

ATL13 Product Data Dictionary

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Product Type: ATL13, Format Version : SET_BY_PGE

Group: /		
Conventions	(Attribute)	CF-1.6
citation	(Attribute)	SET_BY_META
contributor_name	(Attribute)	Thomas E 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	(Attribute)	Instrument Engineer, Investigator, Principle Investigator, Data Producer, Data Producer
creator_name	(Attribute)	SET_BY_META
date_created	(Attribute)	SET_BY_PGE
date_type	(Attribute)	UTC
description	(Attribute)	This data set (ATL13) contains along track surface heights of inland water bodies, including lakes, estuaries and rivers. Water surface slope and descriptive statistics are also provided. The data were acquired by the Advanced Topographic Laser Altimeter S
featureType	(Attribute)	trajectory
geospatial_lat_max	(Attribute)	0.0000000000000000
geospatial_lat_min	(Attribute)	0.0000000000000000
geospatial_lat_units	(Attribute)	degrees_north
geospatial_lon_max	(Attribute)	0.0000000000000000
geospatial_lon_min	(Attribute)	0.0000000000000000
geospatial_lon_units	(Attribute)	degrees_east
granule_type	(Attribute)	ATL13
hdfversion	(Attribute)	SET_BY_PGE
history	(Attribute)	SET_BY_PGE
identifier_file_uuid	(Attribute)	SET_BY_PGE
identifier_product_doi	(Attribute)	10.5067/ATLAS/ATL13.001
identifier_product_doi_authority	(Attribute)	http://dx.doi.org
identifier_product_format_version	(Attribute)	SET_BY_PGE
identifier_product_type	(Attribute)	ATL13
institution	(Attribute)	SET_BY_META
instrument	(Attribute)	SET_BY_META
keywords	(Attribute)	SET_BY_META
keywords_vocabulary	(Attribute)	SET_BY_META
level	(Attribute)	3A
license	(Attribute)	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	(Attribute)	http://dx.doi.org
platform	(Attribute)	SET_BY_META
processing_level	(Attribute)	L3A
project	(Attribute)	SET_BY_META
publisher_email	(Attribute)	SET_BY_META
publisher_name	(Attribute)	SET_BY_META
publisher_url	(Attribute)	SET_BY_META
references	(Attribute)	SET_BY_META
short_name	(Attribute)	ATL13
source	(Attribute)	SET_BY_META
spatial_coverage_type	(Attribute)	Horizontal
standard_name_vocabulary	(Attribute)	CF-1.6
summary	(Attribute)	SET_BY_META
time_coverage_duration	(Attribute)	SET_BY_PGE
time_coverage_end	(Attribute)	SET_BY_PGE
time_coverage_start	(Attribute)	SET_BY_PGE

time_type	(Attribute)	CCSDS UTC-A		
title	(Attribute)	SET_BY_META		
Group: /ancillary_data				
Description	(Attribute)	Contains information ancillary to the data product. This may include product characteristics, instrument characteristics and/or processing constants.		
data_rate	(Attribute)	Data within this group pertain to the granule in its entirety.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
atlas_sdp_gps_epoch (Compact Dataset)	DOUBLE (1)	ATLAS Epoch Offset (not_set)	seconds since 1980-01-06T00:00:00.000000Z Operations	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.
control (Contiguous Dataset)	STRING:100000 (1)	Control File (not_set)	1 Operations	PGE-specific control file used to generate this granule. To reuse, replace breaks (BR) with linefeeds.
data_end_utc (Compact Dataset)	STRING:27 (1)	End UTC Time of Granule (CCSDS-A, Actual) (not_set)	1 Derived	UTC (in CCSDS-A format) of the last data point within the granule.
data_start_utc (Compact Dataset)	STRING:27 (1)	Start UTC Time of Granule (CCSDS-A, Actual) (not_set)	1 Derived	UTC (in CCSDS-A format) of the first data point within the granule.
end_cycle (Compact Dataset)	INTEGER_4 (1)	Ending Cycle (not_set)	1 Derived	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.
end_delta_time (Compact Dataset)	DOUBLE (1)	ATLAS End Time (Actual) (time)	seconds since 2018-01-01 Derived	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.
end_geoseg (Compact Dataset)	INTEGER_4 (1)	Ending Geolocation Segment (not_set)	1 Derived	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.
end_gpssow (Compact Dataset)	DOUBLE (1)	Ending GPS SOW of Granule (Actual) (not_set)	seconds Derived	GPS seconds-of-week of the last data point in the granule.
end_gpsweek (Compact Dataset)	INTEGER_4 (1)	Ending GPSWeek of Granule (Actual) (not_set)	weeks from 1980-01-06 Derived	GPS week number of the last data point in the granule.
end_orbit (Compact Dataset)	INTEGER_4 (1)	Ending Orbit Number (not_set)	1 Derived	The ending 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.
end_region (Compact Dataset)	INTEGER_4 (1)	Ending Region (not_set)	1 Derived	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.
end_rgt (Compact Dataset)	INTEGER_4 (1)	Ending Reference Groundtrack (not_set)	1 Derived	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.
granule_end_utc (Compact Dataset)	STRING:27 (1)	End UTC Time of Granule (CCSDS-A, Requested) (not_set)	1 Derived	Requested end time (in UTC CCSDS-A) of this granule.
granule_start_utc (Compact Dataset)	STRING:27 (1)	Start UTC Time of Granule (CCSDS-A, Requested)	1 Derived	Requested start time (in UTC CCSDS-A) of this granule.

		(not_set)		
release (Compact Dataset)	STRING:80 (1)	Release Number (not_set)	1 Operations	Release number of the granule. The release number is incremented when the software or ancillary data used to create the granule has been changed.
start_cycle (Compact Dataset)	INTEGER_4 (1)	Starting Cycle (not_set)	1 Derived	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.
start_delta_time (Compact Dataset)	DOUBLE (1)	ATLAS Start Time (Actual) (time)	seconds since 2018-01-01 Derived	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 (1980-01-06T00:00:00.000000Z 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.
start_geoseg (Compact Dataset)	INTEGER_4 (1)	Starting Geolocation Segment (not_set)	1 Derived	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.
start_gpssow (Compact Dataset)	DOUBLE (1)	Start GPS SOW of Granule (Actual) (not_set)	seconds Derived	GPS seconds-of-week of the first data point in the granule.
start_gpsweek (Compact Dataset)	INTEGER_4 (1)	Start GPSWeek of Granule (Actual) (not_set)	weeks from 1980-01-06 Derived	GPS week number of the first data point in the granule.
start_orbit (Compact Dataset)	INTEGER_4 (1)	Starting Orbit Number (not_set)	1 Derived	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.
start_region (Compact Dataset)	INTEGER_4 (1)	Starting Region (not_set)	1 Derived	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.
start_rgt (Compact Dataset)	INTEGER_4 (1)	Starting Reference Groundtrack (not_set)	1 Derived	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 increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle.
version (Compact Dataset)	STRING:80 (1)	Version (not_set)	1 Operations	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.

Group: /ancillary_data/inland_water

Description	(Attribute)	Contains general ancillary parameters.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
anmly_test (Compact Dataset)	FLOAT (4)	Anomaly Test (not_set)	meters ATBD Table 5-2	Array containing threshold values against which to test segments for anomalous changes in height. The mode of each segment histogram will be tested against ht_water_coarse and excluded if the difference is greater than the value associated with the segment
atm_window1 (Compact Dataset)	FLOAT (1)	ATM Background Window Bottom (not_set)	meters ATBD Table 5-2	Lower limit of height above coarse water surface height for atmospheric background count calculation.
atm_window2 (Compact Dataset)	FLOAT (1)	ATM Background Window Top (not_set)	meters ATBD Table 5-2	Upper limit of height above coarse water surface height for atmospheric background count calculation.
b1_sseg1 (Compact Dataset)	FLOAT (1)	Small Segment Bin Size (not_set)	meters ATBD Table 5-2	Bin size to be used for histogramming of each small segment.
b2_sseg1 (Compact Dataset)	FLOAT (1)	Small Segment Height Bin Size (not_set)	meters ATBD Table 5-2	Bin size to be used for histogramming of small segment heights.
b_long (Compact Dataset)	FLOAT (1)	Long Bin Size (not_set)	meters ATBD Table 5-2	Bin size to be used by which to establish a histogram of long segments.

bckgrd_threshold (Compact Dataset)	FLOAT (2)	Background Threshold (not_set)	counts/sec ATBD Table 5-2	Thresholds outside of which computed background is flagged (High, Low).
bin_detrend (Compact Dataset)	FLOAT (1)	Detrend Bin Size (not_set)	meters ATBD Table 5-2	Bin size used to establish a band of heights over which to determine the detrending equation.
c_adj (Compact Dataset)	FLOAT (1)	C Adjustment (not_set)	1 ATBD Table 5-2	Adjustment for the speed of light through water (c)
c_fresnel (Compact Dataset)	FLOAT (1)	Fresnel Coeff (not_set)	1 ATBD Table 5-2	Fresnel specular reflection coefficient @ 532 nm
detrend_width (Compact Dataset)	FLOAT (1)	Detrend Width (not_set)	1 ATBD Table 5-2	Number of standard deviations +/- mode to include in detrend band.
f2_d_min (Compact Dataset)	FLOAT (1)	Minimum Distance Thres (not_set)	meters ATBD Table 5-2	Minimum distance threshold between photons required for inclusion in algorithm.
gauss_pk_thres (Compact Dataset)	FLOAT (1)	Gaussian Peak Threshold (not_set)	1 ATBD Table 5-2	Fraction of the peak amplitude above which Gaussian fit error analysis is executed (ie, calculate error on Gaussian only between the peak amplitude and gauss_pk_thres * peak)
h_mavg_a (Compact Dataset)	INTEGER_4 (1)	Num Depth Bins A (not_set)	meters ATBD Table 5-2	Number of depth bins over which to compute H_mavg_a
h_mavg_b (Compact Dataset)	INTEGER_4 (1)	Num Depth Bins B (not_set)	meters ATBD Table 5-2	Number of depth bins over which to compute H_mavg_b
h_mavg_c (Compact Dataset)	INTEGER_4 (1)	Num Depth Bins C (not_set)	meters ATBD Table 5-2	Number of bins over which to calculate moving average
l_sub (Compact Dataset)	INTEGER_4 (1)	Long Subsurface Segment Size (not_set)	1 ATBD Table 5-2	Long segment size, operationally used as unit length over which to characterize the subsurface, and deconvolve the instrument pulse and subsurface effects from the water surface response.
l_surf (Compact Dataset)	INTEGER_4 (1)	Long Surface Segment Size (not_set)	1 ATBD Table 5-2	Long segment size, operationally used as unit length over which to detrend the water surface, characterize the surface, and deconvolve the instrument pulse and subsurface effects from the water surface response.
lsbr_threshold (Compact Dataset)	FLOAT (1)	LSBR Threshold (not_set)	1 ATBD Table 5-2	Threshold at which the LSBR indicates a significant transition from signal photon richness to noise.
m_avg_d (Compact Dataset)	INTEGER_4 (1)	Num Depth Bins D (not_set)	meters ATBD Table 5-2	Number of depth bins over which to compute P_ht_long_subsurf_mavg
max_gseg_search (Compact Dataset)	INTEGER_4 (1)	Max Geoseg Search Radius (not_set)	1 ATBD Table 5-2	Maximum number of geosegments in either direction to search for reported water surface heights
ref_dist_iw_bdy (Compact Dataset)	FLOAT (1)	Reference Difference (not_set)	meters ATBD Table 5-2	Maximum distance from a water body that a geosegment reference photon indicates the need for overlap testing each individual photon in the geosegment
s_seg1 (Compact Dataset)	INTEGER_4 (1)	Short Segment Length (not_set)	1 ATBD Table 5-2	Short segment size, operationally used as unit length over which to identify water surface height anomalies such as islands, bridges, etc.
shore_buffer (Compact Dataset)	INTEGER_4 (1)	Shore Buffer (not_set)	1 ATBD Table 5-2	Number of near-shore short segments to ignore in analysis due to near-shore influences.
sig_threshold (Compact Dataset)	INTEGER_4 (1)	Signal Confidence Threshold (not_set)	1 ATBD Table 5-2	Minimum signal confidence required for photon to be included in analysis
signal_window_bottom (Compact Dataset)	FLOAT (1)	Signal Window Bottom (not_set)	meters ATBD Table 5-2	Lower limit below coarse water surface to include photons for analysis.
signal_window_top (Compact Dataset)	FLOAT (1)	Signal Window Top (not_set)	meters ATBD Table 5-2	Upper limit above coarse water surface to include photons for analysis.
size_to_process (Compact Dataset)	INTEGER_1 (9,9)	Size to Process (not_set)	1 ATL13 ATBD, Section 4.7.1.2, Table 5-4	Water body sizes that are to be processed by the ATL13 algorithm for each water body type. This parameter is a rank 2 array of size 9x9, where array subscripts 1 through 9, coincide with body type digits along columns, and body size digits along rows. Array elements are binary values, if 0 then process body size for that type, 1 otherwise. Water body sizes are described in ATL13 chapter 4.7.1.2 and in Table 5-4. flag_values: 0, 1 flag_meanings : process_size otherwise
sseg_length_test (Compact Dataset)	FLOAT (1)	Short Segment Length Test (not_set)	meters ATBD Table 5-2	Threshold by which to test the length of a short segment to determine if it is anomalous or not anomalous.
sseg_mode_cnt_test (Compact Dataset)	INTEGER_4 (1)	Short Segment Mode Count Test (not_set)	1 ATBD Table 5-2	Threshold to test number of values contained in short segment histogram multimodes against for inclusion or exclusion of short segment
sseg_mode_freq_test (Compact Dataset)	INTEGER_4 (1)	Short Segment Mode Frequency Test (not_set)	1 ATBD Table 5-2	Threshold to test number of short segment histogram modes against for inclusion or exclusion of short segment.
sseg_mode_spread_test (Compact Dataset)	FLOAT (1)	Short Segment Mode Spread Test (not_set)	meters ATBD Table 5-2	Threshold to test distance between short segment histogram multimodes against for inclusion or exclusion of short

				segment.
sub_max (Compact Dataset)	FLOAT (1)	Subsurf Max Vertical Profile (not_set)	meters ATBD Table 5-2	Maximum vertical profile of water subsurface to include in estimation of subsurface characteristics
type_to_process (Compact Dataset)	INTEGER_1 (9)	Type to Process (not_set)	1 ATL13 ATBD, Section 4.7.1.2, Table 5-4	Water body types that are to be processed by the ATL13 algorithm. This parameter is a rank 1 array of extent 9, with the body type digits coinciding with the array subscripts 1 through 9. Array elements are binary values, if 0 then process body type, 1 otherwise. Water body types are described in ATL13 chapter 4.7.1.2 and in Table 5-4. flag_values: 0, 1 flag_meanings : process_type otherwise
Group: /gtx				
Description	(Attribute)	Contains per-beam data products.		
data_rate	(Attribute)	Data within this group are stored at the inland water short segment rate (/ancillary_data/inland_water/s_seg2).		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
atl13refid (Chunked Dataset)	INTEGER_8 (:)	ATL13 Reference ID (not_set)	1 ATL13 ATBD, Section 5.3.1 (C)	Unique aggregate reference number for each shape in the ATL13 Inland Water Body Mask, where digit 1 = type, digit 2 = size, digit 3 = source, and digits 4-10 = shape id
cycle (Chunked Dataset)	INTEGER_1 (:)	Cycle Number (not_set)	counts ATL03	Tracks the number of 91-day cycles in the mission, beginning with 01.
delta_time (Chunked Dataset)	DOUBLE (:)	Delta Time (time)	seconds since 2018-01-01 ATL03	Number of GPS seconds since the ATLAS SDP epoch. 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.
err_ht_water_surf (Chunked Dataset)	FLOAT (:)	Height Error (not_set)	1 section 5.3.3 (C)	Error included in heights reported in ht_water_surf.
err_slope_trk (Chunked Dataset)	FLOAT (:)	Slope Error (not_set)	1 section 5.3.3 (C)	Error included in segment_slope_trk_local.
ht_ortho (Chunked Dataset)	FLOAT (:)	Orthometric Height (not_set)	meters section 5.3.5 (A)	Orthometric height EGM2008 converted from ellipsoidal height.
ht_water_surf (Chunked Dataset)	FLOAT (:)	Water Surface Height (not_set)	meters section 5.3.5 (A)	Water surface height with reference to WGS84 ellipsoid
ice_flag (Chunked Dataset)	INTEGER_1 (:)	Ice Flag (not_set)	1 section 5.3.2 (D)	Flag indicating significant existence of ice on the water surface flag_values: 0, 1 flag_meanings : no_ice ice
inland_water_body_id (Chunked Dataset)	INTEGER_4 (:)	Body ID (not_set)	1 ATL13 ATBD, Section 5.3.1 (C)	Identifying signature of an individual inland water body. Each body of water is represented by a unique numeric value.
inland_water_body_region (Chunked Dataset)	INTEGER_4 (:)	Body Region (not_set)	1 section 5.3.1 (A)	ATL13-created shapefile representing relevant bodies of water over which to implement the ATL13 water surface finding algorithm only within a region of processing interest.
inland_water_body_size (Chunked Dataset)	INTEGER_1 (:)	Body Size (not_set)	1 ATL13 ATBD, Section 5.3.1 (C)	Size of Inland Water Body, A=area, where 0=Not_Assigned, 1=A>10,000 km2, 2=10,000>A>=1,000, 3=1,000>A>=100, 4=100>A>=10, 5=10>A>=1, 6=1>A>=0.1, 7=0.01>A, 8=Reserved, 9=Reserved flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 flag_meanings : Not_Assigned A>10000 10000>A>=1000 1000>A>=100 100>A>=10 10>A>=1 1>A>=0.1 0.01>A Reserved Reserved
inland_water_body_source (Chunked Dataset)	INTEGER_1 (:)	Body Source (not_set)	1 ATL13 ATBD, Section 5.3.1 (C)	Source of Inland Water Body shape, where 1=HydroLAKES, 2=Global Lakes and Wetlands Database, 3=Named Marine Water Bodies, 4=GSHHG Shoreline, 5=Reserved, 6=Reserved, 7=Reserved, 8=Reserved, 9=Reserved flag_values: 1, 2, 3, 4, 5, 6, 7, 8, 9 flag_meanings : HydroLAKES Global_Lakes_and_Wetlands_Database Named_Marine_Water_Bodies GSHHG_Shoreline Reserved Reserved Reserved Reserved
inland_water_body_type (Chunked Dataset)	INTEGER_1 (:)	Body Type (not_set)	1 ATL13 ATBD, Section 5.3.1 (C)	Type of Inland Water Body, where 1=Lake, 2=Known Reservoir, 3=(Reserved for future use), 4=Ephemeral Water, 5=River, 6=Estuary or Bay, 7=Coastal Water, 8=Reserved, 9=Reserved flag_values: 1, 2, 3, 4, 5, 6, 7, 8, 9 flag_meanings : Lake Known_Reservoir Reserved_for_future_use Ephemeral_Water River Estuary_or_Bay Coastal_Water Reserved Reserved

qf_bckgrd (Chunked Dataset)	INTEGER_4 (:)	Background Quality Flag (not_set)	1 Inland Water ATBD	Describes the degree of background photons present in each short segment. bckgrd_dnsty_threshold1= 0.001 (counts per bin per Lseg); bckgrd_dnsty_threshold2= 0.01 (counts per bin per Lseg); bckgrd_dnsty_threshold3= 0.05 (counts per bin per Lseg); bckgrd_dnsty_threshold4= 0.1 (counts per bin per Lseg); bckgrd_dnsty_threshold5= 0.3 (counts per bin per Lseg); bckgrd_dnsty_threshold6= 0.5 (counts per bin per Lseg) flag_values: 0, 1, 2, 3, 4, 5, 6 flag_meanings : equal_to_or_below_threshold1 equal_to_or_below_threshold2 equal_to_or_below_threshold3 equal_to_or_below_threshold4 equal_to_or_below_threshold5 equal_to_or_below_threshold6 above_threshold6
qf_bias_em (Chunked Dataset)	INTEGER_4 (:)	EM Bias Quality Flag (not_set)	1 Inland Water ATBD	The Electromagnetic Bias flag is set based on threshold checks for the estimated electromagnetic height bias. The flag is set as follows: -3 if H_bias_EM < -0.10 (m); -2 if -0.10 < H_bias_EM < -0.05; -1 if -0.05 <= H_bias_EM < -0.01; 0 if -0.01 <= H_bias_EM < 0.01 (m); 1 if 0.01 <= H_bias_EM < 0.05; 2 if 0.05 <= H_bias_EM < 0.10; 3 if 0.10 < H_bias_EM; 4 if H_bias_EM is invalid. flag_values: -3, -2, -1, 0, 1, 2, 3, 4 flag_meanings : below_threshold1 below_threshold2 below_threshold3 below_threshold4 below_threshold5 below_threshold6 above_threshold6 invalid
qf_bias_fit (Chunked Dataset)	INTEGER_4 (:)	Height Bias Fit Quality Flag (not_set)	1 Inland Water ATBD	The height bias fit flag is set based on the value of the goodness of fit bias estimated as the difference between the centroid elevations of the observed surface water histogram and fitted integrated water surface model histogram. The flag values are set as follows: = -3 if H_bias_fit < -0.10 (m); -2 if -0.10 <= H_bias_fit < -0.05; -1 when -0.05 <= H_bias_fit < -0.01; 0 if -0.01 <= H_bias_fit < 0.01 (m); 1 if 0.01 <= H_bias_fit < 0.05; 2 if 0.05 < H_bias_fit < 0.10; 3 if 0.10 <= H_bias_fit; 4 if H_bias_fit is invalid. flag_values: -3, -2, -1, 0, 1, 2, 3, 4 flag_meanings : below_threshold1 below_threshold2 below_threshold3 below_threshold4 below_threshold5 below_threshold6 equal_to_or_above_threshold6 invalid
qf_cloud (Chunked Dataset)	INTEGER_4 (:)	Consolidated cloud flag (not_set)	1 ATL09	This flag is a combination of multiple flags (cloud_flag_atm, cloud_flag_asr, and bsnow_con) and takes daytime/nighttime into consideration. A value of 1 means clouds or blowing snow are likely present. A value of 0 indicates the likely absence of clouds or blowing snow. From the ATL09 data closest to the segment time. flag_values: 0, 1 flag_meanings : likely_clear likely_cloudy
qf_ice (Chunked Dataset)	INTEGER_4 (:)	Ice Quality Flag (not_set)	1 Inland Water ATBD	The quality flag for ice describes the likelihood of ice on the short water body surface segment. 0 for QF_Bckgrd<= 2; 1 for 2 < QF_Bckgrd<= 4; 2 for 4 < QF_Bckgrd; 3 for (4 < QF_Bckgrd and QF_Cloud=1) flag_values: 0, 1, 2, 3 flag_meanings : qf_bckgrd_le_2 qf_bckgrd_le_4 qf_bckgrd_gt_4 qf_bckgrd_w_cloud
qf_iwp (Chunked Dataset)	INTEGER_4 (:)	Inland Water Segment Processing Flag (not_set)	not_set Inland Water ATBD	Inland Water segment Processing (IWP) flag to describe the level of processing the inland water algorithm was able to perform on each short segment based on the data available, ranging from 1 to 7. flag_values: 1, 2, 3, 4, 5, 6, 7 flag_meanings : 1_short_segment 2_short_segments 3_to_5_short_segments 6_to_7_short_segments 8_to_9_short_segments 10_to_29_short_segments 30_or_more_short_segments_analyzed
qf_lseg_length (Chunked Dataset)	INTEGER_4 (:)	Long Segment Length flag (not_set)	1 Inland Water ATBD	The Long Segment Length flag is set based on the length of the long segment. The flag is set as follows: 0 if Lseg_length < 500 (meters); 1 if 500 <= Lseg_length < 1500 (meters); 2 if 1500 <= Lseg_length < 3000 (meters); 3 if 3000 <= Lseg_length flag_values: 0, 1, 2, 3 flag_meanings : below_threshold1 below_threshold2 below_threshold3 above_threshold4
qf_spec_width (Chunked Dataset)	INTEGER_4 (:)	Spectral Width Flag (not_set)	1 Inland Water ATBD	The Spectral Width flag is set based on threshold checks for the estimated Spectral Width. The flag is set as follows: 0 if spec_width < 0.5; 1 if spec_width >= +0.5. flag_values: 0, 1 flag_meanings : below_0.5 above_0.5
qf_sseg_length (Chunked Dataset)	INTEGER_4 (:)	Short Segment Length flag (not_set)	1 Inland Water ATBD	The Short Segment Length flag is set based on the length of the short segment. The flag is set as follows: 0 if sseg_length< 50 (meters); 1 if 50 flag_values: 0, 1, 2, 3

				flag_meanings : below_threshold1 below_threshold2 below_threshold3 above_threshold4
qf_subsurf_anomaly (Chunked Dataset)	INTEGER_4 (:)	Subsurface Anomaly Quality Flag (not_set)	1 Inland Water ATBD 5.3.4(A)	Describes the likelihood that the bottom or other subsurface anomaly is bottom based on the threshold value at which an anomaly was found. 1 = Subsurface anomaly due to bottom likely; 2 = Subsurface signal may indicate bottom or other anomaly; 3 = Possible subsurface anomaly; invalid = No subsurface anomaly detected flag_values: 1, 2, 3 flag_meanings : bottom_likely bottom_or_other_anomaly possible_subsurface_anomaly
rgt (Chunked Dataset)	INTEGER_2 (:)	Reference Ground track (not_set)	1 ATL03	The reference ground track (RGT) is the track on the earth at which a specified unit vector within the observatory is pointed. Under nominal operating conditions, there will be no data collected along the RGT, as the RGT is spanned by GT3 and GT4. During slews or off-pointing, it is possible that ground tracks may intersect the RGT. The ICESat-2 mission has 1387 RGTs.
segment_dac (Chunked Dataset)	FLOAT (:)	Segment DAC (not_set)	meters ATBD Section 5.3.5A	Dynamic atmospheric correction (DAC) includes inverted barometer (IB) effect (+- 5 cm). Although available at short segment rate for all water body types, value is provided mainly for transitional tidal and coastal water (types 6 and 7) and the largest lakes of Type 1 (~> 10,000 km2) for user's discretion.
segment_geoid (Chunked Dataset)	FLOAT (:)	Segment Geoid (not_set)	meters ATL03	Applicable geoid value at reporting location for all short segment statistics.
segment_id_beg (Chunked Dataset)	INTEGER_4 (:)	First ATL03 Segment ID (not_set)	1 ATL03	First ATL03 segment_id associated with the photons within this inland water segment.
segment_id_end (Chunked Dataset)	INTEGER_4 (:)	Last ATL03 Segment ID (not_set)	1 ATL03	Last ATL03 segment_id associated with the photons within this inland water segment.
segment_lat (Chunked Dataset)	DOUBLE (:)	Latitude (latitude)	degrees_north section 5.3.5 (A)	Latitude of reporting location
segment_lon (Chunked Dataset)	DOUBLE (:)	Longitude (longitude)	degrees_east section 5.3.5 (A)	Longitude of reporting location
segment_slope_trk_bdy (Chunked Dataset)	FLOAT (:)	Water Body Slope (not_set)	1 section 5.3.5 (A)	Along track water body surface slope.
segment_tide_equilibrium (Chunked Dataset)	FLOAT (:)	Segment Tide Equilibrium (not_set)	meters ATL03	Long period equilibrium tide self-consistent with ocean tide model (+- 0.04 m). Although available at short segment rate for all water body types, value is provide mainly for transitional tidal and coastal water (types 6 and 7) and the largest lakes of Type 1 (~> 10,000 km2) for user's discretion.
segment_tide_ocean (Chunked Dataset)	FLOAT (:)	Segment Tide Ocean (not_set)	meters ATL03	Ocean tides including diurnal and semi-diurnal (harmonic analysis (+-4 m)). Although available at short segment rate for all water body types, value is provide mainly for transitional tidal and coastal water (types 6 and 7) and the largest lakes of Type 1 (~> 10,000 km2) for user's discretion.
significant_wave_ht (Chunked Dataset)	FLOAT (:)	SWH (not_set)	meters section 5.3.3 (C)	Significant wave height
sseg_mean_lat (Chunked Dataset)	DOUBLE (:)	Short Segment Mean Latitude (not_set)	degrees_north Inland Water ATBD	Mean latitude of the signal-qualified photons in a short segment.
sseg_mean_lon (Chunked Dataset)	DOUBLE (:)	Short Segment Mean Longitude (not_set)	degrees_east Inland Water ATBD	Mean longitude of the signal-qualified photons in a short segment.
sseg_mean_time (Chunked Dataset)	DOUBLE (:)	Short Segment Mean Time (not_set)	Seconds since 2018-01-01 Inland Water ATBD	Mean time of the signal-qualified photons in a short segment.
stdev_water_surf (Chunked Dataset)	FLOAT (:)	Surface StDev (not_set)	meters section 5.3.3 (C)	Standard deviation of water surface, calculated over long segments with result reported at each short segment location tag contained within.
subsurface_attenuation (Chunked Dataset)	FLOAT (:)	Subsurface Attenuation (not_set)	1 section 5.3.4 (A)	Subsurface attenuation coefficient.
water_depth (Chunked Dataset)	FLOAT (:)	Water Depth (not_set)	meters IW ATBD Section 5.3.4(A)	Depth from the mean water surface to detected bottom.

Group: /multibeam

Description	(Attribute)	Contains Multi-Beam Water Height Data Products		
data_rate	(Attribute)	Data within this group are stored per inland water body (where data availability permits).		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
aspect	FLOAT	Aspect	radians	Direction of slope of planar surface with respect to North

(Chunked Dataset)	(:)	(not_set)	section 5.3.5 (B)	between adjacent strong beams.
cycle (Chunked Dataset)	INTEGER_1 (:)	Cycle Number (not_set)	counts ATL03	Tracks the number of 91-day cycles in the mission, beginning with 01.
delta_time (Chunked Dataset)	DOUBLE (:)	Delta Time (time)	seconds since 2018-01-01 ATL03	Number of GPS seconds since the ATLAS SDP epoch. 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.
err_aspect (Chunked Dataset)	FLOAT (:)	Error in Aspect (not_set)	radians section 5.3.5 (C)	Error included in aspect reported.
err_slope_bdy (Chunked Dataset)	FLOAT (:)	Error in Slope (not_set)	1 section 5.3.5 (C)	Error included in segment_slope_trk_bdy.
inland_water_basin_id (Chunked Dataset)	INTEGER_4 (:)	Basin ID (not_set)	1 section 5.3.1 (A)	Identifying signature of an individual inland water basin. Each basin is represented by a unique numeric value.
inland_water_body_id (Chunked Dataset)	INTEGER_4 (:)	Body ID (not_set)	1 ATL13 ATBD, Section 5.3.1 (C)	Identifying signature of an individual inland water body. Each body of water is represented by a unique numeric value.
max_slope (Chunked Dataset)	FLOAT (:)	Maximum Slope (not_set)	1 section 5.3.5 (B)	Maximum slope of planar triangular surface between adjacent strong beams.
plan_lat (Chunked Dataset)	DOUBLE (:)	Latitude (latitude)	degrees_north section 5.3.5 (B)	Latitude of reporting location for multi-beam planar statistics
plan_lon (Chunked Dataset)	DOUBLE (:)	Longitude (longitude)	degrees_east section 5.3.5 (B)	Longitude of reporting location for multi-beam planar statistics
rgt (Chunked Dataset)	INTEGER_2 (:)	Reference Ground track (not_set)	1 ATL03	The reference ground track (RGT) is the track on the earth at which a specified unit vector within the observatory is pointed. Under nominal operating conditions, there will be no data collected along the RGT, as the RGT is spanned by GT3 and GT4. During slews or off-pointing, it is possible that ground tracks may intersect the RGT. The ICESat-2 mission has 1387 RGTs.
segment_id_beg (Chunked Dataset)	INTEGER_4 (:)	First ATL03 Segment ID (not_set)	1 ATL03	First ATL03 segment_id associated with the photons within this inland water segment.
segment_id_end (Chunked Dataset)	INTEGER_4 (:)	Last ATL03 Segment ID (not_set)	1 ATL03	First ATL03 segment_id associated with the photons within this inland water segment.
Group: /orbit_info				
Description	(Attribute)	Contains orbit information.		
data_rate	(Attribute)	Varies. Data are only provided when one of the stored values (besides time) changes.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
crossing_time (Chunked Dataset)	DOUBLE (:)	Ascending Node Crossing Time (time)	seconds since 2018-01-01 POD/PPD	The time, in seconds since the ATLAS SDP GPS Epoch, at which the ascending node crosses the equator. 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.
cycle_number (Chunked Dataset)	INTEGER_1 (:)	Cycle Number (not_set)	1 Operations	A count of the number of exact repeats of this reference orbit.
lan (Chunked Dataset)	DOUBLE (:)	Ascending Node Longitude (not_set)	degrees_east POD/PPD	Longitude at the ascending node crossing.
orbit_number (Chunked Dataset)	UINT_2_LE (:)	Orbit Number (not_set)	1 Operations	Unique identifying number for each planned ICESat-2 orbit.
rgt (Chunked Dataset)	INTEGER_2 (:)	Reference Ground track (not_set)	1 POD/PPD	The reference ground track (RGT) is the track on the earth at which a specified unit vector within the observatory is pointed. Under nominal operating conditions, there will be no data collected along the RGT, as the RGT is spanned by GT3 and GT4. During slews or off-pointing, it is possible that ground tracks may intersect the RGT. The ICESat-2 mission has 1387 RGTs.
sc_orient (Chunked Dataset)	INTEGER_1 (:)	Spacecraft Orientation (not_set)	1 POD/PPD	This parameter tracks the spacecraft orientation between forward, backward and transitional flight modes. ICESat-2 is considered to be flying forward when the weak beams are leading the strong beams; and backward when the strong beams are leading the weak beams. ICESat-2 is considered to be in transition while it is maneuvering between the two

				orientations. Science quality is potentially degraded while in transition mode. flag_values: 0, 1, 2 flag_meanings : backward forward transition
sc_orient_time (Chunked Dataset)	DOUBLE (:)	Time of Last Spacecraft Orientation Change (time)	seconds since 2018-01-01 POD/PPD	The time of the last spacecraft orientation change between forward, backward and transitional flight modes, expressed in seconds since the ATLAS SDP GPS Epoch. ICESat-2 is considered to be flying forward when the weak beams are leading the strong beams; and backward when the strong beams are leading the weak beams. ICESat-2 is considered to be in transition while it is maneuvering between the two orientations. Science quality is potentially degraded while in transition mode. 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.
Group: /quality_assessment				
Description	(Attribute)	Contains quality assessment data. This may include QA counters, QA along-track data and/or QA summary data.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
qa_granule_fail_reason (Compact Dataset)	INTEGER_4 (1)	Granule Failure Reason (not_set)	1 Operations	Flag indicating granule failure reason. 0=no failure; 1=processing failure; 2=insufficient data; 3=TBD3; 4=TBD4; 5=TBD5 flag_values: 0, 1, 2, 3, 4, 5 flag_meanings : no_failure processing_failure insufficient_data TBD3 TBD4 TBD5
qa_granule_pass_fail (Compact Dataset)	INTEGER_4 (1)	Granule Pass Flag (not_set)	1 Operations	Flag indicating granule quality. 0=granule passes automatic QA. 1=granule fails automatic QA. flag_values: 0, 1 flag_meanings : PASS FAIL