

ATL12 Product Data Dictionary

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Product Type: ATL12, 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)	Sea Surface Height (SSH) of the global open ocean including the ice-free seasonal ice zone (SIZ) and near-coast regions.
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)	ATL12
hdfversion	(Attribute)	SET_BY_PGE
history	(Attribute)	SET_BY_PGE
identifier_file_uuid	(Attribute)	SET_BY_PGE
identifier_product_doi	(Attribute)	10.5067/ATLAS/ATL12.001
identifier_product_doi_authority	(Attribute)	http://dx.doi.org
identifier_product_format_version	(Attribute)	SET_BY_PGE
identifier_product_type	(Attribute)	ATL12
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)	ATL12
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		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
ds_surf_type (Compact Dataset)	INTEGER_4 (5)	Surface Type Dimension Scale (not_set)	1 not_set	Dimension scale indexing the surface type array. Index=1 corresponds to Land; index = 2 corresponds to Ocean; Index = 3 corresponds to Sealce; Index=4 corresponds to Landlce; Index=5 corresponds to InlandWater flag_values: 1, 2, 3, 4, 5 flag_meanings : land ocean seaice landice inland_water
ds_y_bincenters (Chunked Dataset)	FLOAT (:)	Y bins center (not_set)	meters not_set	Bin center values for the y histogram. Ranges -14.995 to 14.995 meters in 1 centimeter bin size steps.
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 re-use, 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) (not_set)	1 Derived	Requested start time (in UTC CCSDS-A) of this granule.
qa_at_interval (Compact Dataset)	DOUBLE (1)	QA Along-Track Interval (not_set)	1 control	Statistics time interval for along-track QA data.
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/ocean				
Description	(Attribute)	Contains general ancillary parameters.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
clid_thres (Compact Dataset)	FLOAT (1)	Cloud Threshold (not_set)	percent Operations	Data associated with cloud percentages above this threshold are not processed.
coarse_interval (Compact Dataset)	DOUBLE (1)	Coarse selection interval (not_set)	seconds Operations	The number of seconds of data used for coarse selection (normally equivalent to 400 laser pulses).
depth_shore (Compact Dataset)	FLOAT (1)	Depth Shore (not_set)	meters Control File Override (Defined in Ocean ATBD section 4.2.1.2 Coarse selection)	If ocean depth is less than depth_shore, then the current ocean segment is too close to land for ocean processing.
fine_max_secs (Compact Dataset)	DOUBLE (1)	Maximum Integration Time (not_set)	seconds Operations	Maximum fine segment duration of fine selection segment (equivalent to required number of tx pulses).
fine_min_sig (Compact Dataset)	INTEGER_4 (1)	Minimum Signal Photons (not_set)	counts Operations	Minimum number of signal photons required to perform fine selection.
hist_bin_size (Compact Dataset)	FLOAT (1)	Histogram Bin Size (not_set)	meters Operations	Height histogram and impulse response bin size in meters.
hist_bot (Compact Dataset)	FLOAT (1)	Histogram Bottom (not_set)	meters Operations	Bottom (minimum height) of the coarse and fine select histograms.
hist_nbins (Compact Dataset)	INTEGER_4 (1)	Number of histogram bins. (not_set)	counts Derived	Number of bins in each histogram.
hist_top (Compact Dataset)	FLOAT (1)	Histogram Top (not_set)	meters Operations	Top (maximum height) of the coarse and fine select histograms.
layer_switch (Compact Dataset)	INTEGER_1 (1)	layer_switch (not_set)	1 Control File Override (Defined in Ocean ATBD section 4.2.1.2 Coarse selection)	Switch to enable usage of layer_flag from ATL09. 0 - Ignore layer_flag when processing ocean data (default); 1 - Process a 14 geoseg ocean segment only if layer_flag is also 1. flag_values: 0, 1 flag_meanings : ignore_layer_flag use_layer_flag
min_ph_pcmt (Compact Dataset)	FLOAT (1)	Minimum Photon Percentage (not_set)	percent Operations	Minimum percentage of the selected coarse photons being selected in fine_sel to continue processing.
oc_region (Compact Dataset)	INTEGER_4 (1)	Ocean Region Index (not_set)	1 Operations	The ocean region covered within this granule.
ocseg_min_sig (Compact Dataset)	INTEGER_4 (1)	Ocean Segment Minimum Signal Photons (not_set)	counts Ocean ATBD Sect. 5.2.6.2 step I.Sect. 5.2.4 step G	Minimum number of signal photons required to process an ocean segment.
proc_interval (Compact Dataset)	INTEGER_4 (1)	Processing interval (not_set)	counts Operations	The number of 20 meter segments read at once from ATL03.
pts2bin (Compact Dataset)	INTEGER_4 (1)	Bins in Boxcar Smoother (not_set)	1 Control File Override (Defined in Ocean ATBD, section 5.3.2 step D and Table 5)	Defines the number of bins used in the boxcar smoother
sig_thres (Compact Dataset)	FLOAT (1)	Signal Threshold (not_set)	percent Operations	Threshold for photons to be considered signal.
Group: /gtx				
Description	(Attribute)	This ground contains parameters and subgroups related a specific groundtrack.		
data_rate	(Attribute)	Each subgroup identifies its particular data rate.		
Group: /gtx/ssh_segments				
Description	(Attribute)	Contains parameters relating to the calculated surface height.		
data_rate	(Attribute)	Data within this group are stored at the variable ocean processing segment rate.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
delt_seg (Chunked Dataset)	DOUBLE (:)	Ocean Segment Duration (not_set)	seconds Ocean ATBD Sect. 5.2.4 step N.	Time duration segment
delta_time (Chunked Dataset)	DOUBLE (:)	Elapsed GPS seconds (time)	seconds since 2018-01-01 telemetry	Mean time for the ocean surface segment in 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.

latitude (Chunked Dataset)	DOUBLE (:)	Mean latitude of surface segment (latitude)	degrees_north Ocean ATBD	Mean latitude of surface photons in segment
longitude (Chunked Dataset)	DOUBLE (:)	Mean longitude of surface segment (longitude)	degrees_east Ocean ATBD	Mean longitude of surface photons in segment
Group: /gtx/ssh_segments/heights				
Description	(Attribute)	Contains parameters including and relating to the calculated sea surface height.		
data_rate	(Attribute)	Data within this group are stored at the variable ocean processing segment rate.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
bin_ssbias (Chunked Dataset)	FLOAT (:)	Sea State Bias (not_set)	meters Ocean ATBD	Mean of linear fit removed from surface photon height (4.3.1)
h (Chunked Dataset)	FLOAT (:)	mean sea surface height (not_set)	meters Ocean ATBD Sect. 5.2.6.2 step I, equation 21	Mean sea surface height in meters computed as the mean of the distribution represented as an optimum 2-Gaussian mixture fit to the DOT plus the geoid and the mean removed in detrending the surface photon heights for analysis.
h_kurtosis (Chunked Dataset)	FLOAT (:)	kurtosis of sea surface height (not_set)	1 Ocean ATBD Sect. 5.2.6.2 step I, equation 24.	Excess kurtosis of sea surface height of the distribution represented as an optimum 2-Gaussian mixture fit to the DOT.
h_skewness (Chunked Dataset)	FLOAT (:)	Skewness of sea surface height (not_set)	1 Ocean ATBD Sect. 5.2.6.2 step I, equation 23	Skewness of photon sea surface height of the distribution represented as an optimum 2-Gaussian mixture fit to the DOT.
h_var (Chunked Dataset)	FLOAT (:)	Variance of fit (not_set)	meters^2 Ocean ATBD Sect. 5.2.6.2 step I, equation 22.	Variance in meters squared of the distribution represented as an optimum 2-Gaussian mixture fit to the DOT.
length_seg (Chunked Dataset)	DOUBLE (:)	Length of segment (not_set)	meters Ocean ATBD Sect. 5.2.4 step N.	Length of segment (m)
meanoffit2 (Chunked Dataset)	FLOAT (:)	coarse Sea surface height of segment (not_set)	meters Ocean ATBD Sect. 5.2.4 step G	Average of the linear fit, P_0+P_1*X , where P_0 and P_1 are the coefficients of the linear fit to the initial choice of surface photons and X is the array of along-track positions of the final choice of surface photons
mix_m1 (Chunked Dataset)	FLOAT (:)	Fraction of component 1 Gaussian mixture (not_set)	1 Ocean ATBD Sect. 5.2.6.2 step I.	Fraction of component 1 in 2-component Gaussian mixture
mix_m2 (Chunked Dataset)	FLOAT (:)	Fraction of component 2 Gaussian mixture (not_set)	1 Ocean ATBD Sect. 5.2.6.2 step I.	Fraction of component 2 in 2-component Gaussian mixture
mix_mu1 (Chunked Dataset)	FLOAT (:)	Mean of component 1 Gaussian mixture (not_set)	meters Ocean ATBD Sect. 5.2.6.2 step I.	Mean of component 1 in 2-component Gaussian mixture
mix_mu2 (Chunked Dataset)	FLOAT (:)	Mean of component 2 Gaussian mixture (not_set)	meters Ocean ATBD Sect. 5.2.6.2 step I.	Mean of component 2 in 2-component Gaussian mixture
mix_sig1 (Chunked Dataset)	FLOAT (:)	Standard deviation of component 1 Gaussian mixture (not_set)	meters Ocean ATBD Sect. 5.2.6.2 step I.	Standard deviation of component 1 in 2-component Gaussian mixture
mix_sig2 (Chunked Dataset)	FLOAT (:)	Standard deviation of component 2 Gaussian mixture (not_set)	meters Ocean ATBD Sect. 5.2.6.2 step I.	Standard deviation of component 2 in 2-component Gaussian mixture
n_pulse_seg (Chunked Dataset)	FLOAT (:)	Number laser pulses segment (not_set)	counts Ocean ATBD	Number of laser pulses in segment
p0 (Chunked Dataset)	FLOAT (:)	Intercept of Linear Fit (not_set)	meters Ocean ATBD	Zero intercept of the linear fit used to detrend the photon heights before going into the second round of surface finding
p1 (Chunked Dataset)	FLOAT (:)	Slope of Linear Fit (not_set)	meters/meter Ocean ATBD	Slope of linear fit versus along-track distance to surface photon height
slope_seg (Chunked Dataset)	DOUBLE (:)	Sea surface slope of segment (not_set)	meters/meters Ocean ATBD Sect. 5.2.6.2 step I.Sect. 5.2.4 step G	Sea surface slope equal to the linear coefficient , P_1 , of the linear fit used to detrend the photon heights before going into the second round of surface finding.
swh (Chunked Dataset)	FLOAT (:)	swh (not_set)	meters Ocean ATBD	Significant wave height estimated as 4 times the standard deviation of along track 10-m bin averaged surface height
y (Chunked Dataset)	FLOAT (:, :)	PDF of Height (not_set)	1/meter Ocean ATBD	Probability density function of photon surface height
ykurt (Chunked Dataset)	FLOAT (:)	ykurt (not_set)	1 Ocean ATBD	Excess Kurtosis = (fourth moment of Y)/ Yvar squared, all -3. The fourth moment of Y is calculated as the integral of $Y(z)$ times z to the fourth, all divided by the integral of $Y(z)$.

ymean (Chunked Dataset)	FLOAT (:)	ymean (not_set)	meters Ocean ATBD	Mean=first moment of Y calculated as the integral of Y(z) times z all divided by the integral of Y(z). This, should be $-0 = h - \text{meanoffit}^2$
yskew (Chunked Dataset)	FLOAT (:)	yskew (not_set)	1 Ocean ATBD	Skewness = (third moment of Y)/ Yvar to the 3/2 power. The third moment of Y is calculated as the integral of Y(z) times z cubed, all divided by the integral of Y(z).
yvar (Chunked Dataset)	FLOAT (:)	yvar (not_set)	meter^2 Ocean ATBD	Variance= second moment of Y calculated as the integral of Y(z) times z squared, all divided by the integral of Y(z).
Group: /gtx/ssh_segments/stats				
Description	(Attribute)	Contains parameters related to quality and corrections on the sea surface height parameters		
data_rate	(Attribute)	Data within this group are stored at the variable ocean processing segment rate.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
backgr_seg (Chunked Dataset)	FLOAT (:)	ATL03 background (not_set)	1/meters Ocean ATBD	backgrd_atlas/bckgrd_rate from ATL03 averaged over the segment
dac_seg (Chunked Dataset)	FLOAT (:)	Dynamic Atmosphere Correction (not_set)	meters ATL03	Ocean segment average of dynamic atmospheric correction (DAC) includes inverted barometer (IB) affect
depth_ocn_seg (Chunked Dataset)	FLOAT (:)	Ocean depth (not_set)	meters Ocean ATBD	The average of depth_ocn of geo-segments used in the ocean segment
first_geoseg (Chunked Dataset)	INTEGER_4 (:)	ATL03 Geolocation Segment (not_set)	1 Ocean ATBD	The first of the geosegment ids (segment_id) for each ocean segment
first_pce_mframe_cnt (Chunked Dataset)	UINT_4_LE (:)	First PCE Major frame ID (not_set)	counts I1a/atlas/pce/altimeter/photons_s and photons_w	First Major Frame ID in the SSH segment
first_tx_pulse (Chunked Dataset)	INTEGER_4 (:)	First Transmit Pulse (not_set)	counts Ocean ATBD	First Transmit pulse in along-track segment
fpb_corr (Chunked Dataset)	FLOAT (:)	first photon bias correction (not_set)	meters Ocean ATBD	Estimated first-photon bias correction to mean segment height = 0 pending findings to the contrary for the ocean
fpb_corr_stdev (Chunked Dataset)	FLOAT (:)	fpb_corr_stdev (not_set)	meters Ocean ATBD	Estimated error in fpb_corr = 0 pending findings to the contrary
geoid_seg (Chunked Dataset)	FLOAT (:)	Geoid (not_set)	meters ATL03	Ocean segment average of geoid height above the WGS 84 reference ellipsoid (range -107 to 86 m)
last_pce_mframe_cnt (Chunked Dataset)	UINT_4_LE (:)	Last PCE Major frame ID (not_set)	counts I1a/atlas/pce/altimeter/photons_s and photons_w	Last Major Frame ID in the SSH segment
last_tx_pulse (Chunked Dataset)	INTEGER_4 (:)	Last Transmit Pulse (not_set)	counts Ocean ATBD	Last Transmit pulse in along-track segment
layer_flag_seg (Chunked Dataset)	INTEGER_4 (:)	Layer Flag (not_set)	1 Ocean ATBD	The layer flag from ATL09 that is in effect over 50% of the ocean segment, 0 indicating absence of clouds and forward scattering, and 1 indicating possibility of forward scattering as in ATL09
n_photons (Chunked Dataset)	INTEGER_8 (:)	Number surface photons segment (not_set)	counts Ocean ATBD	Number of surface photons found for the segment
n_ttl_photon (Chunked Dataset)	INTEGER_8 (:)	Number photons segment (not_set)	counts Ocean ATBD Sect. 5.2.4 step N.	Number of photons in the 15-m ocean downlink band
neutat_delay_total_seg (Chunked Dataset)	FLOAT (:)	Total Neutral Atmospheric Delay (not_set)	meters ATL03	Ocean segment average of total neutral atmosphere delay correction (wet + dry)
orbit_number (Chunked Dataset)	INTEGER_2 (:)	Orbit Number (not_set)	1 ATL03	Unique identifying number for each planned ICESat-2 orbit
photon_rate (Chunked Dataset)	FLOAT (:)	Photon count rate, averaged over the segment (not_set)	1/meters Ocean ATBD Sect. 5.2.4 step N.	Photon count rate, averaged over the segment
photonns_rate (Chunked Dataset)	FLOAT (:)	Noise photon count rate, averaged over the segment (not_set)	1/meters Ocean ATBD Sect. 5.2.4 step N. Sect. 5.2.4 step N	Noise photon count rate, averaged over the segment
ref_azimuth_seg (Chunked Dataset)	FLOAT (:)	Azimuth (azimuth)	radians ATL03	Ocean segment average of azimuth of the unit pointing vector for the reference photon in the local ENU frame in radians. The angle is measured from North and positive towards East
ref_elev_seg (Chunked Dataset)	FLOAT (:)	elevation (elevation)	radians ATL03	Ocean segment average of elevation of the unit pointing vector for the reference photon in the local ENU frame in radians. The angle is measured from the East-North plane and positive towards Up
seg_dist_x_seg (Chunked Dataset)	DOUBLE (:)	Distance along-track (not_set)	meters Ocean ATBD	Ocean segment average of the along-track distance from the equator crossing to the start of the 20-m geolocation segments included in the ocean segment

segment_id (Chunked Dataset)	INTEGER_4 (:)	ATL03 geolocation segment ID number. (not_set)	1 ATL03	A 7 digit number identifying the first along-track ATL03 geolocation segment number in the ocean height segment
solar_azimuth_seg (Chunked Dataset)	FLOAT (:)	solar azimuth (not_set)	degrees_east ATL03	Ocean segment average of the azimuth of the sun position vector from the reference photon bounce point position in the local ENU frame. The angle is measured from North and is positive towards East. The average is provided in degrees.
solar_elevation_seg (Chunked Dataset)	FLOAT (:)	solar elevation (not_set)	degrees ATL03	Ocean segment average of the elevation of the sun position vector from the reference photon bounce point position in the local ENU frame. The angle is measured from the East-North plane and is positive towards Up. The average is provided in degrees.
ss_corr (Chunked Dataset)	FLOAT (:)	subsurface scattering correction (not_set)	meters Ocean ATBD	Subsurface scattering correction, placeholder = zero pending further findings to the contrary
ss_corr_stdev (Chunked Dataset)	FLOAT (:)	ss_corr_stdev (not_set)	meters Ocean ATBD	Estimated error of subsurface scattering correction, placeholder = zero pending further findings to the contrary
surf_type_prcnt (Chunked Dataset)	FLOAT (5, :)	Percent Surface Type (not_set)	1 ATL03	Percent of each surface type (land, ocean, sea ice, land ice, inland water from masks) in the ocean segment
tide_earth_seg (Chunked Dataset)	FLOAT (:)	Earth Tide (not_set)	meters ATL03	Ocean segment average of solid earth tides
tide_equilibrium_seg (Chunked Dataset)	FLOAT (:)	Equilibrium Tide (not_set)	meters ATL03	Long period equilibrium tide self-consistent with ocean tide model (+0.04m).
tide_load_seg (Chunked Dataset)	FLOAT (:)	Load Tide (not_set)	meters ATL03	Ocean segment average of local displacement due to ocean loading (-6 to 0 cm)
tide_oc_pole_seg (Chunked Dataset)	FLOAT (:)	Ocean Pole Tide (not_set)	meters ATL03	Ocean segment average of oceanic surface rotational deformation due to polar motion (-2 to +2 mm)
tide_ocean_seg (Chunked Dataset)	FLOAT (:)	Ocean Tide (not_set)	meters ATL03	Ocean segment average of ocean tides including diurnal and semi-diurnal (harmonic analysis) and longer period tides (dynamic and self-consistent equilibrium)
tide_pole_seg (Chunked Dataset)	FLOAT (:)	Solid Earth Pole Tide (not_set)	meters ATL03	Solid Earth Pole Tide -Rotational deformation due to polar motion (-1.5 to 1.5 cm).

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.
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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 error; 2=Insufficient output data was generated; 3=TBD Failure; 4=TBD_Failure; 5=other failure. flag_values: 0, 1, 2, 3, 4, 5 flag_meanings: no_failure PROCESS_ERROR INSUFFICIENT_OUTPUT failure_3 failure_4 OTHER_FAILURE
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

Group: /quality_assessment/along_track

Description	(Attribute)	Along-track statistics
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