1.0 DATA DICTIONARY

The following subsections list the data content of ATL11. Each subsection corresponds to a HDF5 group on the data product. The ATLAS Standard Data Products are designed to be self-documenting and contain additional descriptive information not presented here. The descriptive information within the data dictionary is limited to preserve readability.

description	This data set (ATL06) provides geolocated, land-ice surface heights (above the WGS 84 ellipsoid, ITRF2014 reference frame), plus ancillary parameters that can be used to interpret and assess the quality of the height estimates. The data were acquired by th
level	L3B
short_name	ATL11

1.1 Group: /

This data set (ATL06) provides geolocated, land-ice surface heights (above the WGS 84 ellipsoid, ITRF2014 reference frame), plus ancillary parameters that can be used to interpret and assess the quality of the height estimates. The data were acquired by th

1.1.1 Attributes

Conventions	CF-1.6
citation	Cite these data in publications as follows: The data used in this study were produced by the ICESat-2 Science Project Office at NASA/GSFC. The data archive site is the NASA National Snow and Ice Data Center Distributed Active Archive Center.
contributor_name	Thomas A Neumann (thomas.neumann@nasa.gov), Thorsten Markus (thorsten.markus@nasa.gov), Suneel Bhardwaj (suneel.bhardwaj@nasa.gov) David W Hancock III (david.w.hancock@nasa.gov)
contributor_role	Instrument Engineer, Investigator, Principle Investigator, Data Producer, Data Producer
creator_name	GSFC I-SIPS > ICESat-2 Science Investigator-led Processing System
date_created	2023-06-21T16:31:41.050342Z
date_type	UTC

featureType	trajectory
geospatial_lat_max	80.00161340364136
geospatial_lat_min	59.497368968725446
geospatial_lat_units	degrees_north
geospatial_lon_max	16.67877886776074
geospatial_lon_min	7.113634089951574
geospatial_lon_units	degrees_east
granule_type	ATL11
hdfversion	HDF5 1.10.7
history	2023-06-21T16:31:41.054005Z
identifier_file_uuid	61967858-2507-3000-b94a-3c6e290f1252
identifier_product_doi	doi:10.5067/ATLAS/ATL11.006
identifier_product_doi_authority	http://dx.doi.org
identifier_product_format_version	1.0
identifier_product_type	ATL11
institution	National Aeronautics and Space Administration (NASA)
instrument	ATLAS > Advanced Topographic Laser Altimeter System
keywords	EARTH SCIENCE > CRYOSPHERE > GLACIERS/ICE SHEETS > GLACIER ELEVATION/ICE SHEET ELEVATION > NONE > NONE > NONE
keywords_vocabulary	NASA/GCMD Science Keywords
license	Data may not be reproduced or distributed without including the citation for this product included in this metadata. Data may not be distributed in an altered form without the written permission of the ICESat-2 Science Project Office at NASA/GSFC.
naming_authority	http://dx.doi.org
platform	ICESat-2 > Ice, Cloud, and land Elevation Satellite-2
processing_level	3B
project	ICESat-2 > Ice, Cloud, and land Elevation Satellite-2

publisher_email	nsidc@nsidc.org
publisher_name	NSIDC DAAC > NASA National Snow and Ice Data Center Distributed Active Archive Center
publisher_url	http://nsidc.org/daac/
references	http://nsidc.org/data/icesat2/data.html
source	Spacecraft
spatial_coverage_type	Horizontal
standard_name_vocabulary	CF-1.6
summary	The purpose of ATL11 is to provide an IceSat-2 satellite cycle summary of heights and height changes of land-based ice and will be provided as input to ATL15 and ATL16, gridded estimates of heights and height-changes.
time_coverage_duration	121608472.04844809
time_coverage_end	2023-02-04T00:11:29.000000Z
time_coverage_start	2019-03-29T12:03:37.000000Z
time_type	CCSDS UTC-A

1.2 Group: /METADATA

ISO19115 Structured Metadata Represented within HDF5

1.2.1 Attributes

iso_19139_dataset_xml	SET_BY_META
iso_19139_series_xml	SET_BY_META

1.3 Group: /METADATA/AcquisitionInformation

1.4 Group: /METADATA/AcquisitionInformation/lidar

1.4.1 Attributes

description	ATLAS on ICESat-2 determines the range between the satellite and the Earth's surface by measuring the two-way

	time delay of short pulses of laser light that it transmits in six beams. It is different from previous operational ice-sheet altimeters in that it is a photon-counting LIDAR. ATLAS records a set of arrival times for individual photons, which are then analyzed to derive surface, vegetation, and cloud properties. ATLAS has six beams arranged in three pairs, so that it samples each of three reference pair tracks with a pair of beams; ATLAS transmits pulses at 10 kHz, giving approximately one pulse every 0.7 m along track; ATLAS's expected pointing control will be better than 90 m RMS.
identifier	ATLAS
pulse_rate	10000 pps
type	Laser Altimeter
wavelength	532 nm

1.5 Group: /METADATA/AcquisitionInformation/lidarDocument

1.5.1 Attributes

edition	Pre-Release
publicationDate	12/31/17
title	A document describing the ATLAS instrument will be provided by the ICESat-2 Project Science Office.

1.6 Group: /METADATA/AcquisitionInformation/platform

1.6.1 Attributes

description	Ice, Cloud, and land Elevation Satellite-2
identifier	ICESat-2
type	Spacecraft

1.7 Group: /METADATA/AcquisitionInformation/platformDocument

1.7.1 Attributes

edition	31-Dec-16
publicationDate	31-Dec-16
title	The Ice, Cloud, and land Elevation Satellite-2 (ICESat-2): Science requirements, concept, and implementation. Thorsten Markus, Tom Neumann, Anthony Martino, Waleed Abdalati, Kelly Brunt, Beata Csatho, Sinead Farrell, Helen Fricker, Alex Gardner, David Harding, Michael Jasinski, Ron Kwok, Lori Magruder, Dan Lubin, Scott Luthcke, James Morison, Ross Nelson, Amy Neuenschwander, Stephen Palm, Sorin Popescu, CK Shum, Bob E. Schutz, Benjamin Smith, Yuekui Yang, Jay Zwally. http://dx.doi.org/10.1016/j.rse.2016.12.029

1.8 Group: /METADATA/DataQuality

1.8.1 Attributes

scope	NOT_SET

1.9 Group: /METADATA/DataQuality/CompletenessOmission

1.9.1 Attributes

evaluationMethodType	directInternal
measureDescription	TBD
nameOfMeasure	TBD
unitofMeasure	TBD
value	NOT_SET

1.10 Group: /METADATA/DataQuality/DomainConsistency

1.10.1 Attributes

evaluationMethodType	directInternal

measureDescription	TBD
nameOfMeasure	TBD
unitofMeasure	TBD
value	NOT_SET

1.11 Group: /METADATA/DatasetIdentification

1.11.1 Attributes

VersionID	1.0
abstract	This data set provides time series of land-ice surface heights derived from the ICESat-2 ATL06 Land Ice Height product. It is intended primarily as an input for higher level gridded products, but can also be used on its own as a spatially organized product that allows easy access to height-change information derived from ICESat-2 observations.
characterSet	utf8
creationDate	2023-06-21T16:31:41.054005Z
credit	The software that generates the ATL11 product was designed and implemented within the ICESat-2 Science Investigator-led Processing System at the NASA Goddard Space Flight Center in Greenbelt, Maryland.
fileName	ATL11_069405_0319_006_01.h5
language	eng
originatorOrganizationName	GSFC I-SIPS > ICESat-2 Science Investigator-led Processing System
purpose	The purpose of ATL11 is to provide an IceSat-2 satellite cycle summary of heights and height changes of land-based ice and will be provided as input to ATL15 and ATL16, gridded estimates of heights and height-changes.
shortName	ATL11
spatialRepresentationType	along-track
status	onGoing
topicCategory	geoscientificInformation

uuid	6fba3c53-bab0-497b-a221-6e196c9053b5

1.12 Group: /METADATA/Extent

1.12.1 Attributes

eastBoundLongitude	16.67877886776074
northBoundLatitude	80.00161340364136
rangeBeginningDateTime	2019-03-29T12:03:37.000000Z
rangeEndingDateTime	2023-02-04T00:11:29.048448Z
southBoundLatitude	59.497368968725446
westBoundLongitude	7.113634089951574

1.13 Group: /METADATA/Lineage

1.14 Group: /METADATA/Lineage/ANC36-11

1.14.1 Attributes

fileName	DsESDTAtATL11.001.series.xml
shortName	ANC36-11
uuid	5BFCCB48-D68E-4897-92C6-389DE6A1C32B
version	001

1.15 Group: /METADATA/Lineage/ANC38-11

1.15.1 Attributes

fileName	DsESDTAtATL11.001.dataset.xml
shortName	ANC38-11

uuid	95BF65A6-F1E7-445E-9E94-ADD030917038
version	001

1.16 Group: /METADATA/Lineage/ATL06

1.16.1 Attributes

description	ICESat-2 ATLAS Land Ice
end_cycle	SET_BY_PGE
end_geoseg	SET_BY_PGE
end_orbit	SET_BY_PGE
end_region	SET_BY_PGE
end_rgt	SET_BY_PGE
fileName	SET_BY_PGE
shortName	SET_BY_PGE
start_cycle	SET_BY_PGE
start_geoseg	SET_BY_PGE
start_orbit	SET_BY_PGE
start_region	SET_BY_PGE
start_rgt	SET_BY_PGE
uuid	SET_BY_PGE
version	SET_BY_PGE

1.17 Group: /METADATA/Lineage/Control

1.17.1 Attributes

control	/discover/nobackup/bjelley/python/ATL11/scripts/ATL06_to_ATL11.py 694 5 --cycles 3 19 -d /discover/nobackup/bjelley/ATL06_copy/Arctic/006/cycle_*/ -R 6 -V 1 -o /discover/nobackup/bjelley/ATL11_processing/Arctic_006_cycle_03_19/006 -H

	1 -G /discover/nobackup/bjelley/tile_processing/tiles/Arctic/006/cycle_*/GeoIndex.h5 --sec_offset 43417 --start_date 2019 03 29 --verbose
description	Exact command line execution of ICESat-2/ATL11 algorithm providing all of the conditions required for each individual run of the software.
shortName	CNTL
version	1

1.18 Group: /METADATA/ProcessStep

1.19 Group: /METADATA/ProcessStep/Browse

1.19.1 Attributes

identifier	SET_BY_PGE
processDescription	Browse processing is performed for each granule SIPS produces. The browse utility reads data from the granule and produces browse images as defined in the respective product ATBD. The utility then embeds each browse image into the product within the /Browse group.
runTimeParameters	SET_BY_PGE
softwareDate	SET_BY_PGE
softwareTitle	SET_BY_PGE
softwareVersion	SET_BY_PGE
stepDateTime	SET_BY_PGE

1.20 Group: /METADATA/ProcessStep/Metadata

1.20.1 Attributes

identifier	atlas_meta
processDescription	Metadata information is processed by the metadata utility for each granule produced by SIPS. During PGE processing, dynamic metadata are written to the product. Additional static information is provided with the metadata template. The

	metadata utility reads ISO Dataset and Series metadata files and updates the product with static information from within those files. The utility then merges the static and dynamic metadata to creates output ISO19139 Dataset and Series XML files. Finally the utility reads the ISO19139 Dataset and Series XML files into memory and stores the textual representations as attributes attached to the /METADATA group.
runTimeParameters	ATL11_069405_0319_006_01.h5.ctl
softwareDate	Jun 14 2023
softwareTitle	Creates ATLAS XML metadata files
softwareVersion	Version 5.1
stepDateTime	2023-06-21T20:33:46.000000Z

1.21 Group: /METADATA/ProcessStep/PGE

1.21.1 Attributes

ATBDDate	12/04/2019
ATBDTitle	Algorithm Theoretical Basis Document (ATBD) For Land-Ice Along-Track Products Part 2: Land-ice H(t)/ATL11
ATBDVersion	N/A
documentDate	Feb 2020
documentation	ATLAS Science Algorithm Software Design Description (SDD) - Volume 9 (atlas_l3a_is)
identifier	atlas_l3b_is
processDescription	Computes surface heights for each beam, along and across-track slopes calculated for beam pairs.
runTimeParameters	/discover/nobackup/bjelley/python/ATL11/scripts/ATL06_to_ATL11.py 694 5 --cycles 3 19 -d /discover/nobackup/bjelley/ATL06_copy/Arctic/006/cycle_*/ -R 6 -V 1 -o /discover/nobackup/bjelley/ATL11_processing/Arctic_006_cycle_03_19/006 -H 1 -G /discover/nobackup/bjelley/tile_processing/tiles/Arctic/006/cycle_*/GeoIndex.h5 --sec_offset 43417 --start_date 2019 03 29 --verbose
softwareDate	Nov 01 2020

softwareTitle	ASAS L3B Land Ice PGE
softwareVersion	1.0
stepDateTime	2023-06-21T16:31:41.054005Z

1.22 Group: /METADATA/ProcessStep/QA

1.22.1 Attributes

identifier	atl11_qa_util
processDescription	QA processing is performed by an external utility on each granule produced by SIPS. The utility reads the granule, performs both generic and product-specific quality-assessment calculations, and writes a text-based quality assessment report. The name and creation data of this report are identified within the QADatasetIdentification metadata
runTimeParameters	ATL11_069405_0319_006_01.h5.ctl
softwareDate	Jun 14 2023
softwareTitle	ATL11 QA Utility
softwareVersion	Version 2.1
stepDateTime	2023-06-21T20:39:29.000000Z

1.23 Group: /METADATA/ProductSpecificationDocument

1.23.1 Attributes

ShortName	ATL11_SDP
characterSet	utf8
edition	v4.3
language	eng
publicationDate	Feb 2020
title	ICESat-2-SIPS-SPEC-4260 - ATLAS Science Algorithm Standard Data Product (SDP) Volume 5 (ATL06).

1.24 Group: /METADATA/QADatasetIdentification

1.24.1 Attributes

abstract	An ASCII product that contains statistical information on data product results. These statistics enable data producers and users to assess the quality of the data in the data product granule
creationDate	2023-06-21T20:39:29.000000Z
fileName	ATL11_069405_0319_006_01.h5.qa

1.25 Group: /METADATA/SeriesIdentification

1.25.1 Attributes

VersionID	1.0
abstract	This data set provides time series of land-ice surface heights derived from the ICESat-2 ATL06 Land Ice Height product. It is intended primarily as an input for higher level gridded products, but can also be used on its own as a spatially organized product that allows easy access to height-change information derived from ICESat-2 observations.
characterSet	utf8
credit	The software that generates the ATL11 product was designed and implemented within the ICESat-2 Science Investigator-led Processing System at the NASA Goddard Space Flight Center in Greenbelt, Maryland.
format	HDF
formatVersion	5
identifier_product_DOI	doi:10.5067/ATLAS/ATL11.006
language	eng
longName	ATLAS/ICESat-2 L3B Slope-Corrected Land Ice Height Time Series
maintenanceAndUpdateFrequency	asNeeded
maintenanceDate	SET_BY_META

mission	ICESat-2 > Ice, Cloud, and land Elevation Satellite-2
pointOfContact	NSIDC DAAC > NASA National Snow and Ice Data Center Distributed Active Archive Center
purpose	The purpose of ATL11 is to provide an IceSat-2 satellite cycle summary of heights and height changes of land-based ice and will be provided as input to ATL15 and ATL16, gridded estimates of heights and height-changes.
resourceProviderOrganizationName	National Aeronautics and Space Administration (NASA)
revisionDate	2023-05-31
shortName	ATL11
status	onGoing
topicCategory	geoscientificInformation

1.26 Group: /ancillary_data

Contains information ancillary to the data product. This may include product characteristics, instrument characteristics and/or processing constants.

1.26.1 Attributes

data_rate	Data within this group pertain to the granule in its entirety.

1.26.2 Datasets

Name Standard Name	Type(Dims) FillValue	Units Source	Description
atlas_sdp_gps_epoch ATLAS Epoch Offset	DOUBLE(1) None	seconds since 1980-01-06T00:00:00.000000Z	Number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS Standard Data Product (SDP) epoch (2018-01-01:T00.00.00.000000 UTC). Add this value to delta time parameters to compute full gps_seconds (relative to the GPS epoch) for each data point. (Source: Operations)
control Control File	STRING(1) None	1	PGE-specific control file used to generate this granule. To re-use, replace breaks (BR) with linefeeds. (Source: Operations)
data_end_utc End UTC Time of Granule (CCSDS-A, Actual)	STRING(1) None	1	UTC (in CCSDS-A format) of the last data point within the granule. (Source: Derived)

Name Standard Name	Type(Dims) FillValue	Units Source	Description
data_start_utc Start UTC Time of Granule (CCSDS-A, Actual)	STRING(1) None	1	UTC (in CCSDS-A format) of the first data point within the granule. (Source: Derived)
end_cycle Ending Cycle	INTEGER(1) None	1	The ending cycle number associated with the data contained within this granule. The cycle number is the counter of the number of 91-day repeat cycles completed by the mission. (Source: Derived)
end_delta_time ATLAS End Time (Actual)	DOUBLE(1) None	seconds since 2018-01-01	Number of GPS seconds since the ATLAS SDP epoch at the last data point in the file. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. (Source: Derived)
end_geoseg Ending Geolocation Segment	INTEGER(1) None	1	The ending geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation. (Source: Derived)
end_gpssow Ending GPS SOW of Granule (Actual)	DOUBLE(1) None	seconds	GPS seconds-of-week of the last data point in the granule. (Source: Derived)
end_gpsweek Ending GPSWeek of Granule (Actual)	INTEGER(1) None	weeks from 1980-01-06	GPS week number of the last data point in the granule. (Source: Derived)
end_orbit Ending Orbit Number	INTEGER(1) None	1	The ending orbit number associated with the data contained within this granule. The orbit number increments each time the

Name Standard Name	Type(Dims) FillValue	Units Source	Description
			spacecraft completes a full orbit of the Earth. (Source: Derived)
end_region Ending Region	INTEGER(1) None	1	The ending product-specific region number associated with the data contained within this granule. ICESat-2 data products are separated by geographic regions. The data contained within a specific region are the same for ATL01 and ATL02. ATL03 regions differ slightly because of different geolocation segment locations caused by the irregular shape of the Earth. The region indices for other products are completely independent. (Source: Derived)
end_rgt Ending Reference Groundtrack	INTEGER(1) None	1	The ending reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. (Source: Derived)
granule_end_utc End UTC Time of Granule (CCSDS-A, Requested)	STRING(1) None	1	Requested end time (in UTC CCSDS-A) of this granule. (Source: Derived)
granule_start_utc Start UTC Time of Granule (CCSDS-A, Requested)	STRING(1) None	1	Requested start time (in UTC CCSDS-A) of this granule. (Source: Derived)
qa_at_interval QA Along-Track Interval	DOUBLE(1) None	seconds/cell	Statistics time interval for along-track QA data. (Source: control)
release Release Number	STRING(1) None	1	Release number of the granule. The release number is incremented when the software or ancillary data used to create the granule has been changed. (Source: Operations)
start_cycle Starting Cycle	INTEGER(1) None	1	The starting cycle number associated with the data contained within this granule. The cycle number is the counter of the number of 91-day repeat cycles completed by the mission. (Source: Derived)
start_delta_time ATLAS Start Time (Actual)	DOUBLE(1) None	seconds since 2018-01-01	Number of GPS seconds since the ATLAS SDP epoch at the first data point in the file. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-

Name Standard Name	Type(Dims) FillValue	Units Source	Description
			06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. (Source: Derived)
start_geoseg Starting Geolocation Segment	INTEGER(1) None	1	The starting geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation. (Source: Derived)
start_gpssow Start GPS SOW of Granule (Actual)	DOUBLE(1) None	seconds	GPS seconds-of-week of the first data point in the granule. (Source: Derived)
start_gpsweek Start GPSWeek of Granule (Actual)	INTEGER(1) None	weeks from 1980-01-06	GPS week number of the first data point in the granule. (Source: Derived)
start_orbit Starting Orbit Number	INTEGER(1) None	1	The starting orbit number associated with the data contained within this granule. The orbit number increments each time the spacecraft completes a full orbit of the Earth. (Source: Derived)
start_region Starting Region	INTEGER(1) None	1	The starting product-specific region number associated with the data contained within this granule. ICESat-2 data products are separated by geographic regions. The data contained within a specific region are the same for ATL01 and ATL02. ATL03 regions differ slightly because of different geolocation segment locations caused by the irregular shape of the Earth. The region indices for other products are completely independent. (Source: Derived)
start_rgt Starting Reference Groundtrack	INTEGER(1) None	1	The starting reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack

Name Standard Name	Type(Dims) FillValue	Units Source	Description
			increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. (Source: Derived)
version Version	STRING(1) None	1	Version number of this granule within the release. It is a sequential number corresponding to the number of times the granule has been reprocessed for the current release. (Source: Operations)

1.27 Group: /orbit_info

1.27.1 Datasets

Name Standard Name	Type(Dims) FillValue	Units Source	Description
bounding_polygon_dim1 Polygon vertex count	INTEGER(:) None	1	Polygon extent vertex count (Source: model)
bounding_polygon_lat1 Polygon vertex latitude	FLOAT(:) None	degrees North	Polygon extent vertex latitude (Source: model)
bounding_polygon_lon1 Polygon vertex longitude	FLOAT(:) None	degrees East	Polygon extent vertex longitude (Source: model)

1.28 Group: /ptX

1.28.1 Attributes

ATL06_xover_field_list	['delta_time', 'h_li', 'h_li_sigma', 'latitude', 'longitude', 'atl06_quality_summary', 'segment_id', 'x_atc', 'y_atc', 'dh_fit_dx', 'rgt', 'cycle_number', 'BP', 'LR', 'ref_azimuth', 'ref_coelv', 'seg_azimuth', 'spot', 'sigma_geo_xt', 'sigma_geo_at', 'sigma_geo_h', 'dac', 'tide_ocean']
L_search_AT	60
L_search_XT	65
N_coeffs	8
N_poly_coeffs	8

N_search	3.0
ReferenceGroundTrack	694.0
beam_pair	1
beam_spacing	90
equatorial_radius	6378137
first_cycle	3
last_cycle	19
max_fit_iterations	20
pair_yatc_ctr_tol	1000
polar_radius	6356752.3
poly_max_degree_AT	3
poly_max_degree_XT	2
seg_atc_spacing	100
seg_number_skip	3.0
seg_sigma_threshold_min	0.05
t_scale	31557600.0
xy_scale	100.0

1.28.2 Datasets

Name Standard Name	Type(Dims) FillValue	Units Source	Description
cycle_number "cycle number"	INTEGER_1(:) None	counts	"cycle number" (Source: "ATL06")
delta_time "Elapsed GPS seconds"	DOUBLE(:,:) INVALID_R8B	seconds since 2018-01-01	Mean number of GPS seconds since the ATLAS SDP epoch (Source: "ATL06")
h_corr "mean corrected height"	FLOAT(:,:) INVALID_R4B	meters	"the mean corrected height" (Source: "derived, ATL11 algorithm")
h_corr_sigma "mean corrected height error"	FLOAT(:,:) INVALID_R4B	meters	"the formal error in the corrected height" (Source: "derived, ATL11 algorithm")

Name Standard Name	Type(Dims) FillValue	Units Source	Description
h_corr_sigma_systematic "corrected height error"	FLOAT(:,:) INVALID_R4B	meters	"the magnitude of all errors that might be correlated at scales larger than a single fit center (e.g. pointing errors, GPS errors, etc)" (Source: "derived, ATL11 algorithm")
latitude "latitude"	DOUBLE(:) INVALID_R8B	degrees North	"center latitude based on selected segments" (Source: "ATL06 segments")
longitude "longitude"	DOUBLE(:) INVALID_R8B	degrees East	"center longitude based on selected segments" (Source: "ATL06 segments")
quality_summary "quality summary"	INTEGER_1(:,:) INVALID_I1B	1	"Summary flag: zero indicates high-quality cycles: where min_signal_selection_source <=1 and min_SNR_significance < 0.02, and ATL06_summary_zero_count >0." (Source: "derived, ATL11 algorithm")
ref_pt "reference point number"	INTEGER(:) None	counts	"The reference point is the segment_id corresponding to the center of the ATL06 data used for each ATL11 point. Segment_id is counted from the equator crossing of the RGT, with one segment every 20m." (Source: "ATL06")

1.29 Group: /ptX/crossing_track_data

1.29.1 Datasets

Name Standard Name	Type(Dims) FillValue	Units Source	Description
along_track_rss "root sum of squared differences in crossover heights"	FLOAT(:) INVALID_R4B	meters	"Root sum of the squared differences between the heights of the endpoints for the current segment and the centers of the previous and next segments" (Source: "derived, ATL11 algorithm")
atl06_quality_summary "crossover quality flag"	INTEGER_1(:) INVALID_I1B	1	"Quality flag for the crossing data derived from ATL06. 0 indicates no problems detected, 1 indicates potential problems" (Source: "ATL06")
cycle_number "crossover cycle number"	INTEGER_1(:) INVALID_I1B	counts	"Cycle number for the crossing data" (Source: "ATL06")
dac "dynamic atmosphere correction"	FLOAT(:) INVALID_R4B	meters	"Crossing-track dynamic-atmosphere correction" (Source: "ATL06")
delta_time "Elapsed GPS seconds"	DOUBLE(:) INVALID_R8B	seconds since	"Mean number of GPS seconds since the ATLAS SDP epoch" (Source: "derived, ATL11 algorithm")

Name Standard Name	Type(Dims) FillValue	Units Source	Description
		2018-01-01	
dh_geoloc "geolocation height bias"	FLOAT(:) INVALID_R4B	meters	"Correction applied to Antarctic heights based on estimates of the geolocation bias." (Source: "derived, ATL11 algorithm")
h_corr "corrected height"	FLOAT(:) INVALID_R4B	meters	"WGS-84 height, corrected for the ATL11 surface shape" (Source: "derived, ATL11 algorithm")
h_corr_sigma "corrected height error"	FLOAT(:) INVALID_R4B	meters	"Error in the height estimate" (Source: "derived, ATL11 algorithm")
h_corr_sigma_systematic "corrected height error"	FLOAT(:) INVALID_R4B	meters	"Error in the height estimate" (Source: "derived, ATL11 algorithm")
latitude "crossover latitude"	DOUBLE(:) INVALID_R8B	Degrees North	"latitude of the crossover point" (Source: "derived, ATL11 algorithm")
longitude "crossover longitude"	DOUBLE(:) INVALID_R8B	Degrees East	"longitude of the crossover point" (Source: "derived, ATL11 algorithm")
ref_pt "fit center reference point number, segmnent_id"	INTEGER(:) None	counts	"The reference-point number of the fit center for the datum track" (Source: "derived, ATL11 algorithm")
rgt "crossover reference ground track"	INTEGER(:) INVALID_I4B	counts	"The RGT number for the crossing data" (Source: "ATL06")
spot_crossing "crossover spot number"	INTEGER_1(:) INVALID_I1B	counts	"The spot number for the crossing data" (Source: "ATL06")
tide_ocean "ocean tide"	FLOAT(:) INVALID_R4B	meters	"Ocean tide estimate" (Source: "ATL06")

1.30 Group: /ptX/cycle_stats

1.30.1 Datasets

Name Standard Name	Type(Dims) FillValue	Units Source	Description
atl06_summary_zero_count "ATL06 best quality count"	INTEGER_1(:,:) INVALID_I1B	counts	"Number of segments with ATL06_quality_summary==0 (0 indicates the best-quality data)" (Source: "ATL06")
bsnow_conf "maxmimum blowing snow confidence flag"	INTEGER_1(:,:) INVALID_I1B	1	"Maximum bsnow_conf flag from ATL06: indicates the greatest (among segments)

Name Standard Name	Type(Dims) FillValue	Units Source	Description
			confidence flag for presence of blowing snow for each cycle" (Source: "ATL06")
bsnow_h "weighted average blowing snow height"	FLOAT(:,:) INVALID_R4B	meters	"Weighted-average blowing snow layer height for each cycle" (Source: "ATL06")
cloud_flg_asr "Minimum apparent surface reflectance flag"	INTEGER_1(:,:) INVALID_I1B	1	"Minimum apparent-surface-reflectance -based cloud flag from ATL06: Flag indicates confidence that clouds with OT > 0.2 are present in the lower 3 km of the atmosphere based on ATL09" (Source: "ATL06")
cloud_flg_atm "minimum cloud flag"	INTEGER_1(:,:) INVALID_I1B	1	"Minimum cloud flag from ATL06: Flag indicates confidence that clouds with OT > 0.2 are present in the lower 3 km of the atmosphere based on ATL09" (Source: "ATL06")
dac "weighted average dynamic atmosphere correction"	FLOAT(:,:) INVALID_R4B	meters	"Weighted-average dynamic atmosphere correction for each pass" (Source: "ATL06")
dh_geoloc geolocation height bias"	FLOAT(:,:) INVALID_R4B	meters	"Height correction to correct for Antarctic geolocation bias" (Source: "derived, ATL11 algorithm")
h_mean "weighted average uncorrected surface heights"	FLOAT(:,:) INVALID_R4B	meters	"Weighted-average of surface heights, not including the correction for the reference surface" (Source: "ATL06")
h_rms_misfit "weighted average RMS fit error"	FLOAT(:,:) INVALID_R4B	meters	"Weighted-average RMS misfit between PE heights and along-track land-ice segment fit" (Source: "derived, ATL11 algorithm")
min_signal_selection_source "minimum signal selection source"	INTEGER_1(:,:) INVALID_I1B	1	"Minimum of the ATL06 signal_selection_source value (indicates the highest-quality segment in the cycle)" (Source: "ATL06")
min_snr_significance "minumum signal-noise ration significance"	FLOAT(:,:) INVALID_R4B	1	"Minimum of SNR_significance (indicates the quality of the best segment in the cycle)" (Source: "ATL06")
r_eff "weighted average reflectance"	FLOAT(:,:) INVALID_R4B	1	"Weighted-average effective, uncorrected reflectance for each pass." (Source: "derived, ATL11 algorithm")
seg_count "number valid segments"	INTEGER(:,:) INVALID_I4B	counts	"Number of segments marked as valid for each cycle. Equal to 0 for those cycles not included in the reference-surface shape fit." (Source: "ATL06")
sigma_geo_at "average horizontal x-coordinate geolocation error"	FLOAT(:,:) INVALID_R4B	meters	"Root-mean-weighted-square-average local-coordinate x horizontal geolocation error for each cycle due to PPD and POD" (Source: "ATL06")

Name Standard Name	Type(Dims) FillValue	Units Source	Description
sigma_geo_h "average vertical geolocation error"	FLOAT(:,:) INVALID_R4B	meters	"Root-mean-weighted-square-average total vertical geolocation error due to PPD and POD" (Source: "ATL06")
sigma_geo_xt "average horizontal y-coordinate geolocation error"	FLOAT(:,:) INVALID_R4B	meters	"Root-mean-weighted-square-average local-coordinate y horizontal geolocation error for each cycle due to PPD and POD" (Source: "ATL06")
tide_ocean "weighted average ocean tide"	FLOAT(:,:) INVALID_R4B	meters	"Weighted-average ocean tide for each pass" (Source: "ATL06")
x_atc "weighted average rgt x-coordinates"	DOUBLE(:,:) INVALID_R8B	meters	"weighted average of pair-center RGT x coordinates for each cycle " (Source: "ATL06")
y_atc "weighted average rgt y-coordinates"	DOUBLE(:,:) INVALID_R8B	meters	"weighted mean of pair-center RGT y coordinates for each cycle" (Source: "ATL06")

1.31 Group: /ptX/ref_surf

1.31.1 Attributes

poly_exponent_x	[1 0 2 1 0 3 2 1]
poly_exponent_y	[0 1 0 1 2 0 1 2]

1.31.2 Datasets

Name Standard Name	Type(Dims) FillValue	Units Source	Description
at_slope "along-track slope"	FLOAT(:) INVALID_R4B	1	"Mean along-track component of the slope of the reference surface within 50 m of the fit center" (Source: "derived, ATL11 algorithm")
complex_surface_flag "complex surface flag"	INTEGER_1(:) INVALID_I1B	1	"0 indicates that normal fitting was attempted, 1 indicates that the signal selection algorithm rejected too many repeats, and only a linear fit was attempted" (Source: "derived, ATL11 algorithm")
curvature "curvature"	FLOAT(:) INVALID_R4B	1	"the RMS of the slope of the fit polynomial within 50 m of the fit center" (Source: "derived, ATL11 algorithm")

Name Standard Name	Type(Dims) FillValue	Units Source	Description
deg_x "max-degree x polynomial"	INTEGER_1(:) INVALID_I1B	counts	"Maximum degree of non-zero polynomial components in x" (Source: "derived, ATL11 algorithm")
deg_y "max-degree y polynomial"	INTEGER_1(:) INVALID_I1B	counts	"Maximum degree of non-zero polynomial components in y" (Source: "derived, ATL11 algorithm")
dem_h "DEM elevation"	FLOAT(:) INVALID_R4B	meters	"DEM elevation, derived from ATL06 /gtxx/atl06_segments/dem/dem_h" (Source: "ATL06")
e_slope "east-component slope"	FLOAT(:) INVALID_R4B	1	"the mean East-component slope for the reference surface within 50 m of the fit center" (Source: "derived, ATL11 algorithm")
fit_quality "fit quality summary"	INTEGER_1(:) INVALID_I1B	1	"Indicates quality of the fit: 0: no problem identified, 1: One or more polynomial coefficients has an error of 10 or larger, 2: One or more surface slope components is greater than 0.02, 3: both 1 and 2" (Source: "derived, ATL11 algorithm")
geoid_free2mean "Geoid Free-to-Mean conversion"	FLOAT(:) INVALID_R4B	meters	"Additive value to convert geoid heights from the tide-free system to the mean-tide system, derived from ATL06 /gtxx/atl06_segments/dem/geoid_free2mean" (Source: "ATL06")
geoid_h "Geoid Height"	FLOAT(:) INVALID_R4B	meters	"Geoid height above WGS-84 reference ellipsoid in the tide-free system, derived from ATL06 /gtxx/atl06_segments/dem/geoid_h" (Source: "ATL06")
misfit_RMS "misfit RMS"	FLOAT(:) INVALID_R4B	meters	"RMS misfit for the surface-polynomial fit" (Source: "derived, ATL11 algorithm")
misfit_chi2r "misfit chi square"	FLOAT(:) INVALID_R4B	meters	"misfit chi square, divided by the number of degrees in the solution" (Source: "derived, ATL11 algorithm")
n_slope "north-component slope"	FLOAT(:) INVALID_R4B	1	"the mean North-component slope for the reference surface within 50 m of the fit center" (Source: "derived, ATL11 algorithm")
poly_coeffs "polynomial coefficients"	FLOAT(:,:) INVALID_R4B	1	"polynomial coefficients (up to degree 3), for polynomial components scaled by 100 m" (Source: "derived, ATL11 algorithm")
poly_coeffs_sigma "polynomial coefficients error"	FLOAT(:,:) INVALID_R4B	1	"formal errors for the polynomial coefficients" (Source: "derived, ATL11 algorithm")
poly_exponent_x "polynomial x exponents"	INTEGER_1(:) None	counts	"exponents for the x factors in the surface polynomial" (Source: "derived, ATL11 algorithm")

Name Standard Name	Type(Dims) FillValue	Units Source	Description
poly_exponent_y "polynomial y exponents"	INTEGER_1(:) None	counts	"exponents for the y factors in the surface polynomial" (Source: "derived, ATL11 algorithm")
rgt_azimuth "RGT azimuth"	FLOAT(:) INVALID_R4B	degrees	"Reference track azimuth, in degrees east of local north" (Source: "ATL06")
x_atc "Along track distance"	DOUBLE(:) INVALID_R8B	meters	"Along-track coordinate of the reference point, measured along the RGT from its first equator crossing." (Source: "ATL06")
xt_slope "across-track slope"	FLOAT(:) INVALID_R4B	1	"Mean cross-track component of the slope of the reference surface within 50 m of the fit center" (Source: "derived, ATL11 algorithm")
y_atc "Across track distance"	DOUBLE(:) INVALID_R8B	meters	"Across-track coordinate of the reference point, measured along the RGT from its first equator crossing." (Source: "ATL06")

1.32 Group: /quality_assessment

1.32.1 Datasets

Name Standard Name	Type(Dims) FillValue	Units Source	Description
qa_granule_fail_reason Granule Failure Reason	INTEGER(1) None	1	Flag indicating granule failure reason. 0=no failure; 1=processing error; 2=Insufficient output data was generated; 3=TBD Failure; 4=TBD_Failure; 5=other failure.; (Meanings: [0 1 2 3 4 5]) (Values: ['no_failure', 'PROCESS_ERROR', 'INSUFFICIENT_OUTPUT', 'failure_3', 'failure_4', 'OTHER_FAILURE']) (Source: Operations)
qa_granule_pass_fail Granule Pass Flag	INTEGER(1) None	1	Flag indicating granule quality. 0=granule passes automatic QA. 1=granule fails automatic QA.; (Meanings: [0 1]) (Values: ['PASS', 'FAIL']) (Source: Operations)