AfriSAR LVIS L1A Geotagged Images, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

Blair, J. B. and M. Hofton. 2020. *AfriSAR LVIS L1A Geotagged Images, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NSIDC: National Snow and Ice Data Center. https://doi.org/10.5067/6K0IRWVOUBX7. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/AFOLVIS1A

National Snow and Ice Data Center

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1 DATA DESCRIPTION

NASA’s LVIS Facility collects airborne lidar and digital camera imagery from medium and high-altitude research aircraft. The digital camera images in this Level-1A product were collected by an airborne camera mounted alongside NASA’s Land, Vegetation, and Ice Sensor (LVIS-C) lidar instrument, as part of the AfriSAR mission, an airborne campaign which was conducted in collaboration with the European Space Agency (ESA) and the Gabonese Space Agency. As a precursor to spaceborne missions, the AfriSAR mission collected lidar, radar, and field measurements of tropical forests in Gabon, West Africa, in early 2016 to examine the role of forests in the Earth's carbon cycle. Related data sets include *AfriSAR LVIS L1B Geolocated Return Energy Waveforms*, which contains the geolocated laser waveform data for each laser footprint collected by the LVIS instrumentation, and *AfriSAR LVIS L2 Geolocated Surface Elevation Product*, which contains canopy top elevations, ground elevations, and relative heights derived from the Level-1B data.

1.1 Parameters

The data files include images of various terrains, such as tropical forests, lakes, and rivers.

1.2 File Information

1.2.1 Format

The data files are provided in JPEG (.JPG) format. Each data file is paired with an associated XML file (.xml), which contains additional metadata.

1.2.2 File Contents

Figure 1 shows an example image from the file AFOLVIS1A_Gabon2016_0308_R2007_049788.JPG.

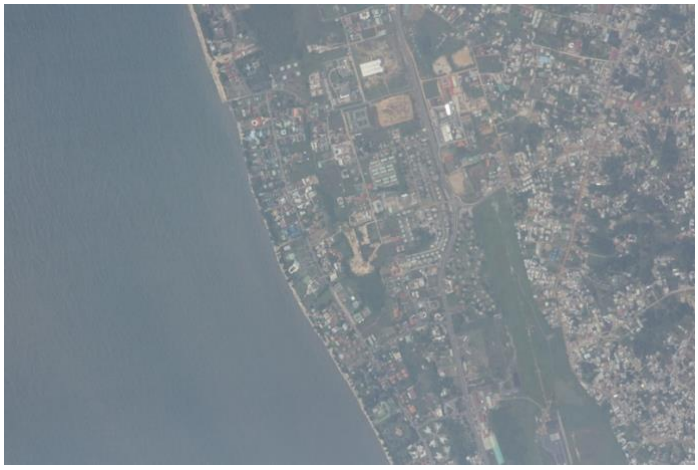

Figure 1. Sample image of the Gabon coastline.

1.2.3 Naming Convention

Example file names:

AFOLVIS1A_Gabon2016_0308_R2007_049900.JPG
AFOLVIS1A_Gabon2016_0308_R2007_049900.JPG.xml

The files are named according to the following convention, which is described in more detail in Table 1.

AFOLVIS1A_GabonYYYY_MMDD_RYYMM_nnnnnn.ext

Table 1. File Naming Convention

Variable	Description
AFOLVIS1A	Data set ID
GabonYYYY	Campaign identifier: Gabon = survey area of the AfriSAR campaigns; YYYY= four-digit year of campaign
MMDD	Two-digit month, two-digit day of start of data collection
RYYMM	Date (two-digit year, two-digit month) of data release
nnnnnn	Number of seconds since GPS midnight of the day on which data collection started
ext	File type: • .JPG (JPG data file) • .JPG.xml (XML metadata file)

1.3 Spatial Information

1.3.1 Coverage

The data set covers rainforests in Gabon, Africa, as noted by the spatial extents below:

Northernmost latitude: 1° N
Southernmost latitude: 2° S
Westernmost longitude: 8° E
Easternmost longitude: 12° E

1.3.2 Resolution

Spatial resolution varies with aircraft altitude. The nominal spatial resolution is 3.6 km by 2.4 km (0.40 m/px) at a nominal flight altitude of 24,000 ft.

1.3.3 Geolocation

International Terrestrial Reference Frame 2005 (ITRF05), WGS-84 ellipsoid

1.4 Temporal Information

1.4.1 Coverage

20 February 2016 to 08 March 2016

1.4.2 Resolution

Table 2 lists all the flight dates and general locations of the data flights for the 2016 AfriSAR campaign. For more detailed information, visit the AfriSAR mission page at ORNL DAAC.

Table 2. Flight Dates and Primary Target Locations

Date	Primary Target Location
20 Feb 2016	Mabounie site
22 Feb 2016	TanDEM-X and GEDI lines
23 Feb 2016	Biomass transect 1
02 Mar 2016	Lope site
04 Mar 2016	Pongara site
07 Mar 2016	RABI site
08 Mar 2016	Fill in: Biomass, Mondah, Pongara sites

2 DATA ACQUISITION AND PROCESSING

2.1 Instrumentation

The images provided in this data set were taken with a downward-facing (nadir) Canon EOS 5DS R camera with a Carl Zeiss 85 mm f/0 lens, an image resolution of 8896 px by 5920 px, and a nominal frame overlap of 60%.

2.2 Acquisition and Processing

Imagery is stored via Ethernet on a supporting computer running the Canon EOS camera utility software to monitor and control image exposure. Frame capture is controlled using an external intervalometer. The intervalometer provides a Transistor-Transistor-Logic (TTL) pulse to the navigation system, which enables precise timing, positioning, and attitude for each image capture.

Images are generally acquired at 7-second intervals, depending on the ground speed of the aircraft. The image name contains the acquisition time in number of seconds since GPS midnight of the day on which data collection started. The Exif data of each image are edited to provide the precise time of the acquisition, as well as position and orientation of the camera at time of acquisition; this includes GPSTimeStamp, GPSLatitude, GPSLongitude, GPSAltitude, GPSRoll, GPSPitch, and GPSImgDirection.

2.3 Quality, Errors, and Limitations

For all LVIS Camera images, the last six numbers in the file name refer to the time at which the picture was taken, indicating the number of seconds past GPS midnight on the day the data collection started. This information can also be found in the Exif data for each file under the “GPS Date/Time” field. Due to a formatting error, a 1-second offset may exist in the image collection time contained in the Exif “GPS Date/Time” field. The affected flights are listed below. For images from these flights, the collection time contained in the file name should be used, or one second should be added to the time contained in the Exif “GPS Date/Time” field.

AfriSAR 2016-02-20
AfriSAR 2016-03-03
AfriSAR 2016-03-07
AfriSAR 2016-03-08

3 SOFTWARE AND TOOLS

The data files can be viewed using any software that recognizes the JPG format. Frame ID markers (requires Google Earth to view KMZ files) are available at the NASA LVIS-AfriSAR campaign website.

4 RELATED DATA SETS

AfriSAR LVIS L0 Raw Ranges
AfriSAR LVIS L1B Geolocated Return Energy Waveforms
AfriSAR LVIS L2 Geolocated Surface Elevation Product

5 RELATED WEBSITES

LVIS data product website at NSIDC
LVIS website at NASA Goddard Space Flight Center
AfriSAR mission page at ORNL DAAC
NASA LVIS-AfriSAR campaign website

6 CONTACTS

Bryan Blair
Geodesy and Geophysics Laboratory, Code 61A
NASA Goddard Space Flight Center
Greenbelt, MD 20771

Michelle Hofton
Department of Geographical Sciences
2181 LeFrak Hall
University of Maryland
College Park, MD 20742

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8 DOCUMENT INFORMATION

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8.2 Date Last Updated

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