ABoVE 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. *ABoVE LVIS L1A Geotagged Images, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/4O5WY1ORYWK2. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/ABOLVIS1A

National Snow and Ice Data Center

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1   DATA DESCRIPTION

The images in this Level-1A product were collected by the NASA Digital Mapping Camera, which was mounted alongside the Land, Vegetation, and Ice Sensor (LVIS), as part of the Arctic-Boreal Vulnerability Experiment (ABoVE). ABoVE is a NASA Terrestrial Ecology Program field campaign conducted in Alaska and Western Canada. The ABoVE data are used to study environmental change and its implications for social-ecological systems. Related data sets include *ABoVE LVIS L1B Geolocated Return Energy Waveforms*, which contains the geolocated laser waveform data for each laser footprint collected by the LVIS instrumentation, and *ABoVE LVIS Level-2 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 tundra, forests, permafrost, and lakes.

1.2 File Information

1.2.1   Format

The data files are provided in JPG (.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 ABOLVIS1A_ABoVE2017_0706_R1802_060896.JPG.
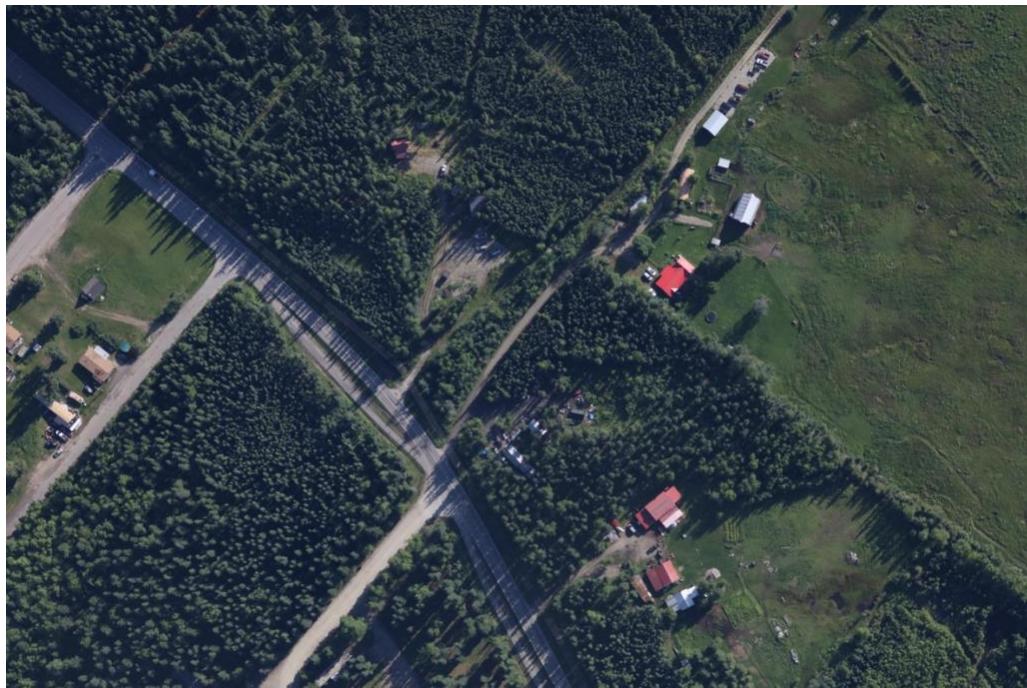
Figure 1. Sample image of forested and cultivated terrain.

1.2.3   Naming Convention

Example file names:

ABOLVIS1A_ABoVE2017_0629_R1802_052752.JPG
ABOLVIS1A_ABoVE2017_0629_R1802_052752.JPG.xml

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

ABOLVIS1A_ABoVEYYYY_MMDD_RYYMM_nnnnnn.ext

Table 1. File Naming Convention

Variable	Description
ABOLVIS1A	Data set ID
ABoVEYYYY	Campaign identifier: ABoVE = acronym for Arctic-Boreal Vulnerability Experiment; 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 UTC midnight of the day on which data collection started
ext	File type: .JPG (JPG data file) or .JPG.xml (XML metadata file)

1.3 Spatial Information

1.3.1 Coverage

Coverage for the ABoVE LVIS campaigns includes areas in Alaska and Western Canada, as noted by the spatial extents below:

Southernmost latitude: 48° N
Northernmost latitude: 72° N
Westernmost longitude: 158° W
Easternmost longitude: 104° W

1.3.2 Resolution

Spatial resolution varies with aircraft altitude. The nominal spatial resolution is 3.1 km by 2.0 km (0.35 m per pixel) at a nominal flight altitude of 27,000 ft.

1.3.3 Geolocation

International Terrestrial Reference Frame 2008 (ITRF08), WGS-84 ellipsoid

Table 2. Geolocation Details

Geographic coordinate system	WGS 84	WGS 84
Prime Meridian	0°	0°
Datum	World Geodetic System 1984 ensemble	ITRF 2008
Ellipsoid/spheroid	WGS 84	GRS 1980
Units	degrees	meters
EPSG codes	4326	5332
PROJ4 string	+proj=longlat +datum=WGS84 +no_defs	+proj=geocent +ellps=GRS80 +units=m +no_defs +type=crs
Reference	https://epsg.io/4326	https://epsg.io/5332

1.4 Temporal Information

1.4.1 Coverage

29 June 2017 to 17 July 2017

1.4.2   Resolution

The ABoVE Alaska and Canada campaigns were conducted on 12 days between 29 June and 17 July 2017. Table 2 lists all the flight dates and general locations of the data flights for those days. For more detailed information, visit the NASA LVIS-ABoVE campaign website.

Table 3. Flight Dates and Locations

Date	Location
29 Jun 2017	Saskatoon to Yellowknife
29 Jun 2017	Slave Lake
30 Jun 2017	Yellowknife to Inuvik
30 Jun 2017	Inuvik to Yellowknife
01 Jul 2017	Daring Lake
02 Jul 2017	W and SW Slave Lake
03 Jul 2017	Yellowknife to Whitehorse
03 Jul 2017	Whitehorse to Fairbanks
06 Jul 2017	Kluane
07 Jul 2017	Healy
09 Jul 2017	Fairbanks to Barrow
14 Jul 2017	Fairbanks to Deadhorse via Toolik Lake
14 Jul 2017	Deadhorse to Fairbanks via Fort Yukon
15 Jul 2017	Fort Yukon
16 Jul 2017	Fairbanks to Ketchikan
16 Jul 2017	Ketchikan to Glasgow
17 Jul 2017	Boreal Ecosystem Research and Monitoring Sites (BERMS) Flight

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 an image resolution of 50.3 Megapixels (8688 px x 5792 px). The lens model is a Carl Zeiss Makro-Planar T* 100mm f/2 ZE. Frame overlap is approximately 75%.

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 acquired at 5-second intervals. The image name contains the acquisition time in number of seconds since UTC midnight of the day on which data collection started. Each image is tagged with data regarding the precise time of the acquisition, as well as position and orientation of the camera at time of acquisition; this includes latitude, longitude, altitude, roll, pitch, and yaw.

2.3 Quality, Errors, and Limitations

Currently, there are no known errors or limitations in this data set.

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-ABoVE campaign website.

4 RELATED DATA SETS

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

5 RELATED WEBSITES

LVIS data product website at NSIDC
LVIS website at NASA Goddard Space Flight Center
ABoVE website at NASA

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

7   ACKNOWLEDGMENTS

8   REFERENCES

Miller, C. E., Griffith, P. C., Goetz, S. J., Hoy, E. E., Pinto, N., McCubbin, I. B., … Margolis, H. A. (2019). An overview of ABoVE airborne campaign data acquisitions and science opportunities. Environmental Research Letters, 14(8), 80201. https://doi.org/10.1088/1748-9326/ab0d44

9   DOCUMENT INFORMATION

9.1 Publication Date

December 2019

9.2 Date Last Updated

September 2025