBA Data and Publication Policy [http://daac.ornl.gov/LBA/lba_data_policy.html] is in effect for a period of five (5) years from the date of archiving and should be followed by data users who have obtained LBA data sets from the ORNL DAAC. Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.

This data set was archived in August of 2011. Users who download the data between August 2011 and July 2016 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. Alternatively, the LBA Web Site [<http://lba.inpa.gov.br/lba/>] in Brazil will have current contact information.

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](#)
- [2 Data Characteristics](#)
- [3 Applications and Derivation](#)
- [4 Quality Assessment](#)
- [5 Acquisition Materials and Methods](#)
- [6 Data Access](#)
- [7 References](#)

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: LC-15 (Saatchi / Alvala)

The investigator was Saatchi, Dr. Sassan. You may contact Saatchi, Dr. Sassan (Saatchi@congo.jpl.nasa.gov) .

LBA Data Set Inventory ID: LC15_GRFM_JERS1_Mosaic

This data set contains two image mosaics of L-band radar backscatter and two image mosaics of first order texture. The two backscatter images are mosaics of L-band Radar Backscatter at Horizontal-Horizontal (HH) Polarization created from 1,500 images collected from the Japanese Earth Resources Satellite-1 (JERS-1) Synthetic Aperture Radar (SAR) over the Amazon River Basin as part of the Global Rainforest Mapping Project (GRMP). These backscatter image mosaics were developed using data collected over 62 days from August to November of 1995 for the peak of the dry season and for 62 days from May to June of 1996 during the peak of the wet season. The two image mosaics are at 3 arc-sec resolution. Data provided under this project are resampled images at 30 arc-sec resolution (or about 1 km resolution). For each radar backscatter image, first order texture statistical information was saved and is distributed along with the image mosaic.

Related data Set

- JERS-1 SAR Global Rain Forest Mapping Project: Vol. AM-1, South America (a 4-disc set containing Synthetic Aperture Radar (SAR) imagery from the rainforest region of South America, including the Amazon Basin, during 1995-1996)

2. Data Characteristics:

Data were collected in two campaigns: the dry season images were collected over 62 days from August to November of 1995 for the peak of dry season, and the wet season images were collected over 62 days from May to June of 1996 for the peak of wet season.

Data Values: Values range from 0 - 255 (8 bit).

Projection: Geographic with WGS84 datum

Data Files: This data set contains four images, each in both ENVI standard format and GeoTIFF format and are provided in eight zipped files.

- The four zip files with ENVI files contain “_envi” in their file name and when unzipped contain an ENVI image (*_envi.dat) and an ENVI image header file (*_envi.hdr).
- The four zip files with GeoTIFF files contain “_geotiff” in their file name and when unzipped contain a GeoTIFF image (*_geotiff.tif) and a GeoTIFF header file (*_geotiff.tfw) file.

Dry season: 1 km resolution backscatter:

- dry_back2_1km_envi.dat
- dry_back2_1km_envi.hdr
- dry_back2_1km_geotiff.tif
- dry_back2_1km_geotiff.tfw

Dry season texture:

- dry_txt2_1km._envi.dat
- dry_txt2_1km_envi.hdr
- dry_txt2_1km_geotiff.tif
- dry_txt2_1km.dat_geotiff.tfw

Wet season: 1 km resolution backscatter:

- wet_back2_1km_envi.dat
- wet_back2_1km_envi.hdr
- wet_back2_1km_geotiff.tif
- wet_back2_1km_geotiff.tfw

Wet season Texture:

- wet_txt2_1km_envi.dat
- wet_txt2_1km_envi.hdr
- wet_txt2_1km_geotiff.tif
- wet_txt2_1km_geotiff.tfw

Header File: Example, dry_back2_1km_envi.hdr

ENVI

description = {File Resize Result, x resize factor: 0.100000, y resize factor: 0.100000. [Fri Dec 27 14:55:29 2002]}

samples = 4318

lines = 4432

bands = 1

header offset = 0
 file type = ENVI Standard
 data type = 1
 interleave = bsq
 sensor type = Unknown
 byte order = 1
 map info = {Geographic Lat/Lon, 1.0000, 1.0000, -83.00083333, 13.50083330, 8.33300000e-03,
 8.33300000e-03, WGS-84,units=Degrees}
 band names = {Resize (Band 1:low_back2_1.dat)}

Site boundaries: (All latitude and longitude given in decimal degrees)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Amazon Basin	-82.72083	- 47.0231	-13.8583	-23.4268	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period 1995/08/01 to 1996/06/30.

Platform/Sensor/Parameters measured include:

- JERS-1 (JAPANESE EARTH RESOURCES SATELLITE-1) / SAR (SYNTHETIC APERTURE RADAR) / RADAR BACKSCATTER
- JERS-1 (JAPANESE EARTH RESOURCES SATELLITE-1) / SAR (SYNTHETIC APERTURE RADAR) / LAND USE CLASSES

3. Data Application and Derivation:

Understanding human or climate-induced changes in the tropical landscape requires knowledge of the current status of the ecosystem and the extent of the land cover types susceptible to change. Optical remote sensing has been used successfully for the classification of land cover types on local to regional scales. There are, however, limitations to current remote sensing techniques and methodologies used in both defining land cover types and identifying the parameters to be monitored. While optical remote sensing data is commonly used to classify land cover, microwave sensors such as radar remain unexploited for the most part. Radar data offers two distinct advantages to optical remote sensing: 1) it is insensitive to atmospheric conditions and sun angle allowing frequent acquisition and 2) radar backscatter signal carries information about forest structure and moisture conditions by penetrating the forest canopy. With this data users can explore the abilities and limitations of using radar data (specifically JERS-1 images) to classify land cover (Saatchi et al., 2000).

4. Quality Assessment:

Geometrical accuracy of the mosaic was checked against 41 control points from Brazilian and Peruvian 1:100,000 scale topographical maps. Ninety-five percent of the control points were found within one pixel (100 m) of their correct position. The mosaic image shows orbital stripes which are due to slight radiometric discrepancies between the calibration of the orbital data takes. These discrepancies are usually less than 0.5 dB in intensity and do not affect the texture measures and classification of the image at a resampled resolution of 1 km. The use of a large window (10 x 10 pixels) for transforming

100 m resolution images to 1 km may reduce the accuracy of subsequent land cover mapping by introducing mixed information and errors in the definition of edges of land parcels.

5. Data Acquisition Materials and Methods:

JERS-1 SAR is an L band spaceborne SAR system operating at 1.275 GHz with horizontal polarization for both transmission and reception. The spatial resolution of the system is 18 m in both azimuth and range and the swath width is 75 km. The single-look images have 4.2 m pixel spacing in both azimuth and range and the standard three-look image has 12.5 m pixel spacing in both azimuth and range. In late 1995 the JERS-1 satellite entered into its GRFM phase and over a period of 62 days from August to November of 1995 (dry season) and for 62 days from May to June of 1996 (wet season) obtained wall to wall coverage of the Amazon basin. One hundred m resolution JERS-1 data (8 x 8 averaging of high-resolution 12.5 m three-look data) was used to generate a map of the entire basin from 1,500 images. The spatial mosaicing technique was based on a mathematical wallpapering approach that minimizes propagation of errors (Siqueira et al., 1999).

Radar backscatter signals contain two components: speckle, due to randomly distributed scatterers in a pixel, and texture which is a result of spatial variability of the scene. The backscatter data was filtered to reduce the speckle and enhance the texture (Ulaby et al., 1986). Texture measures were developed from the 100 m JERS-1 mosaic over a 10 x 10 pixel window resulting in 1 km resolution texture images with independent pixel information as the windows were shifted in a blockwise fashion in 10 pixel increments. The amplitude mosaic image was used to quantify eight texture measures from the first-order histogram of a 10 x 10 pixel window: mean, variance entropy, energy, contrast, skewness, kurtosis, and coefficient of variation.

6. Data Access:

This data is 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

7. References:

Saatchi, S.S., B. Nelson, E. Podest, and J. Holt. 2000. Mapping land cover types in the Amazon Basin using 1 km JERS-1 mosaic. *International Journal of Remote Sensing* 21(6-7):1201-1234.

Siqueira, P., S. Hensley, S. Shaffer et al. 2000. A continental scale mosaic of the Amazon basin using JERS-1 SAR *IEEE Transactions on Geoscience and Remote Sensing* 38: 2638-2644.

Ulaby, F.T., F. Kouyate, B. Brisco, and T.H.L. Williams. 1986. Textural information in SAR images. *IEEE Transactions on Geoscience and Remote Sensing*, vol. GRS-24, no. 2: 235-245.