ATL10 Product Data Dictionary

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description	(Attribute)	This data set (ATL10) contains along-track estimates of sea ice freeboard using height and surface type information from ATL07. Key metrics from ATL07 are passed through also.
level	(Attribute)	L3A
short_name	(Attribute)	ATL10
title	(Attribute)	SET_BY_META
Group: /		This data set (ATL10) contains along-track estimates of sea ice freeboard using height and surface type information from ATL07. Key metrics from ATL07 are passed through also.
Conventions	(Attribute)	CF-1.6
citation	(Attribute)	SET_BY_META
contributor_name	(Attribute)	Ron Kwok (rkwok01@uw.edu), Alek Petty (alek.a.petty@nasa.gov), Jesse Wimert (jeses.wimert@us.kbr.com, Marco Bagnardi (marco.bagnardi@nasa.gov), Glenn Cunninghan, David W Hancock III (david.w.hancock@nasa.gov), Jeff Lee (jeffery.e.lee@nasa.gov), Alvaro Ivanoff (alvaro.ivanoff-1@nasa.gov), Thomas E Neumann (thomas.neumann@nasa.gov), Thorsten Markus (thorsten.markus@nasa.gov), Nathan Kurtz (nathan.t.kurtz@nasa.gov)
contributor_role	(Attribute)	Data Product Lead, Data Product Lead, Software Engineer, Data Analysis, Data Analysis, Software Engineer, Software Engineer, Software Engineer, Mission Scienist, Mission Scientist, Deputy Mission Scientist
creator_name	(Attribute)	SET_BY_META
date_created	(Attribute)	SET_BY_PGE
date_type	(Attribute)	UTC
featureType	(Attribute)	trajectory
geospatial_lat_max	(Attribute)	0.0
geospatial_lat_min	(Attribute)	0.0
geospatial_lat_units	(Attribute)	degrees_north
geospatial_lon_max	(Attribute)	0.0
geospatial_lon_min	(Attribute)	0.0
geospatial_lon_units	(Attribute)	degrees_east
granule_type	(Attribute)	ATL10
hdfversion	(Attribute)	SET_BY_PGE
history	(Attribute)	SET_BY_PGE
identifier_product_doi	(Attribute)	10.5067/ATLAS/ATL10.001
identifier_product_doi_authority	(Attribute)	http://dx.doi.org
identifier_product_format_version	(Attribute)	SET_BY_PGE
identifier_product_type	(Attribute)	ATL10
institution	(Attribute)	SET_BY_META
instrument	(Attribute)	SET_BY_META
keywords	(Attribute)	SET_BY_META
keywords_vocabulary	(Attribute)	SET_BY_META
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
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

Group: /ancillary_data		Contains information ancillary to the data product. This may include product characteristics, instrument characteristics and/or processing constants.		
Label (Layout)	**Datatype(Dims)** Fillvalue	**long_name** standard_name	**units**	**description**
atlas_sdp_gps_epoch COMPACT	DOUBLE(1)	ATLAS Epoch Offset 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 CONTIGUOUS	STRING(1)	Control File None	1	PGE-specific control file used to generate this granule. To re-use, replace breaks (BR) with linefeeds. (Source: Operations)
data_end_utc COMPACT	STRING(1)	End UTC Time of Granule (CCSDS-A, Actual) None	1	UTC (in CCSDS-A format) of the last data point within the granule. (Source: Derived)
data_start_utc COMPACT	STRING(1)	Start UTC Time of Granule (CCSDS-A, Actual) None	1	UTC (in CCSDS-A format) of the first data point within the granule. (Source: Derived)
end_cycle COMPACT	INTEGER(1)	Ending Cycle 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 COMPACT	DOUBLE(1)	ATLAS End Time (Actual) time	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 COMPACT	INTEGER(1)	Ending Geolocation Segment 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 COMPACT	DOUBLE(1)	Ending GPS SOW of Granule (Actual) None	seconds	GPS seconds-of-week of the last data point in the granule. (Source: Derived)

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end_gpsweek COMPACT	INTEGER(1)	Ending GPSWeek of Granule (Actual) None	weeks from 1980-01-06	GPS week number of the last data point in the granule. (Source: Derived)
end_orbit COMPACT	INTEGER(1)	Ending Orbit Number None	1	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. (Source: Derived)
end_region COMPACT	INTEGER(1)	Ending Region 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 COMPACT	INTEGER(1)	Ending Reference Groundtrack 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 COMPACT	STRING(1)	End UTC Time of Granule (CCSDS-A, Requested) None	1	Requested end time (in UTC CCSDS-A) of this granule. (Source: Derived)
granule_start_utc COMPACT	STRING(1)	Start UTC Time of Granule (CCSDS-A, Requested) None	1	Requested start time (in UTC CCSDS-A) of this granule. (Source: Derived)
release COMPACT	STRING(1)	Release Number 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 COMPACT	INTEGER(1)	Starting Cycle 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 COMPACT	DOUBLE(1)	ATLAS Start Time (Actual) time	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 (1980-01-06T00:00:00.000000Z 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 COMPACT	INTEGER(1)	Starting Geolocation Segment 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 COMPACT	DOUBLE(1)	Start GPS SOW of Granule (Actual) None	seconds	GPS seconds-of-week of the first data point in the granule. (Source: Derived)

start_gpsweek COMPACT	INTEGER(1)	Start GPSWeek of Granule (Actual) None	weeks from 1980-01-06	GPS week number of the first data point in the granule. (Source: Derived)
start_orbit COMPACT	INTEGER(1)	Starting Orbit Number 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 COMPACT	INTEGER(1)	Starting Region 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 COMPACT	INTEGER(1)	Starting Reference Groundtrack 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 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 COMPACT	STRING(1)	Version 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)
Group: /ancillary_data/freeboard_estimation		Contains ancillary parameters related to the surface classification algorithm.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
b_fr COMPACT	FLOAT(1)	b_fr None	meters	Bin size of the freeboard histogram (Source: Sea Ice ATBD)
fbswath_fb_hist_max COMPACT	FLOAT(1)	Freeboard Histogram Maximum Height None	meters	Freeboard histogram maximum height bin center for any swath segment. (Source: Sea Ice ATBD)
fbswath_fb_hist_min COMPACT	FLOAT(1)	Freeboard Histogram Minimum Height None	meters	Freeboard histogram minimum height bin center for any swath segment. (Source: Sea Ice ATBD)
fill_height_pct COMPACT	FLOAT(1)	fill_height_pct None	1	percentile of sorted heights (in fraction) (Source: Sea Ice ATBD)
fill_snow_depth COMPACT	FLOAT(1)	fill_snow_depth None	1	snow depth bias for fill segments (Source: Sea Ice ATBD)
fill_ub_width COMPACT	FLOAT(1)	fill_ub_width None	meters	maximum width for fill segments (width of gaussian from fine tracking) (Source: Sea Ice ATBD)
height_segment_fit_quality_flag_max COMPACT	INTEGER(1)	Maximum Fit Quality to Use None	1	The maximum height segment fit quality flag value for which an ATL07 sea ice segment is considered for use within the freeboard height computations. (Source: Sea Ice ATBD)
height_segment_fit_quality_flag_min COMPACT	INTEGER(1)	Minimum Fit Quality to Use None	1	The minimum height segment fit quality flag value for which an ATL07 sea ice segment is considered for use within the freeboard height computations. (Source: Sea Ice ATBD)
ht_thresh1 COMPACT	FLOAT(1)	height threshold 1 None	meters	Refsurf height difference threshold for low concentration cases (Source: Sea Ice ATBD)
ht_thresh2 COMPACT	FLOAT(1)	height threshold 2 None	meters	Refsurf height difference threshold for consecutive estimates (Source: Sea Ice ATBD)
ic_thresh1 COMPACT	FLOAT(1)	minimum ice concentration filter 1 None	1	Minimum ice concentration for filtering reference surfaces

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
				(Source: Sea Ice ATBD)
ic_thresh2 COMPACT	FLOAT(1)	minimum ice concentration filter 2 None	1	Reference surfaces estimates filtered below this ice concentration (Source: Sea Ice ATBD)
l COMPACT	FLOAT(1)	fb_seg_len None	meters	Along track section length for freeboard calculations (Source: Sea Ice ATBD)
lb_n_f COMPACT	INTEGER(1)	lb_n_f None	1	Lower bounds on number of SSH estimates (Source: Sea Ice ATBD)
lb_refsurf COMPACT	FLOAT(1)	lower_bound_refsurf None	m	Reference surface minimum height (Source: Sea Ice ATBD)
maxgapht COMPACT	FLOAT(1)	max gap height None	meters	Allowable height separation between refsurf heights across time gap (Source: Sea Ice ATBD)
maxgaptime COMPACT	INTEGER(1)	max gap time None	seconds	Maximum allowable time gap for interpolation (Source: Sea Ice ATBD)
maxpadtime COMPACT	FLOAT(1)	max pad time None	seconds	Maximum allowable time gap for reference surface filling using one-point and end-point fill (Source: Sea Ice ATBD)
mean_ocean_slp COMPACT	FLOAT(1)	mean_ocean_sea_level_pressure mean ocean sea level pressure	Pa	Mean ocean sea level pressure computed using SLP from ANC10 and ocean fraction mask from ANC48, from ATL07 (Source: Sea Ice ATBD, ATL07)
min_land_dist COMPACT	INTEGER(1)	minimum distance from land None	km	Minimum distance from land for filtering reference surface (Source: Sea Ice ATBD)
min_refsurf_count COMPACT	INTEGER(1)	Minimum Reference Surfaces Count None	1	ATL10 granules with less than this number of strong beam reference surface sections will be marked as failed. (Source: Sea Ice ATBD)
min_segs_count COMPACT	INTEGER(1)	Minimum Segments Count None	1	ATL10 granules with less than this number of strong beam freeboard segments will be marked as failed. (Source: Sea Ice ATBD)
multi_beam_disable_flag COMPACT	INTEGER(1)	miltibeam_disable_flag None	1	disable multi-beam (intra-pair and inter-pair) freeboard calculations (Source: Sea Ice ATBD); (Meanings: [0 1]) (Values: ['no', 'yes'])
n_fillpass COMPACT	INTEGER(1)	n_fillpass None	1	Number of passes for gap filling (DEFUNCT) (Source: Sea Ice ATBD)
refsurf_3pt_smoother COMPACT	INTEGER(1)	refsurf_3pt_smoother_flag None	1	switch for reference surface 3-pt smoother (Source: Sea Ice ATBD); (Meanings: [0 1]) (Values: ['no', 'yes'])
refsurf_h_offset1 COMPACT	FLOAT(1)	h_offset1 None	meters	height offset for fill refsurf bound check (DEFUNCT) (Source: Sea Ice ATBD)
refsurf_h_offset2 COMPACT	FLOAT(1)	h_offset2 None	meters	height offset for fill refsurf estimate (DEFUNCT) (Source: Sea Ice ATBD)
refsurf_sd_fill COMPACT	FLOAT(1)	ssh_sd_fill None	meters	Filled SSH stdev estimate (Source: Sea Ice ATBD)
refsurf_slope_fill COMPACT	FLOAT(1)	ssh_slope_fill None	degrees	Filled SSH sloper estimate (Source: Sea Ice ATBD)
refsurf_slope_ub COMPACT	FLOAT(1)	ssh_slope_ub None	degrees	Upper bound for SSH slope (Source: Sea Ice ATBD)
ub_refsurf COMPACT	FLOAT(1)	upper_bound_refsurf None	m	Reference surface maximum height (Source: Sea Ice ATBD)
Group: /freeboard_swath_segment		Contains parameters related to quality and corrections on the the freeboard values		
data_rate	(Attribute)	Data within this group are stored at the freeboard swath segment rate.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
delta_time CHUNKED	DOUBLE(:)	GPS elapsed time time	seconds since 2018-01-01	The center time assigned to this freeboard swath segment (mean of all freeboard times), in seconds since the ATLAS SDP GPS 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. (Source: ATBD section 5)
ds_si_hist_bins CHUNKED	INTEGER(:)	Sea Ice Histogram Bins Dimension Scale None	1	Dimension scale indexing the sea ice histogram bins. The bin heights must be computed from information contained within the same group as the histogram. (Source: SeaIce ATBD)
fbswath_fb_height CHUNKED	FLOAT(:) INVALID_R4B	Freeboard height relative to fb_swath_refsurf_height None	meters	Freeboard height relative to fbswath_refsurf_height. (Source: ATBD section 5)
fbswath_fb_hist CHUNKED	INTEGER_2(:,200)	freeboard histogram None	1	Swath Freeboard (using fbswath reference surface height) histogram (distribution) for this freeboard swath-segment (Source: ATBD section 5)
fbswath_fb_length CHUNKED	FLOAT(:) INVALID_R4B	Length of freeboard swath-segment None	meters	Length of freeboard swath-segment (Source: ATBD section 5)
fbswath_fb_sigma CHUNKED	FLOAT(:) INVALID_R4B	Freeboard standard deviation swath-segment None	meters	Freeboard standard deviation of the height-segments in freeboard swath-segment (Source: ATBD section 5)
fbswath_fb_width CHUNKED	FLOAT(:) INVALID_R4B	Width of freeboard swath-segment None	meters	Width of freeboard swath-segment (Source: ATBD section 5)
fbswath_lead_n_gt1l CHUNKED	INTEGER(:)	Number of gt1l leads None	1	Number of gt1l leads used for this swath's reference surface (Source: Sea Ice ATBD)
fbswath_lead_n_gt1r CHUNKED	INTEGER(:)	Number of gt1r leads None	1	Number of gt1r leads used for this swath's reference surface (Source: Sea Ice ATBD)
fbswath_lead_n_gt2l CHUNKED	INTEGER(:)	Number of gt2l leads None	1	Number of gt2l leads used for this swath's reference surface (Source: Sea Ice ATBD)
fbswath_lead_n_gt2r CHUNKED	INTEGER(:)	Number of gt2r leads None	1	Number of gt2r leads used for this swath's reference surface (Source: Sea Ice ATBD)
fbswath_lead_n_gt3l CHUNKED	INTEGER(:)	Number of gt3l leads None	1	Number of gt3l leads used for this swath's reference surface (Source: Sea Ice ATBD)
fbswath_lead_n_gt3r CHUNKED	INTEGER(:)	Number of gt3r leads None	1	Number of gt3r leads used for this swath's reference surface (Source: Sea Ice ATBD)
fbswath_lead_ndx_gt1l CHUNKED	INTEGER(:)	Swath index gt1l first lead None	1	1-based index to first /gt1l/leads lead used in this swath's reference surface (Source: ATBD section 5)
fbswath_lead_ndx_gt1r CHUNKED	INTEGER(:)	Swath index gt1r first lead None	1	1-based index to first /gt1r/leads lead used in this swath's reference surface (Source: ATBD section 5)
fbswath_lead_ndx_gt2l CHUNKED	INTEGER(:)	Swath index gt2l first lead None	1	1-based index to first /gt2l/leads lead used in this swath's reference surface (Source: ATBD section 5)
fbswath_lead_ndx_gt2r CHUNKED	INTEGER(:)	Swath index gt2r first lead None	1	1-based index to first /gt2r/leads lead used in this swath's reference surface (Source: ATBD section 5)
fbswath_lead_ndx_gt3l CHUNKED	INTEGER(:)	Swath index gt3l first lead None	1	1-based index to first /gt3l/leads lead used in this swath's reference surface (Source: ATBD section 5)
fbswath_lead_ndx_gt3r CHUNKED	INTEGER(:)	Swath index gt3r first lead None	1	1-based index to first /gt3r/leads lead used in this swath's reference surface (Source: ATBD section 5)

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
fbswath_refsurf_height CHUNKED	FLOAT(:) INVALID_R4B	Reference surface height for the freeboard swath-segment None	meters	Reference surface computed by the weighted mean of leads in freeboard swath-segment. The reference surface height is relative to the tide-free MSS. (Source: ATBD section 5)
fbswath_refsurf_interp_flag CHUNKED	INTEGER_2(:)	reference surface interpolation flag None	1	Identifies swath segments with reference surface height filled through interpolation. -1 = no valid refrence surface was determined; 0= refsur computed from leads in this swath; 1 = reference surface inferred from data not in this swath; 2 = previous or next adjacent reference surface was used; 3 = filled based on the the upper height minus an offset (Source: ATBD section 5); (Meanings: [-1 0 1 2 3]) (Values: ['no_surf', 'leads_in_swath', 'inferred', 'neighbor_used', 'upper_height_minus_offset'])
fbswath_refsurf_sigma CHUNKED	FLOAT(:) INVALID_R4B	sigma of freeboard swath-segment refsurf None	meters	The sigma (standard deviation) of reference surface for this freeboard swath-segment. weighted combination of the lead sigmas in this beam for this swath segment (Source: ATBD section 5)
latitude CHUNKED	DOUBLE(:)	Center latitude of freeboard swath-segment latitude	degrees_north	Center latitude of freeboard swath-segment (mean of all freeboard latitudes) (Source: ATBD section 5)
longitude CHUNKED	DOUBLE(:)	Center longitude of freeboard swath-segment longitude	degrees_east	Center longitude of freeboard swath-segment (mean of all freeboard longitudes) (Source: ATBD section 5)
seg_dist_x CHUNKED	DOUBLE(:)	Along Track Distance None	meters	Along-track distance from the equator crossing to the segment center. (Source: Sea Ice ATBD)
Group: /freeboard_swath_segment/gtx		Contains freeboard estimate and associated height segment parameters computed by the swath reference surface.		
Group: /freeboard_swath_segment/gtx/swath_freeboard		Contains freeboard estimate and associated height segment parameters computed by the swath reference surface.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
delta_time CHUNKED	DOUBLE(:)	Elapsed GPS seconds time	seconds since 2018-01-01	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. (Source: Derived via Time Tagging)
fbswath_fb_confidence CHUNKED	FLOAT(:) INVALID_R4B	Freeboard confidence None	1	Confidence level in the freeboard estimate (Source: ATBD section 5)
fbswath_fb_height CHUNKED	FLOAT(:) INVALID_R4B	Freeboard height relative to fbswath_refsurf_height None	meters	Freeboard height relative to fbswath_refsurf_height. (Source: ATBD section 5)
fbswath_fb_quality_flag CHUNKED	INTEGER_1(:)	Flag describing the quality of the freeboard estimate None	1	Flag describing the quality of the results of the along-track fit. (-1=height value is invalid; 1=ngrid_w < wlength/2; 2=ngrid_w >= wlength/2; 3=ngrid_dt < dtlength/2; 4=ngrid_dt >= dtlength/2; 5=ngrid_dt >= (dtlength-2): where 1 is best and 5 is poor). (Source: ATBD section 5); (Meanings: [-1 1 2 3 4 5]) (Values: ['invalid', 'best', 'high', 'med', 'low', 'poor'])
fbswath_fb_sigma CHUNKED	FLOAT(:) INVALID_R4B	Freeboard sigma estimate None	meters	Sigma (standard deviation) estimate of the freeboard height (Source: ATBD section 5)
fbswath_ndx CHUNKED	INTEGER(:)	Index to freeboard swath segment None	1	The 1-based fbswath_nx identifies the swath associated with each element. There are the same number of elements in the group /freeboard_swath_segment and in each of the /GTx/freeboard_beam_segment group. The fbswath_nx identifies the fbswath_refsurf_height used to compute the fbswath_fb_height. It is the same index number that idenitifies the beam_refsurf_height to its

				swath and the beam_refsurf_height used to computed the beam_fb_height. (Source: ATBD section 5)
height_segment_id CHUNKED	INTEGER(:)	Identifier of each height segment None	1	Identifier of each height segment (Source: Sea Ice ATBD)
latitude CHUNKED	DOUBLE(:) INVALID_R8B	Latitude latitude	degrees_north	Latitude, WGS84, North=+, Lat of segment center (Source: section 3.1.9)
longitude CHUNKED	DOUBLE(:) INVALID_R8B	Longitude longitude	degrees_east	Longitude, WGS84, East=+,Lon of segment center (Source: section 3.1.9)
Group: /gtx			Each group contains data for each of the six ATLAS beams. As ICESat-2 orbits the earth, sequential transmit pulses illuminate six ground tracks on the surface of the earth. The track width is approximately 10m wide. Each ground track is numbered, according to the laser spot number that generates a given ground track. Ground tracks from the strong beams are therefore numbered 1, 3 and 5; ground tracks from the weak beams are numbered 2, 4 and 6. See ICESat-2 L2A ATBD.		
Group: /gtx/freeboard_segment			Contains freeboard estimate and associated parameters computed by its beam reference surface section.		
data_rate	(Attribute)		Data within this group are stored at the variable individual height/freeboard segment rate		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
beam_fb_confidence CHUNKED	FLOAT(:) INVALID_R4B	Freeboard confidence None	1	Confidence level in the freeboard estimate (Source: ATBD section 5)
beam_fb_height CHUNKED	FLOAT(:) INVALID_R4B	Freeboard height relative to beam_refsurf_height None	meters	Freeboard height based on ATL07 ice surface height relative to beam_refsurf_height. (Source: ATBD section 5)
beam_fb_quality_flag CHUNKED	INTEGER_1(:)	Flag describing the quality of the freeboard estimate None	1	Flag describing the quality of the results of the along-track fit. (-1=height value is invalid; 1=ngrid_w < wlength/2; 2=ngrid_w >= wlength/2; 3=ngrid_dt < dtlength/2; 4=ngrid_dt >= dtlength/2; 5=ngrid_dt >= (dtlength-2): where 1 is best and 5 is poor). (Source: ATBD section 5); (Meanings: [-1 1 2 3 4 5]) (Values: ['invalid', 'best', 'high', 'med', 'low', 'poor'])
beam_fb_unc CHUNKED	FLOAT(:) INVALID_R4B	Freeboard segment uncertainty None	meters	Combined uncertainty from the height segment sigma and the reference surface sigma estimates (Source: ATBD section 5)
beam_refsurf_ndx CHUNKED	INTEGER(:)	Index to beam refsur None	1	1-based index to reference surface used for this freeboard height. Its value is identical to the fbswath_ndx. This index also identifies the beam section with which the beam freeboard associated. (Source: ATBD section 5)
delta_time CHUNKED	DOUBLE(:)	Elapsed GPS seconds time	seconds since 2018-01-01	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. (Source: Derived via Time Tagging)
geoseg_beg CHUNKED	INTEGER(:)	Beginning GEOSEG None	1	Geolocation segment (geoseg) ID associated with the first photon used in this sea ice segment (Source: Sea Ice ATBD)
geoseg_end CHUNKED	INTEGER(:)	Ending GEOSEG None	1	Geolocation segment (geoseg) ID associated with the last photon used in this sea ice segment (Source: Sea Ice ATBD)
height_segment_id CHUNKED	INTEGER(:)	Identifier of each height segment None	1	Identifier of each height segment (Source: Sea Ice ATBD)
latitude CHUNKED	DOUBLE(:)	Latitude latitude	degrees_north	Latitude, WGS84, North=+, Lat of freeboard segment center (Source: Sea Ice ATBD)
longitude CHUNKED	DOUBLE(:)	Longitude longitude	degrees_east	Longitude, WGS84, East=+, Lon of freeboard segment center (Source: Sea Ice ATBD)
seg_dist_x	DOUBLE(:)	Along track distance	meters	Along-track distance from the equator crossing to the

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
CHUNKED		None		segment center. (Source: Sea Ice ATBD)
Group: /gtx/freeboard_segment/geophysical		Contains geophysical parameters from ATL07 associated with the freeboard estimate, at the segment scale		
delta_time CHUNKED	DOUBLE(:)	Elapsed GPS seconds time	seconds since 2018-01-01	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. (Source: Derived via Time Tagging)
height_segment_dac CHUNKED	FLOAT(:) INVALID_R4B	Dynamic Atmosphere Correction None	meters	Dynamic Atmospheric Correction (DAC) includes inverted barometer (IB) effect (From ATL07) (Source: Sea Ice ATBD)
height_segment_dynib CHUNKED	FLOAT(:) INVALID_R4B	Dynamic inverted barometer effect dynamic inverted barometer	meters	Inverted barometer effect calculated from dynamic mean ocean sea level pressure (computed using ANC10 and ANC48, /ancillary_data/freeboard_estimation/mean_ocean_slp) (Source: ATBD section 4.2)
height_segment_earth CHUNKED	FLOAT(:) INVALID_R4B	Earth Tide None	meters	Solid Earth Tide (From ATL07). The solid earth tide height is in the tide-free system. (Source: Sea Ice ATBD)
height_segment_earth_free2mean CHUNKED	FLOAT(:) INVALID_R4B	Earth Tide Free-to-Mean conversion None	meters	Additive value to convert solid earth tide from the tide-free system to the mean-tide system. (Add to height_segment_earth to get the solid earth tides in the mean-tide system.) (Source: Sea Ice ATBD)
height_segment_geoid CHUNKED	FLOAT(:) INVALID_R4B	EGM2008 Geoid None	meters	Geoid height above WGS-84 reference ellipsoid (range -107 to 86m), based on the EGM2008 model (From ATL07). The geoid height is in the tide-free system. (Source: Sea Ice ATBD)
height_segment_geoid_free2mean CHUNKED	FLOAT(:) INVALID_R4B	EGM2008 Geoid Free-to-Mean conversion None	meters	Additive value to convert geoid heights from the tide-free system to the mean-tide system. (Add to height_segment_geoid to get the geoid heights in the mean-tide system.) (Source: Sea Ice ATBD)
height_segment_ib CHUNKED	FLOAT(:) INVALID_R4B	inverted barometer effect None	meters	Inverted barometer effect calculated from surface pressure (Source: ATBD section 4.2)
height_segment_load CHUNKED	FLOAT(:) INVALID_R4B	Load Tide None	meters	Load Tide - Local displacement due to Ocean Loading (-6 to 0 cm). (From ATL07) (Source: Sea Ice ATBD)
height_segment_lpe CHUNKED	FLOAT(:) INVALID_R4B	Equilibrium Tide None	meters	Long period equilibrium tide self-consistent with ocean tide model (+-0.04m). (Source: Sea Ice ATBD)
height_segment_mss CHUNKED	FLOAT(:) INVALID_R4B	Mean Sea Surface None	meters	Mean sea surface height above WGS-84 reference ellipsoid (range: -68 to 65m), based on a CryoSat-2/DTU14 merged product (https://doi.org/10.5281/zenodo.4294047). The MSS height (from ANC15 used in atlas_l3a_si processing) is adjusted to be in a tide free reference system (subtracting the geoid_free2mean correction) to be consistent with the tide free ATL03 heights. (Source: Sea Ice ATBD)
height_segment_ocean CHUNKED	FLOAT(:) INVALID_R4B	Ocean Tide None	meters	Ocean Tides including diurnal and semi-diurnal (harmonic analysis), and longer period tides (dynamic and self-consistent equilibrium). (Source: Sea Ice ATBD)
height_segment_tide_pole CHUNKED	FLOAT(:) INVALID_R4B	Pole Tide None	meters	Pole Tide -Rotational deformation due to polar motion (-1.5 to 1.5 cm). (From ATL07) (Source: Sea Ice ATBD)

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
latitude CHUNKED	DOUBLE(:)	Latitude latitude	degrees_north	Latitude, WGS84, North=+, Lat of segment center (Source: Sea Ice ATBD)
longitude CHUNKED	DOUBLE(:)	Longitude longitude	degrees_east	Longitude, WGS84, East=+,Lon of segment center (Source: Sea Ice ATBD)
Group: /gtx/freeboard_segment/heights		Contains key height segment parameters from ATL07 associated with the freeboard estimates, at the segment scale		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
asr_25 CHUNKED	FLOAT(:) INVALID_R4B	Apparent surface reflectance at 25 hz None	1	Apparent surface reflectance at 25 hz, average to the sea ice segment (Source: ATL07)
backgr_calc CHUNKED	FLOAT(:) INVALID_R4B	background count rate calculated None	hz	Calculated background count rate based on sun angle, surface slope, unit reflectance (Source: ATL07)
backgr_r_200 CHUNKED	FLOAT(:) INVALID_R4B	background rate 200 hz None	hz	Background count rate, averaged over the segment based on ATLAS 50 pulse counts (Source: ATL09)
backgr_r_25 CHUNKED	FLOAT(:) INVALID_R4B	background rate 25 hz None	hz	Background count rate, averaged over the segment based on 25 hz atmosphere (Source: ATL09)
background_r_norm CHUNKED	FLOAT(:) INVALID_R4B	normalized background (50 shot) None	hz	Background rate normalized to a fixed solar elevation angle (Source: ATL07)
bsnow_con CHUNKED	FLOAT(:) INVALID_R4B	Blowing snow confidence None	1	Blowing snow confidence (Source: ATL09)
bsnow_h CHUNKED	FLOAT(:) INVALID_R4B	Blowing snow top height None	meters	Blowing snow layer top height (Source: ATL09)
cloud_flag_asr CHUNKED	INTEGER_1(:)	cloud flag asr None	1	Cloud flag (probability) from apparent surface reflectance. 0=clear with high confidence; 1=clear with medium confidence; 2=clear with low confidence; 3=cloudy with low confidence; 4=cloudy with medium confidence; 5=cloudy with high confidence (Source: ATL09); (Meanings: [0 1 2 3 4 5]) (Values: ['clear_with_high_confidence', 'clear_with_medium_confidence', 'clear_with_low_confidence', 'cloudy_with_low_confidence', 'cloudy_with_medium_confidence', 'cloudy_with_high_confidence'])
cloud_flag_atm CHUNKED	INTEGER_1(:)	cloud flag atm None	1	Number of layers found from the backscatter profile using the DDA layer finder (Source: ATL09)
delta_time CHUNKED	DOUBLE(:)	Elapsed GPS seconds time	seconds since 2018-01-01	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. (Source: Derived via Time Tagging)
height_segment_confidence CHUNKED	FLOAT(:) INVALID_R4B	Surface height confidence None	1	Confidence level in the surface height estimate based on the number of photons; the background noise rate; and the error analysis (ATL07 h_confidence) (Source: Sea Ice ATBD)
height_segment_dist2land CHUNKED	FLOAT(:) INVALID_R4B	height of segment distance to land dist2land	meters	Height segment distance to land (Source: Sea Ice ATBD)
height_segment_height CHUNKED	FLOAT(:) INVALID_R4B	height of segment surface None	meters	Mean height from along-track segment fit determined by the sea ice algorithm(ATL07 h_si). The sea ice height is relative to the tide-free MSS. (Source: Sea Ice ATBD)
height_segment_length_seg	FLOAT(:)	length of segment	meters	Along-track length of segment containing

CHUNKED	INVALID_R4B	None		n_photons_actual (ATL07 length_seg) (Source: Sea Ice ATBD)
height_segment_ocdepth CHUNKED	FLOAT(:) INVALID_R4B	height of segment ocean depth ocdepth	meters	Height segment ocean depth (Source: Sea Ice ATBD)
height_segment_rms CHUNKED	FLOAT(:) INVALID_R4B	height rms None	meters	RMS difference between sea ice modeled and observed photon height distribution (ATL07 h_rms) (Source: Sea Ice ATBD)
height_segment_sigma CHUNKED	FLOAT(:) INVALID_R4B	h surface sigma None	meters	Sigma height surface error estimate - width of the trimmed histogram divided by the number of photons. (Source: Sea Ice ATBD)
height_segment_ssh_flag CHUNKED	INTEGER_1(:)	Sea Surface Height Flag None	1	Identifiesthe height segments that are candidates for use as sea surface reference in freeboard calculations in ATL10. The flags are set as follows: 0 = sea ice; 1 = potential reference sea surface height; 2 = used in calculating reference sea surface height (Source: Sea Ice ATBD); (Meanings: [0 1 2]) (Values: ['sea_ice', 'potential_sea_ice_surface', 'new_meaning'])
height_segment_type CHUNKED	INTEGER_1(:)	Segment surface type None	1	Value that indicates segment surface type as sea ice or different types of sea surface. (0=cloud covered) (Source: ATBD section 4.3); (Meanings: [0 1 2 3 4 5 6 7 8 9 -1]) (Values: ['cloud_covered', 'other', 'specular_lead_low_w_bkg', 'specular_lead_low', 'specular_lead_high_w_bkg', 'specular_lead_high', 'dark_lead_smooth_w_bkg', 'dark_lead_smooth', 'dark_lead_rough_w_bkg', 'dark_lead_rough', 'new_meaning'])
height_segment_w_gaussian CHUNKED	FLOAT(:) INVALID_R4B	width of best fit gaussian None	meters	Width of best fit gaussian (ATL07 w_gaussian) (Source: Sea Ice ATBD)
ice_conc_amsr2 CHUNKED	FLOAT(:) INVALID_R4B	sea ice concentration from AMSR2 file None	1	Sea ice concentration from daily AMSR2 sea ice concentration file (ANC49) (Source: ATL07/ANC31)
ice_conc_ssmi CHUNKED	FLOAT(:) INVALID_R4B	sea ice concentration None	1	Sea ice concentration from daily SSMI sea ice concentration file (ANC31) (Source: ATL07/ANC31)
latitude CHUNKED	DOUBLE(:)	Latitude latitude	degrees_north	Latitude, WGS84, North=+, Lat of segment center (Source: Sea Ice ATBD)
layer_flag CHUNKED	INTEGER_1(:)	consolidated cloud flag None	1	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. (Source: ATL09); (Meanings: [0 1]) (Values: ['likely_clear', 'likely_cloudy'])
longitude CHUNKED	DOUBLE(:)	Longitude longitude	degrees_east	Longitude, WGS84, East=+, Lon of segment center (Source: Sea Ice ATBD)
msw_flag CHUNKED	INTEGER_1(:)	multiple scattering warning flag None	1	Multiple Scattering warning flag. The multiple scattering warning flag (ATL09 parameter msw_flag) has values from -1 to 5 where zero means no multiple scattering and 5 the greatest. If no layers were detected, then msw_flag = 0. If blowing snow is detected and its estimated optical depth is greater than or equal to 0.5, then msw_flag = 5. If the blowing snow optical depth is less than 0.5, then msw_flag = 4. If no blowing snow is detected but there are cloud or aerosol layers detected, the msw_flag assumes values of 1 to 3 based on the height of the bottom of the lowest layer: < 1 km, msw_flag = 3; 1-3 km, msw_flag = 2; > 3km, msw_flag = 1. A value of -1 indicates that the signal to noise of the data was too low to reliably ascertain the presence of cloud or blowing snow. We expect values of -1 to occur only during daylight. (Source: ATL09); (Meanings: [-1 0 1 2 3 4 5]) (Values: ['cannot_determine', 'no_layers', 'layer_gt_3km', 'layer_between_1_and_3_km', 'layer_lt_1km', 'blow_snow_od_lt_0.5', 'blow_snow_od_gt_0.5'])
photon_rate	FLOAT(:)	photon rate	1	Photon count rate, averaged over sea ice segment.

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
CHUNKED	INVALID_R4B	None		(Source: ATL07)
podppd_flag CHUNKED	INTEGER_1(:)	POD_PPD Flag None	1	Composite POD/PPD flag that indicates the quality of input geolocation products for the specific height_segment. Value for height segment is sampled from geolocation parameter on ATL03. A non-zero value may indicate that geolocation solutions are degraded or that ATLAS is within a calibration scan period (CAL). Possible non-CAL values are: 0=Nominal; 1=POD_DEGRADE; 2=PPD_DEGRADE; 3=PODPPD_DEGRADE; possible CAL values are: 4=CAL_NOMINAL; 5=CAL_POD_DEGRADE; 6=CAL_PPD_DEGRADE; 7=CAL_PODPPD_DEGRADE. (ATL07 podppd_flag) (Source: ATL07, ATL03, ATL02, ANC04, ANC05); (Meanings: [0 1 2 3 4 5 6 7]) (Values: ['nominal', 'pod_degrade', 'ppd_degrade', 'podppd_degrade', 'cal_nominal', 'cal_pod_degrade', 'cal_ppd_degrade', 'new_meaning'])

Group: /gtx/leads		Contains parameters relating to the determination of open water leads and the reference surface heights		
data_rate	(Attribute)	Data within this group are stored at the lead index rate.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
delta_time CHUNKED	DOUBLE(:)	Elapsed GPS seconds time	seconds since 2018-01-01	Center time of the lead in seconds since the ATLAS SDP GPS 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. (Source: Derived via Time Tagging)
latitude CHUNKED	DOUBLE(:)	Center latitude of lead latitude	degrees_north	Center latitude of lead (mean of all sea surface height latitudes) (Source: ATBD section 5)
lead_dist_x CHUNKED	DOUBLE(:) INVALID_R8B	Along Track Distance distance	m	Along-track distance from the equator crossing. Distance is calculated by averaging distance of all ssh segments contained in lead. (Source: atl07)
lead_height CHUNKED	FLOAT(:) INVALID_R4B	Lead height None	meters	Lead height - weighted mean of consective sea surface heights used for this lead. The lead height is relative to the tide-free MSS. (Source: ATBD section 5)
lead_length CHUNKED	FLOAT(:) INVALID_R4B	Lead size None	meters	Along-track length of this lead (Source: ATBD section 5)
lead_sigma CHUNKED	FLOAT(:) INVALID_R4B	Lead sigma estimate None	meters	Lead height sigma (standard deviation) estimate - weighted combination of sea surface height sigmas used as leads in this beam for this swath segment (Source: ATBD section 5)
longitude CHUNKED	DOUBLE(:)	Center longitude of lead longitude	degrees_east	Center longitude of lead (mean of all freeboard longitudes) (Source: ATBD section 5)
ssh_n CHUNKED	INTEGER(:)	number of sea surface references None	1	Number of sea surface height segments used for this lead (Source: ATBD section 5)
ssh_ndx CHUNKED	INTEGER(:)	index first sea surface None	1	1-based index to the first freeboard element (i.e.first sea surface height segment) used for this lead (Source: Sea Ice ATBD)

Group: /gtx/reference_surface_section		Contains reference sea surface and mean freeboard parameters by each beam.		
data_rate	(Attribute)	Data within this group are stored at the reference surface section rate		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
beam_fb_hist_refsurf CHUNKED	INTEGER_2(:,:)	Reference surface section freeboard histogram	1	Reference surface freeboard histogram (distribution) for this reference surface section

		None		(Source: ATBD section 5)
beam_fb_length_refsurf_sum CHUNKED	FLOAT(:) INVALID_R4B	Total length of freeboard segments None	meters	Length of freeboard beam-segments within this reference surface section (Source: ATBD section 5)
beam_fb_refsurf CHUNKED	FLOAT(:) INVALID_R4B	Mean reference surface section freeboard None	meters	Mean segment length weighted reference surface freeboard. (Source: ATBD section 5)
beam_fb_unc_refsurf CHUNKED	FLOAT(:) INVALID_R4B	Mean freeboard uncertainty None	meters	Freeboard uncertainty estimate from the reference surface section mean freeboard, sampled from beam_freeboard/beam_fb_unc (Source: ATBD section 5)
beam_lead_n CHUNKED	INTEGER(:)	Number of leads None	1	Number of leads used for this beam reference surface section (Source: Sea Ice ATBD)
beam_lead_ndx CHUNKED	INTEGER(:)	index first lead None	1	1-based index to the first /GTx/leads lead used for this beam's reference surface. (Source: Sea Ice ATBD)
beam_refsurf_alongtrack_slope CHUNKED	FLOAT(:) INVALID_R4B	Reference surface along track slope None	degrees	Reference surface height along track slope (Source: ATBD section 5)
beam_refsurf_dist_x CHUNKED	DOUBLE(:) INVALID_R8B	Along track distance distance	m	Along-track distance from the equator crossing. Distance is calculated by averaging distance of all leads contained in reference surface. (Source: atl07)
beam_refsurf_earth_free2mean CHUNKED	FLOAT(:) INVALID_R4B	Reference surface section solid earth tide free-to-mean conversion solid earth tide free2mean	meters	Additive value to convert solid earth tide from the tide-free system to the mean-tide system at reference surface length scale. (Source: Sea Ice ATBD)
beam_refsurf_geoid CHUNKED	FLOAT(:) INVALID_R4B	reference surface section mean EGM2008 Geoid None	meters	Geoid height above WGS-84 reference ellipsoid at the reference surface length scale (range -107 to 86m), based on the EGM2008 model. The geoid height is in the tide-free system. (Source: Sea Ice ATBD)
beam_refsurf_geoid_free2mean CHUNKED	FLOAT(:) INVALID_R4B	Reference surface geoid free-to-mean conversion geoid free2mean	meters	Additive value to convert geoid heights from the tide-free system to the mean-tide system at reference surface length scale. (Source: Sea Ice ATBD)
beam_refsurf_height CHUNKED	FLOAT(:) INVALID_R4B	Reference surface section height mean None	meters	Reference surface section mean height - weighted combination of leads in this beam for this reference surface section. The reference surface height is relative to the tide-free MSS. (Source: ATBD section 5)
beam_refsurf_interp_flag CHUNKED	INTEGER_2(:)	Reference surface section interpolation flag None	1	Identifies reference surface sections with reference surface height filled through interpolation. -1 = no valid reference surface determined; 0= reference surface computed from leads in this swath; 1 = reference surface computed by interpolation using two valid reference surface (constrained by thresholds maxgaptime and maxgapht); 2 = reference surface computed using one-point fill (linear interpolation between two adjacent valid reference surfaces, constrained by threshold maxpadtime); 3 = reference surface computed using end-point fill (missing reference surface is set to the previous or next adjacent valid reference surface, constrained by threshold maxpadtime) (Source: ATBD section 5); (Meanings: [-1 0 1 2 3]) (Values: ['no_surf', 'leads_in_swath', 'inferred', 'one-point_fill', 'end-point_fill'])
beam_refsurf_mss CHUNKED	FLOAT(:) INVALID_R4B	Reference surface section Mean Sea Surface None	meters	Mean sea surface height above WGS-84 reference ellipsoid at reference surface length scale, sampled from height_segment_mss (tide free). (Source: Sea Ice ATBD)
beam_refsurf_sigma CHUNKED	FLOAT(:) INVALID_R4B	Reference surface height sigma None	meters	Reference surface height sigma (standard deviation) - weighted combination of lead sigmas in this beam for this swath segment (Source: ATBD section 5)

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Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
delta_time CHUNKED	DOUBLE(:) INVALID_R8B	Elapsed GPS seconds time	seconds since 2018-01-01	The center time assigned to this freeboard swath segment (mean of all freeboard times), in elapsed GPS seconds since the ATLAS SDP GPS 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. (Source: ATBD section 5)
ds_si_hist_bins CHUNKED	INTEGER(:)	Sea Ice Histogram Bins Dimension Scale None	1	Dimension scale indexing the sea ice histogram bins. The bin heights must be computed from information contained within the same group as the histogram. (Source: SeaIce ATBD)
fbswath_ndx CHUNKED	INTEGER(:)	Index to freeboard swath segment None	1	The 1-based fbswath_nx identifies the swath associated with each element. There are the same number of elements in the group /freeboard_swath_segment and in each of the /GTx/freeboard_beam_segment groups. The fbswath_nx identifies the fbswath_refsurf_height used to compute the fbswath_fb_height. It is the same index number that idenitifies the beam_refsurf_height to its swath and the beam_refsurf_height used to computed the beam_fb_height. (Source: ATBD section 5)
latitude CHUNKED	DOUBLE(:) INVALID_R8B	Center latitude of reference surface section latitude	degrees_north	Center latitude of reference surface section (mean of all freeboard latitudes) (Source: ATBD section 5)
longitude CHUNKED	DOUBLE(:) INVALID_R8B	Center longitude of reference surface section longitude	degrees_east	Center longitude of reference surface section (mean of all freeboard longitudes) (Source: ATBD section 5)
Group: /orbit_info		Contains orbit information.		
data_rate	(Attribute)	Varies. Data are only provided when one of the stored values (besides time) changes.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
crossing_time CHUNKED	DOUBLE(:)	Ascending Node Crossing Time time	seconds since 2018-01-01	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. (Source: POD/PPD)
cycle_number CHUNKED	INTEGER_1(:)	Cycle Number None	1	A count of the number of exact repeats of this reference orbit. (Source: Operations)
lan CHUNKED	DOUBLE(:)	Ascending Node Longitude None	degrees_east	Longitude at the ascending node crossing. (Source: POD/PPD)
orbit_number CHUNKED	UINT_2_LE(:)	Orbit Number None	1	Unique identifying number for each planned ICESat-2 orbit. (Source: Operations)
rgt CHUNKED	INTEGER_2(:)	Reference Ground track None	1	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. (Source: POD/PPD)
sc_orient CHUNKED	INTEGER_1(:)	Spacecraft Orientation None	1	This parameter tracks the spacecraft orientation between forward, backward and transitional flight

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
				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. (Source: POD/PPD); (Meanings: [0 1 2]) (Values: ['backward', 'forward', 'transition'])
sc_orient_time CHUNKED	DOUBLE(:)	Time of Last Spacecraft Orientation Change time	seconds since 2018-01-01	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. (Source: POD/PPD)

Group: /quality_assessment		Contains quality assessment data. This may include QA counters, QA along-track data and/or QA summary data.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
qa_granule_fail_reason COMPACT	INTEGER(1)	Granule Failure Reason 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. (Source: Operations); (Meanings: [0 1 2 3 4 5]) (Values: ['no_failure', 'PROCESS_ERROR', 'INSUFFICIENT_OUTPUT', 'failure_3', 'failure_4', 'OTHER_FAILURE'])
qa_granule_pass_fail COMPACT	INTEGER(1)	Granule Pass Flag None	1	Flag indicating granule quality. 0=granule passes automatic QA. 1=granule fails automatic QA. (Source: Operations); (Meanings: [0 1]) (Values: ['PASS', 'FAIL'])