ATL12 Product Data Dictionary

Date Generated : 2020-10-21T15:57:06

description	(Attribute)	Sea Surface Height (SSH) of the global open ocean including the ice-free seasonal ice zone (SIZ) and near-coast regions.
level	(Attribute)	L3A
short_name	(Attribute)	ATL12
title	(Attribute)	SET_BY_META
Group: /		Sea Surface Height (SSH) of the global open ocean including the ice-free seasonal ice zone (SIZ) and near-coast regions.
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
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)	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
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		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
ds_a CHUNKED	INTEGER(['Unlimited'])	Wave Number Dimension Scale None	1	Dimension scale for harmonic coefficients. (Source: Dim Scale)
ds_surf_type COMPACT	INTEGER([5])	Surface Type Dimension Scale None	1	Dimension scale indexing the surface type array. Index=1 corresponds to Land; index = 2 corresponds to Ocean; Index = 3 corresponds to SeaIce; Index=4 corresponds to LandIce; Index=5 corresponds to InlandWater (Source: Dim Scale); (Meanings: [1 2 3 4 5]) (Values: ['land' 'ocean' 'seaice' 'landice' 'inland_water'])
ds_wn CHUNKED	INTEGER(['Unlimited'])	Wave Number Dimension Scale None	1	Dimension scale for harmonic wave numbers. (Source: Dim Scale)
ds_xbin CHUNKED	FLOAT(['Unlimited'])	10m bin centers None	meters	Bin center values for the 10m bin averaged data from the SSB calculation. (Source: Dim Scale)
ds_y_bincenters CHUNKED	FLOAT(['Unlimited'])	Y bins center None	meters	Bin center values for the y histogram. Ranges -14.995 to 14.995 meters in 1 centimeter bin size steps. (Source: Dim Scale)
Group: /ancillary_data		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(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	STRING([1])	End UTC Time of	1	UTC (in CCSDS-A format) of the last data point

COMPACT		Granule (CCSDS-A, Actual) None		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)
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)
qa_at_interval COMPACT	DOUBLE([1])	QA Along-Track Interval None	1	Statistics time interval for along-track QA data. (Source: control)
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	seconds	GPS seconds-of-week of the first data point in the granule.

		(Actual) None		(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/ocean		Contains general ancillary parameters.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
cld_thres COMPACT	FLOAT([1])	Cloud Threshold None	percent	Data associated with cloud percentages above this threshold are not processed. (Source: Operations)
coarse_interval COMPACT	DOUBLE([1])	Coarse selection interval None	seconds	The number of seconds of data used for coarse selection (normally equivalent to 400 laser pulses). (Source: Operations)
conf_lim COMPACT	INTEGER([1])	Minimum Confidence Level None	1	Minimum confidence level to be included in moving average. Typically 3 or 4. (Source: Operations)
conf_lim_min COMPACT	INTEGER([1])	Fallback Minimum Confidence Level None	1	Minimum fallback confidence level to be used in moving average. Typically 2 or 3. (Source: Operations)
depth_shore COMPACT	FLOAT([1])	Depth Shore None	meters	If ocean depth is less than depth_shore, then the current ocean segment is too close to land for ocean processing. (Source: Control File Override (Defined in Ocean ATBD section 4.2.1.2 Coarse selection))
fine_max_secs COMPACT	DOUBLE([1])	Maximum Integration Time	seconds	Maximum fine segment duration of fine selection segment (equivalent to required number of tx

		None		pulses). (Source: Operations)
fine_min_sig COMPACT	INTEGER([1])	Minimum Signal Photons None	counts	Minimum number of signal photons required to perform fine selection. (Source: Operations)
gapfilldx COMPACT	FLOAT([1])	Pseudo photon spacing None	meters	Spacing of pseudo photons for harmonic analysis. (Source: Control File Override (Defined in Ocean ATBD section 4.2.1.2 Coarse selection))
gaplimit COMPACT	FLOAT([1])	Min Gap for Normal Harmonic Analysis None	meters	Largest data gap for harmonic analysis. (Source: Control File Override (Defined in Ocean ATBD section 4.2.1.2 Coarse selection))
hist_bin_size COMPACT	FLOAT([1])	Histogram Bin Size None	meters	Height histogram and impulse response bin size in meters. (Source: Operations)
hist_bot COMPACT	FLOAT([1])	Histogram Bottom None	meters	Bottom (minimum height) of the coarse and fine select histograms. (Source: Operations)
hist_nbins COMPACT	INTEGER([1])	Number of histogram bins. None	counts	Number of bins in each histogram. (Source: Derived)
hist_top COMPACT	FLOAT([1])	Histogram Top None	meters	Top (maximum height) of the coarse and fine select histograms. (Source: Operations)
layer_switch COMPACT	INTEGER_1([1])	layer_switch None	1	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. (Source: Control File Override (Defined in Ocean ATBD section 4.2.1.2 Coarse selection)); (Meanings: [0 1]) (Values: ['ignore_layer_flag' 'use_layer_flag'])
min_ph_pcnt COMPACT	FLOAT([1])	Minimum Photon Percentage None	percent	Minimum percentage of the selected coarse photons being selected in fine_sel to continue processing. (Source: Operations)
min_sigconf COMPACT	INTEGER([1])	Minimum Confidence Level in coarse_sel None	1	Minimum confidence level to be used in coarse_sel. Typically 1. (Source: Operations)
nharms COMPACT	INTEGER([1])	Number of Harmonics for Fit None	1	Number of harmonics to fit to selected surface photons. (Source: Operations)
nphoton COMPACT	INTEGER([1])	Half Number Photons For Average None	1	Number of photons either side of central photon to consider averaging 5 for an 11 point average. (Source: Operations)
oc_region COMPACT	INTEGER([1])	Ocean Region Index None	1	The ocean region covered within this granule. (Source: Operations)
ocseg_min_sig COMPACT	INTEGER([1])	Ocean Segment Minimum Signal Photons None	counts	Minimum number of signal photons required to process an ocean segment. (Source: Ocean ATBD Sect. 5.2.6.2 step I.Sect. 5.2.4 step G)
proc_interval COMPACT	INTEGER([1])	Processing interval None	counts	The number of 20 meter segments read at once from ATL03. (Source: Operations)

pts2bin COMPACT	INTEGER([1])	Bins in Boxcar Smoother None	1	Defines the number of bins used in the boxcar smoother (Source: Control File Override (Defined in Ocean ATBD, section 5.3.2 step D and Table 5))
sig_thres COMPACT	FLOAT([1])	Signal Threshold None	percent	Threshold for photons to be considered signal. (Source: Operations)
sw_delta_t COMPACT	DOUBLE([1])	Strong-Weak Delta Time None	seconds	Approximate time differencebetween strong and weak beams for one segment_id. (Source: Operations)
use_podppd_flag COMPACT	INTEGER_1([1])	use_podppd_flag None	1	0 - Ignore podppd_flag when processing ocean data; 1 - Skip data where podppd_flag is 1. (Source: Control File Override (Defined in Ocean ATBD section 4.2.1.2 Coarse selection)); (Meanings: [0 1]) (Values: ['ignore_podppd_flag' 'use_podppd_flag'])
Group: /gtx		This ground contains parameters and subgroups related a specific groundtrack.		
data_rate	(Attribute)	Each subgroup identifies its particular data rate.		
Group: /gtx/ssh_segments		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(Dims) Fillvalue	long_name standard_name	units	description
delt_seg CHUNKED	DOUBLE(['Unlimited'])	Ocean Segment Duration None	seconds	Time duration segment (Source: Ocean ATBD Sect. 5.2.4 step N.)
delta_time CHUNKED	DOUBLE(['Unlimited'])	Elapsed GPS seconds time	seconds since 2018-01-01	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. (Source: telemetry)
latitude CHUNKED	DOUBLE(['Unlimited'])	Mean latitude of surface segment latitude	degrees_north	Mean latitude of surface photons in segment (Source: Ocean ATBD)
longitude CHUNKED	DOUBLE(['Unlimited'])	Mean longitude of surface segment longitude	degrees_east	Mean longitude of surface photons in segment (Source: Ocean ATBD)
Group: /gtx/ssh_segments/heights		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(Dims) Fillvalue	long_name standard_name	units	description
a CHUNKED	DOUBLE(['Unlimited', 'Unlimited'])	Harmonic Coefficients None	meters	Vector of 2 x nharms + 1 coefficients for each harmonic component in the harmonic analysis of heights. a(1,oc_seg) is the coefficient for wavenumber equal zero. a(even index j, oc_seg) is the sine coefficient for wn(j/2), and a(odd index j, oc_seg) is the cosine coefficient for wn((j-1)/2) (Source: Ocean ATBD, Section 5.3.3.2, step 4)
bin_ssbias CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Sea State Bias None	meters	Mean of linear fit removed from surface photon height (4.3.1) (Source: Ocean ATBD)
dxbar	FLOAT(['Unlimited'])	Mean Dist	meters	Mean distance between signal photons.

CHUNKED	INVALID_R4B	Between Signal Photons None		(Source: Ocean ATBD)
dxskew CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Skewness of Dist Between Sig Photons None	meters	Skewness of distance between signal photons. (Source: Ocean ATBD)
dxvar CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Variance of Dist Between Sig Photons None	meters	Variance of distance between signal photons. (Source: Ocean ATBD)
h CHUNKED	FLOAT(['Unlimited'])	mean sea surface height None	meters	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. (Source: Ocean ATBD Sect. 5.2.6.2 step I, equation 21)
h_kurtosis CHUNKED	FLOAT(['Unlimited'])	kurtosis of sea surface height None	1	Excess kurtosis of sea surface height of the distribution represented as an optimum 2-Gaussian mixture fit to the DOT. (Source: Ocean ATBD Sect. 5.2.6.2 step I, equation 24.)
h_skewness CHUNKED	FLOAT(['Unlimited'])	Skewness of sea surface height None	1	Skewness of photon sea surface height of the distribution represented as an optimum 2-Gaussian mixture fit to the DOT. (Source: Ocean ATBD Sect. 5.2.6.2 step I, equation 23)
h_uncrtn CHUNKED	FLOAT(['Unlimited'])	Uncertaintity in mean SSH None	1	Uncertainty in the mean sea surface height over an ocean segment (Source: Ocean ATBD, Section 5.3.6.1 c)
h_var CHUNKED	FLOAT(['Unlimited'])	Variance of fit None	meters^2	Variance in meters squared of the distribution represented as an optimum 2-Gaussian mixture fit to the DOT. (Source: Ocean ATBD Sect. 5.2.6.2 step I, equation 22.)
htybin CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	Average 10m height None	meters	The 10-m bin averaged heights from the SSB calculation for each ocean segment. (Source: Ocean ATBD)
latbind CHUNKED	DOUBLE(['Unlimited', 'Unlimited']) INVALID_R8B	Average latitude for each 10m bin None	degrees north	Averages of latitudes in each 10-meter bin (Source: Ocean ATBD)
length_seg CHUNKED	DOUBLE(['Unlimited'])	Length of segment None	meters	Length of segment (m) (Source: Ocean ATBD Sect. 5.2.4 step N.)
lonbind CHUNKED	DOUBLE(['Unlimited', 'Unlimited']) INVALID_R8B	Average longitude for each 10m bin None	degrees east	Averages of longitudes in each 10-meter bin (Source: Ocean ATBD)
meanoffit2 CHUNKED	FLOAT(['Unlimited'])	coarse Sea surface height of segment None	meters	Average of the linear fit, P0+P1*X, where P0 and P1 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 (Source: Ocean ATBD Sect. 5.2.4 step G)
mix_m1 CHUNKED	FLOAT(['Unlimited'])	Fraction of component 1 Gaussian mixture None	1	Fraction of component 1 in 2-component Gaussian mixture (Source: Ocean ATBD Sect. 5.2.6.2 step I.)

mix_m2 CHUNKED	FLOAT(['Unlimited'])	Fraction of component 2 Gaussian mixture None	1	Fraction of component 2 in 2-component Gaussian mixture (Source: Ocean ATBD Sect. 5.2.6.2 step I.)
mix_mu1 CHUNKED	FLOAT(['Unlimited'])	Mean of component 1 Gaussian mixture None	meters	Mean of component 1 in 2-component Gaussian mixture (Source: Ocean ATBD Sect. 5.2.6.2 step I.)
mix_mu2 CHUNKED	FLOAT(['Unlimited'])	Mean of component 2 Gaussian mixture None	meters	Mean of component 2 in 2-component Gaussian mixture (Source: Ocean ATBD Sect. 5.2.6.2 step I.)
mix_sig1 CHUNKED	FLOAT(['Unlimited'])	Standard deviation of component 1 Gaussian mixture None	meters	Standard deviation of component 1 in 2-component Gaussian mixture (Source: Ocean ATBD Sect. 5.2.6.2 step I.)
mix_sig2 CHUNKED	FLOAT(['Unlimited'])	Standard deviation of component 2 Gaussian mixture None	meters	Standard deviation of component 2 in 2-component Gaussian mixture (Source: Ocean ATBD Sect. 5.2.6.2 step I.)
n_pulse_seg CHUNKED	FLOAT(['Unlimited'])	Number laser pulses segment None	counts	Number of laser pulses in segment (Source: Ocean ATBD)
np_effect CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Degrees of Freedom None	1	Effective degrees of freedom of the average sea surface height for the ocean segment (Source: Ocean ATBD, Section 5.3.6.1 c)
p0 CHUNKED	FLOAT(['Unlimited'])	Intercept of Linear Fit None	meters	Zero intercept of the linear fit used to detrend the photon heights before going into the second round of surface finding (Source: Ocean ATBD)
p1 CHUNKED	FLOAT(['Unlimited'])	Slope of Linear Fit None	meters/meter	Slope of linear fit versus along-track distance to surface photon height (Source: Ocean ATBD)
slope_seg CHUNKED	DOUBLE(['Unlimited'])	Sea surface slope of segment None	meters/meters	Sea surface slope equal to the linear coefficient , P1, of the linear fit used to detrend the photon heights before going into the second round of surface finding. (Source: Ocean ATBD Sect. 5.2.6.2 step I.Sect. 5.2.4 step G)
snr_harm CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Harmonic SNR None	meters**2/meters**2	Signal to noise ratio of harmonic fit with coefficients in a to the surface reflected photons including meanoffit2 and with data gaps greater than gaplimit filled with Gaussian white noise about meanoffit2 (Source: Ocean ATBD)
swh CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	swh None	meters	Significant wave height estimated as 4 times the standard deviation of along track 10-m bin averaged surface height (Source: Ocean ATBD)
wn CHUNKED	DOUBLE(['Unlimited', 'Unlimited'])	Harmonic Wave Numbers None	1/meters	nharms wavenumbers, equal to the inverse of wavelengths for each harmonic component in harmonic analysis of heights. (Source: Ocean ATBD, Section 5.3.3.2 step 1)
xbind	FLOAT(['Unlimited',	Average distance	meters	Averages of along-track distance in each 10-

CHUNKED	'Unlimited']) INVALID_R4B	for each 10m bin None		meter bin (Source: Ocean ATBD)
xrbin CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	Average 10m photon rate None	photons/meter	The 10-m bin averaged photon rate from the SSB calculation for each ocean segment. (Source: Ocean ATBD)
y CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	PDF of Height None	1/meter	Probability density function of photon surface height (Source: Ocean ATBD)
ykurt CHUNKED	FLOAT(['Unlimited'])	ykurt None	1	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). (Source: Ocean ATBD)
ymean CHUNKED	FLOAT(['Unlimited'])	ymean None	meters	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 -meanoffit2 (Source: Ocean ATBD)
yskew CHUNKED	FLOAT(['Unlimited'])	yskew None	1	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). (Source: Ocean ATBD)
yvar CHUNKED	FLOAT(['Unlimited'])	yvar None	meter^2	Variance= second moment of Y calculated as the integral of Y(z) times z squared, all divided by the integral of Y(z). (Source: Ocean ATBD)
Group: /gtx/ssh_segments/stats		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(Dims) Fillvalue	long_name standard_name	units	description
backgr_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	ATL03 background None	1/meters	backgrd_atlas/bckgrd_rate from ATL03 averaged over the segment (Source: Ocean ATBD)
cloudcover_percent_seg CHUNKED	FLOAT(['Unlimited'])	Percent Cloudcover None	1	The percentage of geosegs in the ocean segment with layer_flag=1 (Source: Ocean ATBD)
dac_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Dynamic Atmosphere Correction None	meters	Ocean segment average of dynamic atmospheric correction (DAC) includes inverted barometer (IB) affect (Source: ATL03)
depth_ocn_seg CHUNKED	FLOAT(['Unlimited'])	Ocean depth None	meters	The average of depth_ocn of geo-segments used in the ocean segment (Source: Ocean ATBD)
first_geoseg CHUNKED	INTEGER(['Unlimited'])	ATL03 Geolocation Segment None	1	The first of the geosegment ids (segment_id) for each ocean segment (Source: Ocean ATBD)
first_pce_mframe_cnt CHUNKED	UINT_4_LE(['Unlimited'])	First PCE Major frame ID None	counts	First Major Frame ID in the SSH segment (Source: l1a/atlas/pcex/altimeter/photons_s and photons_w)
first_tx_pulse CHUNKED	INTEGER(['Unlimited'])	First Transmit Pulse None	counts	First Transmit pulse in along-track segment (Source: Ocean ATBD)
fpb_corr CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	first photon bias correction None	meters	Estimated first-photon bias correction to mean segment height = 0 pending findings to the contrary for the ocean (Source: Ocean ATBD)
fpb_corr_stdev	FLOAT(['Unlimited'])	fpb_corr_stdev	meters	Estimated error in fpb_corr = 0 pending findings

CHUNKED	INVALID_R4B	None		to the contrary (Source: Ocean ATBD)
full_sat_fract_seg CHUNKED	FLOAT(['Unlimited'])	Fraction Fully Saturated None	1	Fraction of all pulses in all geosegs used that were fully saturated (Source: ATL03)
geoid_free2mean_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Geoid Free-to-Mean conversion None	meters	Ocean segment average additive value to convert geoid heights from the tide-free system to the mean-tide system. (Subtract from geoid_seg to get the geoid heights in the free-tide system.) (Source: ATL03)
geoid_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Geoid (Mean Tide System) None	meters	Ocean segment average of mean tide system geoid height above the WGS 84 reference ellipsoid (range -107 to 86 m). (Source: ATL03)
last_geoseg CHUNKED	INTEGER(['Unlimited'])	ATL03 geolocation segment ID number. None	1	A 7 digit number identifying the last along-track ATL03 geolocation segment number in the ocean height segment (Source: ATL03)
last_pce_mframe_cnt CHUNKED	UINT_4_LE(['Unlimited'])	Last PCE Major frame ID None	counts	Last Major Frame ID in the SSH segment (Source: l1a/atlas/pcex/altimeter/photons_s and photons_w)
last_tx_pulse CHUNKED	INTEGER(['Unlimited'])	Last Transmit Pulse None	counts	Last Transmit pulse in along-track segment (Source: Ocean ATBD)
layer_flag_seg CHUNKED	INTEGER(['Unlimited'])	Layer Flag None	1	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 (Source: Ocean ATBD)
n_photons CHUNKED	INTEGER_8(['Unlimited'])	Number surface photons segment None	counts	Number of surface photons found for the segment (Source: Ocean ATBD)
n_ttl_photon CHUNKED	INTEGER_8(['Unlimited'])	Number photons segment None	counts	Number of photons in the 15-m ocean downlink band (Source: Ocean ATBD Sect. 5.2.4 step N.)
near_sat_fract_seg CHUNKED	FLOAT(['Unlimited'])	Fraction Nearly Saturated None	1	Fraction of all pulses in all geosegs used that were nearly saturated (Source: ATL03)
neutat_delay_total_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Total Neutral Atmospheric Delay None	meters	Ocean segment average of total neutral atmosphere delay correction (wet + dry) (Source: ATL03)
orbit_number CHUNKED	INTEGER_2(['Unlimited'])	Orbit Number None	1	Unique identifying number for each planned ICESat-2 orbit (Source: ATL03)
photon_rate CHUNKED	FLOAT(['Unlimited'])	Photon count rate, averaged over the segment None	1/meters	Photon count rate, averaged over the segment (Source: Ocean ATBD Sect. 5.2.4 step N.)
photonns_rate CHUNKED	FLOAT(['Unlimited'])	Noise photon count rate, averaged over the segment None	1/meters	Noise photon count rate, averaged over the segment (Source: Ocean ATBD Sect. 5.2.4 step N.Sect. 5.2.4 step N)
ref_azimuth_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Azimuth azimuth	radians	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

				(Source: ATL03)
ref_elev_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	elevation elevation	radians	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 (Source: ATL03)
seg_dist_x_seg CHUNKED	DOUBLE(['Unlimited'])	Distance along-track None	meters	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 (Source: Ocean ATBD)
solar_azimuth_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	solar azimuth None	degrees_east	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. (Source: ATL03)
solar_elevation_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	solar elevation None	degrees	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. (Source: ATL03)
ss_corr CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	subsurface scattering correction None	meters	Subsurface scattering correction, placeholder = zero pending further findings to the contrary (Source: Ocean ATBD)
ss_corr_stdev CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	ss_corr_stdev None	meters	Estimated error of subsurface scattering correction, placeholder = zero pending further findings to the contrary (Source: Ocean ATBD)
surf_type_prcnt CHUNKED	FLOAT(['Unlimited', 5])	Percent Surface Type None	1	Percent of each surface type (land, ocean, sea ice, land ice, inland water from masks) in the ocean segment (Source: ATL03)
tide_earth_free2mean_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Earth Tide Free-to-Mean conversion None	meters	Ocean segment average additive value to convert solid earth tide from the tide-free system to the mean tide system. (Add to tide_earth to get solid earth tides in the mean-tide system.) (Source: ATL03)
tide_earth_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Earth Tide None	meters	Ocean segment average of tide free system solid earth tides (Source: ATL03)
tide_equilibrium_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Equilibrium Tide None	meters	Long period equilibrium tide self-consistent with ocean tide model (+-0.04m). (Source: ATL03)
tide_load_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Load Tide None	meters	Ocean segment average of local displacement due to ocean loading (-6 to 0 cm) (Source: ATL03)
tide_oc_pole_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Ocean Pole Tide None	meters	Ocean segment average of oceanic surface rotational deformation due to polar motion (-2 to +2 mm) (Source: ATL03)
tide_ocean_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Ocean Tide None	meters	Ocean segment average of ocean tides including diurnal and semi-diurnal (harmonic analysis) and longer period tides (dynamic and self-consistent equilibrium) (Source: ATL03)

tide_pole_seg CHUNKED	FLOAT(['Unlimited']) INVALID_R4B	Solid Earth Pole Tide None	meters	Solid Earth Pole Tide -Rotational deformation due to polar motion (-1.5 to 1.5 cm). (Source: ATL03)
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(['Unlimited'])	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(['Unlimited'])	Cycle Number None	1	A count of the number of exact repeats of this reference orbit. (Source: Operations)
lan CHUNKED	DOUBLE(['Unlimited'])	Ascending Node Longitude None	degrees_east	Longitude at the ascending node crossing. (Source: POD/PPD)
orbit_number CHUNKED	UINT_2_LE(['Unlimited'])	Orbit Number None	1	Unique identifying number for each planned ICESat-2 orbit. (Source: Operations)
rgt CHUNKED	INTEGER_2(['Unlimited'])	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(['Unlimited'])	Spacecraft Orientation None	1	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. (Source: POD/PPD); (Meanings: [0 1 2]) (Values: ['backward' 'forward' 'transition'])
sc_orient_time CHUNKED	DOUBLE(['Unlimited'])	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'])
Group: /quality_assessment/along_track		Along-track statistics		