



IceBridge UAF GPS/IMU L1B Corrected Position and Attitude Data, Version 1

USER GUIDE

How to Cite These Data

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

Larsen, C. 2011. *IceBridge UAF GPS/IMU L1B Corrected Position and Attitude Data, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/LXDUDGNFZXHV>. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/IPUAF1B>



National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

1.1 Format

The data files are in ASCII format.

1.2 File and Directory Structure

Data files are organized on the following HTTPS site:

https://daacdata.apps.nsidc.org/pub/DATASETS/ICEBRIDGE/IPUAF1B_UAFPOScorrected_v01/

1.3 File Naming Convention

Example file name:

IPUAF1B_ascii_DHC-3_20110530_022658_1.pos

The data files are named according to the following convention and as described in Table 1:

IPUAF1B_ascii_DHC-3_YYYYMMDD_XXXXX_x.pos

Table 1. File Naming Convention

Variable	Description
IPUAF1B	Short name for IceBridge UAF GPS/IMU L1B Corrected Position and Attitude Data
ascii	Indicates ASCII data file
DHC-3	DeHavilland Otter aircraft
YYYY	Four-digit year of data collection
MM	Two-digit month of data collection
DD	Two-digit day of data collection
XXXXX_x	Hour, minute and second of start time of collection
.pos	Indicates positional data

1.4 File Size

Data files range from approximately 45 MB to 251 MB.

The total data set volume is approximately 3.6 GB.

1.5 Spatial Coverage

Spatial coverage includes Alaska, as noted by the spatial extents below:

Southernmost Latitude: 55° N

Northernmost Latitude: 72° N

Westernmost Longitude: 156° W

Easternmost Longitude: 130° W

1.5.1 Spatial Resolution

Varies, measured in decimal degrees longitude and latitude, eight decimal places.

1.5.2 Projection and Grid Description

Geographic, WGS-84

1.6 Temporal Coverage

19 August 2009 to 12 September 2011

1.6.1 Temporal Resolution

IceBridge campaigns are conducted on an annually repeating basis; Alaska campaigns are typically conducted from May through September.

1.7 Parameter or Variable

1.7.1 Parameter Description

Parameters contained in UAF GPS/IMU L1B Corrected Position and Attitude data files are described in Table 2. Columns 1 to 7 in Table 2 represent columns left-to-right in the data. Columns are not numbered in the data files.

Table 2. Parameter Description and Units

Column	Description	Units
1	Time	UTC
2	Latitude	Degrees
3	Longitude	Degrees
4	Height	Meters
5	Roll	Degrees
6	Pitch	Degrees
7	Heading	Degrees

1.7.2 Sample Data Record

Figure 1 shows an excerpt of the data file IPUAF1B_ascii_DHC-3_20110530_022658_1.pos. The seven fields in each record correspond to the columns described in Table 2.

```
8974.000 59.33183370 -138.26647817 59.820 0.317 8.794 359.951
8974.010 59.33183370 -138.26647817 59.820 0.318 8.793 359.953
8974.020 59.33183369 -138.26647817 59.821 0.318 8.796 359.951
8974.030 59.33183369 -138.26647817 59.821 0.319 8.792 359.952
8974.040 59.33183369 -138.26647818 59.821 0.319 8.794 359.952
```

Figure 1. Sample records from the data file IPUAF1B_ascii_DHC-3_20110530_022658_1.pos.

2 SOFTWARE AND TOOLS

The data files may be opened by any ASCII text reader.

3 DATA ACQUISITION AND PROCESSING

The data represent position and attitude of the inertial platform. They were recorded at 100 Hz by an Oxford Technical Solutions (OxTS) Inertial+2 IMU coupled to a Trimble R7 geodetic GPS receiver.

3.1 Data Acquisition Methods

The IMU data are recorded on the IMU at 100 Hz. The GPS data are recorded on the GPS at 5 Hz. The two data sets are merged during the post-processing phase to provide the .pos files with 100 Hz resolution.

3.2 Derivation Techniques and Algorithms

3.2.1 Processing Steps

The following processing steps are performed by the data provider:

- All GPS processing of the aircraft position uses L-1 frequency (1575.42 MHz) and L-2 frequency (1227.6 MHz) data recorded at 5 Hz. The data are processed with the TRACK GPS differential phase kinematic positioning program, a module of the GAMIT/GLOBK software programs from the Department of Earth Atmospheric and Planetary Sciences at MIT.
- GPS base station coordinates are found using the Online Positioning User Service (OPUS). The kinematic processing and the laser shot point coordinates are referenced to these base station coordinates.
- The IMU raw data are post-processed and blended with the GPS post-processed solution using the OxTS program "RTpostprocess". This program outputs files in the .pos format.

3.2.2 Error Sources

Typical errors sources include the normal GPS post-processing kinematic solution concerns, including the loss of lock from aircraft maneuvers and ionosphere noise.

3.3 Sensor or Instrument Description

The main components of the GPS/IMU are an Oxford Technical Solutions Inertial+2 inertial measurement unit and a Trimble R7 geodetic GPS receiver.

4 REFERENCES AND RELATED PUBLICATIONS

Johnson, A. J., C. F. Larsen, N. Murphy, A. A. Arendt, and S. L. Zirnheld. 2013. Mass balance in the Glacier Bay area of Alaska, USA, and British Columbia, Canada, 1995–2011, using airborne laser altimetry, *Journal of Glaciology*, 59(216): 632-648. doi: [10.3189/2013JoG12J101](https://doi.org/10.3189/2013JoG12J101).

4.1 Related Data Collections

- [IceBridge UAF Lidar Profiler L1B Geolocated Surface Elevation Triplets](#)
- [IceBridge UAF Lidar Scanner L1B Geolocated Surface Elevation Triplets](#)

4.2 Related Websites

- [GAMIT-GLOBK, MIT Department of Earth Atmospheric and Planetary Sciences](#)
- [IceBridge data website at NSIDC](#)
- [IceBridge website at NASA](#)

- [ICESat/GLAS website at NASA Wallops Flight Facility](#)
- [ICESat/GLAS website at NSIDC](#)
- [NOAA OPUS: Online Positioning User Service](#)
- [TRACK usage example](#)

5 CONTACTS AND ACKNOWLEDGMENTS

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6 DOCUMENT INFORMATION

6.1 Publication Date

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6.2 Date Last Updated

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