

ATL04 Product Data Dictionary

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Product Type: ATL04, 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)	ATL04 contains along-track normalized relative backscatter profiles of the atmosphere. The product includes full 532 nm (14 km) uncalibrated attenuated backscatter profiles at 25 times per second for vertical bins of approximately 30 meters. Calibration co
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)	ATL04
hdfversion	(Attribute)	SET_BY_PGE
history	(Attribute)	SET_BY_PGE
identifier_file_uuid	(Attribute)	SET_BY_PGE
identifier_product_doi	(Attribute)	10.5067/ATLAS/ATL04.001
identifier_product_doi_authority	(Attribute)	http://dx.doi.org
identifier_product_format_version	(Attribute)	SET_BY_PGE
identifier_product_type	(Attribute)	ATL04
institution	(Attribute)	SET_BY_META
instrument	(Attribute)	SET_BY_META
keywords	(Attribute)	SET_BY_META
keywords_vocabulary	(Attribute)	SET_BY_META
level	(Attribute)	2A
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)	L2A
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)	ATL04
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 Sealice; Index=4 corresponds to Landice; Index=5 corresponds to InlandWater flag_values: 1, 2, 3, 4, 5 flag_meanings : land ocean sealice landice inland_water
Group: /ancillary_data				
Description	(Attribute)	Contains information ancillary to the data product. This may include product characteristics, instrument characteristics and/or processing constants.		
data_rate	(Attribute)	Data within this group pertain to the granule in its entirety.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
atlas_sdp_gps_epoch (Compact Dataset)	DOUBLE (1)	ATLAS Epoch Offset (not_set)	seconds since 1980-01-06T00:00:00.000000Z Operations	Number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS Standard Data Product (SDP) epoch (2018-01-01:T00.00.00.000000 UTC). Add this value to delta time parameters to compute full gps_seconds (relative to the GPS epoch) for each data point.
control (Contiguous Dataset)	STRING:100000 (1)	Control File (not_set)	1 Operations	PGE-specific control file used to generate this granule. To reuse, replace breaks (BR) with linefeeds.
data_end_utc (Compact Dataset)	STRING:27 (1)	End UTC Time of Granule (CCSDS-A, Actual) (not_set)	1 Derived	UTC (in CCSDS-A format) of the last data point within the granule.
data_start_utc (Compact Dataset)	STRING:27 (1)	Start UTC Time of Granule (CCSDS-A, Actual) (not_set)	1 Derived	UTC (in CCSDS-A format) of the first data point within the granule.
end_cycle (Compact Dataset)	INTEGER_4 (1)	Ending Cycle (not_set)	1 Derived	The ending cycle number associated with the data contained within this granule. The cycle number is the counter of the number of 91-day repeat cycles completed by the mission.
end_delta_time (Compact Dataset)	DOUBLE (1)	ATLAS End Time (Actual) (time)	seconds since 2018-01-01 Derived	Number of GPS seconds since the ATLAS SDP epoch at the last data point in the file. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed.
end_geoseg (Compact Dataset)	INTEGER_4 (1)	Ending Geolocation Segment (not_set)	1 Derived	The ending geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation.
end_gpssow (Compact Dataset)	DOUBLE (1)	Ending GPS SOW of Granule (Actual) (not_set)	seconds Derived	GPS seconds-of-week of the last data point in the granule.
end_gpsweek (Compact Dataset)	INTEGER_4 (1)	Ending GPSWeek of Granule (Actual) (not_set)	weeks from 1980-01-06 Derived	GPS week number of the last data point in the granule.
end_orbit (Compact Dataset)	INTEGER_4 (1)	Ending Orbit Number (not_set)	1 Derived	The ending orbit number associated with the data contained within this granule. The orbit number increments each time the spacecraft completes a full orbit of the Earth.
end_region (Compact Dataset)	INTEGER_4 (1)	Ending Region (not_set)	1 Derived	The ending product-specific region number associated with the data contained within this granule. ICESat-2 data products are separated by geographic regions. The data contained within a specific region are the same for ATL01 and ATL02. ATL03 regions differ slightly because of different geolocation segment locations caused by the irregular shape of the Earth. The region indices for other products are completely independent.
end_rgt (Compact Dataset)	INTEGER_4 (1)	Ending Reference Groundtrack (not_set)	1 Derived	The ending reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The

				reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle.
granule_end_utc (Compact Dataset)	STRING:27 (1)	End UTC Time of Granule (CCSDS-A, Requested) (not_set)	1 Derived	Requested end time (in UTC CCSDS-A) of this granule.
granule_start_utc (Compact Dataset)	STRING:27 (1)	Start UTC Time of Granule (CCSDS-A, Requested) (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/atmosphere

Description	(Attribute)	Contains general ancillary parameters.		
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
aer_scat_rat (Compact Dataset)	FLOAT (1)	Aerosol Scattering Ratio (not_set)	1 Atmosphere ATBD	Aerosol Scattering Ratio in the calibration zone (11
alpha (Compact Dataset)	FLOAT (1)	Scaling factor (a) (not_set)	1 Atmosphere ATBD	Scaling factor (a) for computation of the magnitude of molecular folding.

			section 2	
atlas_atm_hist_binsize (Compact Dataset)	FLOAT (1)	Histogram bin size (m) (not_set)	meters Atmosphere ATBD	Nominal size of each ATM histogram bin, in meters
atlas_atm_hist_binsize_s (Compact Dataset)	DOUBLE (1)	Histogram bin size (s) (not_set)	seconds Atmosphere ATBD	Nominal size of each ATM histogram bin, in seconds
atlas_atm_shot_sum_25hz (Compact Dataset)	INTEGER_4 (1)	Number of shots at 25hz (not_set)	counts Atmosphere ATBD	Number of shots summed to compute an ATM histogram at 25 hz (nominal)
atlas_atm_shot_sum_50hz (Compact Dataset)	INTEGER_4 (1)	Number of shots at 50hz (not_set)	counts Atmosphere ATBD	Number of shots summed to compute an ATM histogram at 50 hz (diagnostic)
atlas_n_atm_hist_bins (Compact Dataset)	INTEGER_4 (1)	Number of histogram bins (not_set)	counts Atmosphere ATBD	Number of ATM histogram bins
atlas_n_pce (Compact Dataset)	INTEGER_4 (1)	Number of ATLAS PCEs (not_set)	1 Atmosphere ATBD	Number of ATLAS PCE boards
atm_laser_wavelength_m (Compact Dataset)	DOUBLE (1)	Laser Wavelength (m) (not_set)	meters Atmosphere ATBD	ATLAS Laser wavelength, in meters
atm_laser_wavelength_nm (Compact Dataset)	FLOAT (1)	Laser Wavelength (nm) (not_set)	nm Atmosphere ATBD	ATLAS Laser wavelength, in nanometers
atm_processing_interval (Compact Dataset)	DOUBLE (1)	Seconds of ATM data processed in one chunk. (not_set)	seconds Control	The number of seconds of ATM data processed in one chunk.
atm_pulse_ns (Compact Dataset)	DOUBLE (1)	Pulse Time (not_set)	sq meters Atmosphere ATBD	The time between ATLAS pulses.
atm_tep_start (Compact Dataset)	DOUBLE (1)	TEP Window Start (not_set)	ns Atmosphere ATBD	The start time of the TEP removal window.
atm_tep_width (Compact Dataset)	DOUBLE (1)	TEP Window Width (not_set)	sq meters Atmosphere ATBD	The width of the TEP removal window.
back_f2 (Compact Dataset)	FLOAT (1)	Background Fact method2 (not_set)	1 Atmosphere ATBD section 3.3.4	Scaling factor in Method 2 background computation
backg_day_exp_factor (Compact Dataset)	FLOAT (1)	Background daytime exponent factor (not_set)	1 Atmosphere ATBD section 3.3.4	Background daytime exponent factor in Method 1 bkgd comp
backg_day_scale_factor1 (Compact Dataset)	FLOAT (1)	Background daytime scaling factor 1 (not_set)	1 Atmosphere ATBD section 3.3.4	Background daytime scaling factor 1 in Method 1 bkgd comp
backg_day_scale_factor2 (Compact Dataset)	FLOAT (1)	Background daytime scaling factor 2 (not_set)	1 Atmosphere ATBD section 3.3.4	Background daytime scaling factor 2 in Method 1 bkgd comp
backg_max_solar_elev (Compact Dataset)	FLOAT (1)	Background maximum solar elevation angle (not_set)	degrees Atmosphere ATBD section 3.3.4	Background maximum solar elevation angle in Method 1 bkgd comp
backg_min_solar_elev (Compact Dataset)	FLOAT (1)	Background minimum solar elevation angle (not_set)	degrees Atmosphere ATBD section 3.3.4	Background minimum solar elevation angle in Method 1 bkgd comp
backg_night_bkgd (Compact Dataset)	FLOAT (1)	Background nighttime background (not_set)	1 Atmosphere ATBD section 3.3.4	Background nighttime background in Method 1 bkgd comp
backg_night_scale_factor (Compact Dataset)	FLOAT (1)	Background nighttime scaling factor (not_set)	1 Atmosphere ATBD section 3.3.4	Background nighttime scaling factor in Method 1 bkgd comp
backg_nseg (Compact Dataset)	INTEGER_4 (1)	Number of background segments in method 1 (not_set)	counts Atmosphere ATBD section 3.3.4	Number of background segments in method 1
backg_response_time (Compact Dataset)	FLOAT (1)	Background response time (not_set)	1 Atmosphere ATBD section 3.3.4	Background response time in Method 1 bkgd comp
backg_select (Compact Dataset)	INTEGER_4 (1)	background method used (not_set)	1 Atmosphere ATBD section 3.3.4	The background method used in calculation of NRB flag_values: 1, 2, 3 flag_meanings : method1 method2 method3
backg_twilight_scale_factor (Compact Dataset)	FLOAT (1)	Background twilight scaling factor (not_set)	1 Atmosphere ATBD section 3.3.4	Background twilight scaling factor in Method 1 bkgd comp
boltzmann_const (Compact Dataset)	FLOAT (1)	Boltzmann Constant (not_set)	erg/K Atmosphere ATBD section 2	Boltzmann constant
cal_atm_trans (Compact Dataset)	FLOAT (1)	Cal Atm Trans (not_set)	1 Atmosphere ATBD	Particulate transmission from top of atmosphere to the calibration height (13 km)

			section 2	
cal_bot_ht (Compact Dataset)	FLOAT (1)	Bottom height of Cal zone (not_set)	meters Atmosphere ATBD section 2	Bottom height of the calibration zone
cal_cloud_thres (Compact Dataset)	FLOAT (1)	Cal Cloud Threshold (not_set)	counts Atmosphere ATBD section 2	Threshold for excluding NRB data in calibration zone.
cal_day_pce1 (Compact Dataset)	FLOAT (1)	Daytime PCE1 CAL (not_set)	1 Control	Daytime calibration constant for pce1 in method 2
cal_day_pce2 (Compact Dataset)	FLOAT (1)	Daytime PCE2 CAL (not_set)	1 Control	Daytime calibration constant for pce2 in method 2
cal_day_pce3 (Compact Dataset)	FLOAT (1)	Daytime PCE3 CAL (not_set)	1 Control	Daytime calibration constant for pce3 in method 2
cal_default (Compact Dataset)	FLOAT (1)	Default CAL Constant (not_set)	Photons*m ³ *sr / J Atmosphere ATBD section 2	Default atmosphere calibration constant. Used by default when no calibration data have been computed for an ATLO4 granule.
cal_integ_time (Compact Dataset)	FLOAT (1)	Cal Integ Time (not_set)	seconds Atmosphere ATBD section 2	Calibration integration time
cal_lat_bound (Compact Dataset)	DOUBLE (1)	Cal Latitude Bound (not_set)	degrees Atmosphere ATBD section 2	The latitude boundary for calibration calculation
cal_night_pce1 (Compact Dataset)	FLOAT (1)	CAL Night PCE1 (not_set)	1 Control	Nighttime calibration constant for pce1 in method 2
cal_night_pce2 (Compact Dataset)	FLOAT (1)	CAL Night PCE2 (not_set)	1 Control	Nighttime calibration constant for pce2 in method 2
cal_night_pce3 (Compact Dataset)	FLOAT (1)	CAL Night PCE3 (not_set)	1 Control	Nighttime calibration constant for pce3 in method 2
cal_scatter_ratio (Compact Dataset)	FLOAT (1)	Cal Scat Ratio (not_set)	1 Atmosphere ATBD section 2	Calibration Zone (13 to 11 km) aerosol scattering ratio
cal_select (Compact Dataset)	INTEGER_4 (1)	Calibration Algorithm Used (not_set)	1 Control	Calibration algorithm used. flag_values: 1, 2, 3 flag_meanings : method1 method2 method3
cal_solar_angle_limit (Compact Dataset)	FLOAT (1)	Cal Solar Angle Limit (not_set)	degrees Atmosphere ATBD section 2	Minimum solar zenith angle for calibration calculation
cal_solar_elev_max (Compact Dataset)	FLOAT (1)	Maximum Solar Elevation (not_set)	degrees Control	Maximum solar elevation angle in calibration method 2.
cal_solar_elev_min (Compact Dataset)	FLOAT (1)	Minimum Solar Elevation for CAL (not_set)	degrees Control	Minimum solar elevation angle in calibration method 2.
cal_top_ht (Compact Dataset)	FLOAT (1)	Top height of Cal zone (not_set)	meters Atmosphere ATBD section 2	Top height of the calibration zone
cal_twilight_pce1 (Compact Dataset)	FLOAT (1)	Twilight PCE1 CAL (not_set)	1 Control	Twilight calibration constant for pce1 in method 2
cal_twilight_pce2 (Compact Dataset)	FLOAT (1)	Twilight PCE2 CAL (not_set)	1 Control	Twilight calibration constant for pce2 in method 2
cal_twilight_pce3 (Compact Dataset)	FLOAT (1)	Twilight PCE3 CAL (not_set)	1 Control	Twilight calibration constant for pce3 in method 2
chappius_coef (Compact Dataset)	FLOAT (1)	Chappius Coefficient (not_set)	1 Atmosphere ATBD	Chappius ozone absorption coefficient
dead_time_sf (Compact Dataset)	FLOAT (1)	Dead Time Signal Factor (not_set)	1 Atmosphere ATBD section 2	Dead time signal factor
default_nrb_day (Compact Dataset)	FLOAT (3)	Daytime NRB Defaults (not_set)	Photons m2/Joule Atmosphere ATBD	Default value for daytime NRB used to replace NRB values that are out of range for each pce for calibration method 3
default_nrb_night (Compact Dataset)	FLOAT (3)	Nighttime NRB Defaults (not_set)	Photons m2/Joule Atmosphere ATBD	Default value for nighttime NRB - used to replace NRB values that are out of range for each pce for calibration method 3
deg2rad (Compact Dataset)	DOUBLE (1)	Degree to radians conversion (not_set)	1 Globals	Degrees to radians conversion factor
detector_efficiency (Compact Dataset)	FLOAT (1)	Detector Quantum Efficiency (not_set)	1 Atmosphere ATBD	Detector quantum efficiency (Qe)
dtime_select (Compact Dataset)	INTEGER_4 (1)	dead time factor used (not_set)	1 Control	Deadtime factor used. flag_values: 1, 2 flag_meanings : dtime_fact1 dtime_fact2

fold_nbins (Compact Dataset)	INTEGER_4 (1)	1 (not_set)	bins Atmosphere ATBD	Number of bins starting from end of raw profile to compute mean of signal to test for presence of cloud folding
fold_thresh_day (Compact Dataset)	FLOAT (1)	Daytime Folding Threshold (not_set)	photons/bin Atmosphere ATBD	Raw signal level above which the mean of the last fold_nbins indicates the presence of cloud folding for daytime data
fold_thresh_night (Compact Dataset)	FLOAT (1)	Nighttime Folding Threshold (not_set)	photons/bin Atmosphere ATBD	Raw signal level above which the mean of the last fold_nbins indicates the presence of cloud folding for nighttime data
gas_const_r (Compact Dataset)	DOUBLE (1)	Ideal gas constant R (not_set)	1 Globals	Ideal gas constant (R)
grd_search_width (Compact Dataset)	INTEGER_4 (1)	Ground Search Width (not_set)	bins Atmosphere ATBD section 3.3.5	Ground detection search width
grd_thres_atl03 (Compact Dataset)	FLOAT (1)	Ground Threshold using ATL03 signal (not_set)	photons/bin Atmosphere ATBD section 2	Threshold for Ground detection (photons/bin) when using ATL03-classified signal
grd_thres_sfac1 (Compact Dataset)	FLOAT (1)	grd_thres_sfac1 (not_set)	1 Atmosphere ATBD Section 3.3.5	Ground detection signal factor 1
grd_thres_sfac2 (Compact Dataset)	FLOAT (1)	grd_thres_sfac2 (not_set)	1 Atmosphere ATBD Section 3.3.5	Ground detection signal factor 2
ht_min (Compact Dataset)	FLOAT (1)	Minimum height to use in ATM profile (not_set)	meters Atmosphere ATBD	Minimum height to use in ATM profile
king_fact (Compact Dataset)	FLOAT (1)	KING factor (not_set)	1 Atmosphere ATBD	King factor for molecular transmission.
max_calib_day (Compact Dataset)	FLOAT (3)	Maximum Daytime Calibration (not_set)	Photons*m3sr/J Atmosphere ATBD	Maximum calculated calibration value allowed for daytime for each pce for calibration method 3
max_calib_night (Compact Dataset)	FLOAT (3)	Maximum Nighttime Calibration (not_set)	Photons*m3sr/J Atmosphere ATBD	Maximum calculated calibration value allowed for nighttime for each pce for calibration method 3
max_nrb_day (Compact Dataset)	FLOAT (3)	Maximum Daytime NRB (not_set)	Photons m2/Joule Atmosphere ATBD	Maximum daytime NRB accepted for filtered NRB data for each pce for calibration method 3
max_nrb_night (Compact Dataset)	FLOAT (3)	Maximum Nighttime NRB (not_set)	Photons m2/Joule Atmosphere ATBD	Maximum nighttime NRB accepted for filtered NRB array for each pce for calibration method 3
min_calib_day (Compact Dataset)	FLOAT (3)	Minimum Daytime Calibration (not_set)	Photons*m3sr/J Atmosphere ATBD	Minimum calculated calibration allowed for daytime for each pce for calibration method 3
min_calib_night (Compact Dataset)	FLOAT (3)	Minimum Nighttime Calibration (not_set)	Photons*m3sr/J Atmosphere ATBD	Minimum calculated calibration value allowed for nighttime for each pce for calibration method 3
min_nrb_day (Compact Dataset)	FLOAT (3)	Minimum Daytime NRB (not_set)	Photons m2/Joule Atmosphere ATBD	Minimum daytime NRB accepted for filtered NRB data for each pce for calibration method 3
min_nrb_night (Compact Dataset)	FLOAT (3)	Minimum Nighttime NRB (not_set)	Photons m2/Joule Atmosphere ATBD	Minimum nighttime NRB accepted for filtered NRB data for each pce for calibration method 3
molec_top_ht (Compact Dataset)	FLOAT (1)	Top height of molecular profile (not_set)	meters Atmosphere ATBD	Top height of molecular profile.
nrb_average_period (Compact Dataset)	INTEGER_4 (1)	NRB Averaging Period (not_set)	seconds Atmosphere ATBD	Number of seconds to average the smoothed and filtered NRB array before computing the calibration constant for calibration method 3
nrb_smooth (Compact Dataset)	INTEGER_4 (1)	NRB Smoothing (not_set)	1 Atmosphere ATBD	Number of points to average the NRB data for calibration method 3
num_molec_bins (Compact Dataset)	INTEGER_4 (1)	Number of bins in molecular profile (not_set)	counts Atmosphere ATBD	Number of bins in molecular profile
num_va_bins (Compact Dataset)	INTEGER_4 (1)	Number of vertically aligned bins (not_set)	counts Atmosphere ATBD	Number of vertically aligned bins
ozone_const (Compact Dataset)	FLOAT (1)	Ozone column density constant (not_set)	1 Atmosphere ATBD	Ozone column density constant
pi (Compact Dataset)	DOUBLE (1)	PI (not_set)	counts Globals	PI
planck_const (Compact Dataset)	DOUBLE (1)	Planck constant (h) (not_set)	Js Atmosphere ATBD section 2	Planck constant (h)
receiver_optical_throughput (Compact Dataset)	FLOAT (1)	Receiver Optics Throughput (not_set)	1 Atmosphere ATBD	Nominal Receiver Optics Throughput
saa_latmax (Compact Dataset)	FLOAT (1)	SAA Maximum Latitude (not_set)	degrees_north Atmosphere ATBD	Latitude maximum of box that encompasses the area affected by the South Atlantic Anomaly (SAA)
saa_latmin (Compact Dataset)	FLOAT (1)	SAA Minimum Latitude (not_set)	degrees_north Atmosphere ATBD	Latitude minimum of box that encompasses the area affected by the South Atlantic Anomaly (SAA)
saa_lonmax	FLOAT	SAA Maximum Longitude	degrees_east	Longitude maximum of box that encompasses the area

(Compact Dataset)	(1)	(not_set)	Atmosphere ATBD	affected by the South Atlantic Anomaly (SAA)
saa_lonmin (Compact Dataset)	FLOAT (1)	SAA Minimum Longitude (not_set)	degrees_east Atmosphere ATBD	Longitude minimum of box that encompasses the area affected by the South Atlantic Anomaly (SAA)
saa_scale_fac (Compact Dataset)	FLOAT (1)	SAA Scale Factor (not_set)	1 Atmosphere ATBD	Scale factor for computing the background in method 1 within the south Atlantic anomaly box
speed_of_light (Compact Dataset)	DOUBLE (1)	Speed of light (c) (not_set)	meters/second Globals	Speed of light (c)
telescope_area (Compact Dataset)	DOUBLE (1)	Telescope Effective Area (not_set)	sq meters Atmosphere ATBD	Effective collection area of telescope (At)
va_top_ht (Compact Dataset)	FLOAT (1)	Top height of vertically aligned profile (not_set)	meters Atmosphere ATBD	Top height of vertically aligned profile
Group: /meteorology_molec_bkscat				
Description	(Attribute)	Contains sampled GEOS5_FPIT meteorological model data and molecular backscatter. This data is created from the time/locations of the center profile.		
data_rate	(Attribute)	Data in this group is stored at a 1hz (1 per second) rate.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
delta_time (Chunked Dataset)	DOUBLE (:)	Elapsed GPS seconds (time)	seconds since 2018-01-01 Atmosphere ATBD	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.
ds_va_bin_h (Compact Dataset)	FLOAT (700)	VA Bin Height Dimension Scale (not_set)	meters Atmosphere ATBD	Dimension scale containing the heights of the vertically-aligned bins.
latitude (Chunked Dataset)	DOUBLE (:)	Latitude of the ATM histogram (latitude)	degrees_north ATL03g ATBD	Latitude at the the top of the ATM histogram, WGS84, North=+, Derived from the geolocation of the ATM range window.
longitude (Chunked Dataset)	DOUBLE (:)	Longitude of the ATM histogram (longitude)	degrees_east ATL03g ATBD	Longitude at the the top of the ATM histogram, WGS84, East=+, derived from the geolocation of the ATM range window.
met_cldprs (Chunked Dataset)	FLOAT (:)	cloud_top_pressure (pressure)	Pa GEOS5 FPIT 2D DFPITT1NXSLV	Pressure of the highest cloud top at this location from GEOS5 data
met_ps (Chunked Dataset)	FLOAT (:)	Surface Pressure (pressure)	Pa GEOS5 FPIT 3D DFPITI3NVASM	Surface Pressure (Pa)
met_qv10m (Chunked Dataset)	FLOAT (:)	specific_humidity_at_10m (specific_humidity)	kg kg-1 GEOS5 FPIT 2D DFPITT1NXSLV	Specific humidity at 10 m above the displacement height
met_qv2m (Chunked Dataset)	FLOAT (:)	specific_humidity_at_2m (specific_humidity)	kg kg-1 GEOS5 FPIT 2D DFPITT1NXSLV	Specific humidity at 2 m above the displacement height
met_slp (Chunked Dataset)	FLOAT (:)	sea_level_pressure (sea_level_pressure)	Pa GEOS5 FPIT 3D DFPITI3NVASM	sea-level pressure (Pa)
met_t10m (Chunked Dataset)	FLOAT (:)	temperature_at_10m (temperature)	K GEOS5 FPIT 2D DFPITT1NXSLV	Temperature at 10m above the displacement height (K)
met_t2m (Chunked Dataset)	FLOAT (:)	temperature_at_2m (temperature)	K GEOS5 FPIT 2D DFPITT1NXSLV	Temperature at 2m above the displacement height (K)
met_tqi (Chunked Dataset)	FLOAT (:)	cloud_ice (not_set)	kg m-2 GEOS5 FPIT 2D DFPITT1NXSLV	Total column cloud ice (Kg/m2)
met_tql (Chunked Dataset)	FLOAT (:)	cloud_liquid_water (not_set)	kg m-2 GEOS5 FPIT 2D DFPITT1NXSLV	Total column cloud liquid water (kg/m2)
met_troppb (Chunked Dataset)	FLOAT (:)	blended_tropopause_pressure (pressure)	Pa GEOS5 FPIT 2D DFPITT1NXSLV	Blended tropopause pressure (pa)
met_tropt (Chunked Dataset)	FLOAT (:)	blended_tropopause_temperature (temperature)	K GEOS5 FPIT 2D DFPITT1NXSLV	Tropopause temperature (k)
met_ts (Chunked Dataset)	FLOAT (:)	surface_temperature (temperature)	K GEOS5 FPIT 2D	Surface skin temperature (K)

			DFPITT1NXSLV	
met_u10m (Chunked Dataset)	FLOAT (:)	Eastward_wind_at_10m (eastward_wind)	m s-1 GEOS5 FPIT 2D DFPITT1NXSLV	Eastward wind at 10m above the displacement height (m/s-1)
met_u2m (Chunked Dataset)	FLOAT (:)	Eastward_wind_at_2m (eastward_wind)	m s-1 GEOS5 FPIT 2D DFPITT1NXSLV	Eastward wind at 2m above the displacement height (m/s-1)
met_u50m (Chunked Dataset)	FLOAT (:)	Eastward_wind_at_50m (eastward_wind)	m s-1 GEOS5 FPIT 2D DFPITT1NXSLV	Eastward wind at 50m above the displacement height (m/s-1)
met_v10m (Chunked Dataset)	FLOAT (:)	Northward_wind_at_10m (northward_wind)	m s-1 GEOS5 FPIT 2D DFPITT1NXSLV	Northward wind at 10m above the displacement height (m/s-1)
met_v2m (Chunked Dataset)	FLOAT (:)	Northward_wind_at_2m (northward_wind)	m s-1 GEOS5 FPIT 2D DFPITT1NXSLV	Northward wind at 2m above the displacement height (m/s-1)
met_v50m (Chunked Dataset)	FLOAT (:)	northward_wind_at_50m (northward_wind)	m s-1 GEOS5 FPIT 2D DFPITT1NXSLV	Northward wind at 50m above the displacement height (m/s-1)
mol_backs_folded (Chunked Dataset)	FLOAT (700, :)	Folded molecular transmission profile (not_set)	m-1 sr-1 Atmosphere ATBD	Folded molecular transmission profile, 30 m resolution, , m-1 sr-1; 20 km to -1 km (equation 3.17)
mol_backscatter (Chunked Dataset)	FLOAT (700, :)	Molecular backscatter profile (not_set)	m-1 sr-1 Atmosphere ATBD	Molecular backscatter profile, 30 m resolution, 20 km to -1 km
molec_bkscat_p (Chunked Dataset)	FLOAT (700, :)	Pressure profile (not_set)	Pa Atmosphere ATBD	Pressure profiles from 20 km to -1 km
molec_bkscat_rh (Chunked Dataset)	FLOAT (700, :)	Relative humidity profiles (not_set)	percentage Atmosphere ATBD	Relative humidity profiles from 20 km to -1 km
molec_bkscat_t (Chunked Dataset)	FLOAT (700, :)	Temperature profile (not_set)	K Atmosphere ATBD	Temperature profiles from 20 km to -1 km
molec_trans (Chunked Dataset)	FLOAT (700, :)	Molecular transmission profile (not_set)	1 Atmosphere ATBD	Molecular transmission profile, 30 m resolution, 20 km to -1 km
ozone_trans (Chunked Dataset)	FLOAT (700, :)	Ozone transmission profile (not_set)	1 Atmosphere ATBD	Ozone transmission profile, 30 m resolution, 20 km to -1 km
segment_id (Chunked Dataset)	INTEGER_4 (:)	along-track segment ID number. (not_set)	1 ATL03 ATBD, Section 3.1	A 7 digit number identifying the along-track geolocation segment number. These are sequential, starting with 1 for the first segment after an ascending equatorial crossing node.
surf_type (Chunked Dataset)	INTEGER_1 (5, :)	surface type (not_set)	1 ATL03 ATBD, Section 4	Flags describing which surface types this interval is associated with. 0=not type, 1=is type. Order of array is land, ocean, sea ice, land ice, inland water. flag_values: 0, 1 flag_meanings : not_type is_type

Group: /orbit_info

Description	(Attribute)	Contains orbit information.		
data_rate	(Attribute)	Varies. Data are only provided when one of the stored values (besides time) changes.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
crossing_time (Chunked Dataset)	DOUBLE (:)	Ascending Node Crossing Time (time)	seconds since 2018-01-01 POD/PPD	The time, in seconds since the ATLAS SDP GPS Epoch, at which the ascending node crosses the equator. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed.
cycle_number (Chunked Dataset)	INTEGER_1 (:)	Cycle Number (not_set)	1 Operations	A count of the number of exact repeats of this reference orbit.
lan (Chunked Dataset)	DOUBLE (:)	Ascending Node Longitude (not_set)	degrees_east POD/PPD	Longitude at the ascending node crossing.
orbit_number (Chunked Dataset)	UINT_2_LE (:)	Orbit Number (not_set)	1 Operations	Unique identifying number for each planned ICESat-2 orbit.
rgt (Chunked Dataset)	INTEGER_2 (:)	Reference Ground track (not_set)	1 POD/PPD	The reference ground track (RGT) is the track on the earth at which a specified unit vector within the observatory is pointed. Under nominal operating conditions, there will be no data collected along the RGT, as the RGT is spanned by GT3 and GT4. During slews or off-pointing, it is possible that ground tracks may intersect the RGT. The ICESat-2 mission has 1387 RGTs.

sc_orient (Chunked Dataset)	INTEGER_1 (:)	Spacecraft Orientation (not_set)	1 POD/PPD	This parameter tracks the spacecraft orientation between forward, backward and transitional flight modes. ICESat-2 is considered to be flying forward when the weak beams are leading the strong beams; and backward when the strong beams are leading the weak beams. ICESat-2 is considered to be in transition while it is maneuvering between the two orientations. Science quality is potentially degraded while in transition mode. flag_values: 0, 1, 2 flag_meanings : backward forward transition
sc_orient_time (Chunked Dataset)	DOUBLE (:)	Time of Last Spacecraft Orientation Change (time)	seconds since 2018-01-01 POD/PPD	The time of the last spacecraft orientation change between forward, backward and transitional flight modes, expressed in seconds since the ATLAS SDP GPS Epoch. ICESat-2 is considered to be flying forward when the weak beams are leading the strong beams; and backward when the strong beams are leading the weak beams. ICESat-2 is considered to be in transition while it is maneuvering between the two orientations. Science quality is potentially degraded while in transition mode. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed.
Group: /profile_x				
Description	(Attribute)	Each group contains the segments for the strong beam of one Pair Track. As ICESat-2 orbits the earth, sequential transmit pulses illuminate six ground tracks on the surface of the earth. The track width is approximately 14m. The Atmosphere profiles are only reported for the strong beam. Profiles are numbered from the left to the right in the direction of spacecraft travel as: 1 for the left-most pair of beams; 2 for the center pair of beams; and 3 for the right-most pair of beams.		
data_rate	(Attribute)	Data in this group is stored at a 25hz (25 per second) rate.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
atm_rw_width_m (Chunked Dataset)	FLOAT (:)	Atmospheric Range Window Width (not_set)	seconds ATL02	The range, in meters, from the Atmospheric range window start to the range window stop.
atm_tw_top (Chunked Dataset)	FLOAT (:)	Atmospheric Telemetry Window Top (not_set)	meters ATL03g ATBD	The geolocated ellipsoidal height at the top of the Atmospheric range window
backg_mean2 (Chunked Dataset)	FLOAT (:)	Signal mean (not_set)	counts Atmosphere ATBD section 3.3.4	Signal mean from method 2 (pb2 defined in Atmosphere ATBD part 1 section 2.3.4)
backg_method1 (Chunked Dataset)	FLOAT (:)	Background method 1 (not_set)	counts Atmosphere ATBD section 3.3.4	Background from method 1 in photons/bin. (pb1 Defined in Atmosphere ATBD section 2.3.2)
backg_method2 (Chunked Dataset)	FLOAT (:)	Background method 2 (not_set)	counts Atmosphere ATBD section 3.3.4	Background from method 2 in photons/bin. (pb2 Defined in Atmosphere ATBD section 2.3.2)
backg_method3 (Chunked Dataset)	FLOAT (:)	Background method 3 (not_set)	counts Atmosphere ATBD section 3.3.4	Background from method 3 in photons/bin. (Defined in Atmosphere ATBD section 3.3.4)
backg_std_dev2 (Chunked Dataset)	FLOAT (:)	Background standard deviation 2 (not_set)	counts Atmosphere ATBD section 3.3.4	Background standard deviation from the selected method used (Sstd2 Defined in Atmosphere ATBD section 2.3.2)
beam_azimuth (Chunked Dataset)	FLOAT (:)	beam azimuth (not_set)	degrees_east ATL03 ATBD	Beam azimuth
beam_elevation (Chunked Dataset)	FLOAT (:)	beam elevation (not_set)	degrees ATL03 ATBD	Beam elevation
bg_sensitivity (Chunked Dataset)	FLOAT (:)	Background Sensitivity (not_set)	events/sec ATL02 ATBD, Section 5.5.2	Receiver response per watt of continuous illumination in the passband from a diffuse source larger than the field of view, in the absence of any dead time effects.
cloud_fold_flag (Chunked Dataset)	INTEGER_1 (:)	Cloud Folding Flag (not_set)	1 Atmosphere ATBD	Flag that indicates this profile likely contains cloud signal folded down from above 15 km to the last 2-3 km of the profile. See ATBD Table 3.9 for detailed flag value meanings flag_values: 0, 1, 2, 3 flag_meanings : no_folding goes5_indicates profile_indicates both_indicate
delta_time (Chunked Dataset)	DOUBLE (:)	Elapsed GPS seconds (time)	seconds since 2018-01-01 Atmosphere ATBD	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.
dem_flag (Chunked Dataset)	INTEGER_1 (:)	dem source flag (not_set)	1 Atmosphere ATBD	Indicates source of the DEM height. Values: 0=None, 1=Arctic, 2=GMTED, 3=MSS, 4=Antarctic. flag_values: 0, 1, 2, 3, 4 flag_meanings : none arctic gmted mss antarctic
dem_h (Chunked Dataset)	FLOAT (:)	DEM Height (not_set)	meters Atmosphere ATBD	Best available DEM (in priority of Arctic/Antarctic/GMTED/MSS) value at the geolocation point.
ds_va_bin_h (Compact Dataset)	FLOAT (700)	VA Bin Height Dimension Scale (not_set)	meters Atmosphere ATBD	Dimension scale containing the heights of the vertically-aligned bins.
dtime_fac1 (Chunked Dataset)	FLOAT (:)	dead_time_factor1 (not_set)	1 Atmosphere ATBD	Dead time correction factor for surface signal computed from radiometric lookup table.
dtime_fac2 (Chunked Dataset)	FLOAT (:)	dead_time_factor2 (not_set)	1 Atmosphere ATBD	Dead time correction factor for surface signal computed from ATBD equation 2.1.
latitude (Chunked Dataset)	DOUBLE (:)	Latitude of the ATM histogram (latitude)	degrees_north ATL03g ATBD	Latitude at the the top of the ATM histogram, WGS84, North=+, Derived from the geolocation of the ATM range window.
longitude (Chunked Dataset)	DOUBLE (:)	Longitude of the ATM histogram (longitude)	degrees_east ATL03g ATBD	Longitude at the the top of the ATM histogram, WGS84, East=+, derived from the geolocation of the ATM range window.
nrb_bot_bin (Chunked Dataset)	INTEGER_4 (:)	NRB Profile bottom valid bin (not_set)	1 Atmosphere ATBD section 2.3	The ending (bottom) bin number within the 20 to -1 km vertically aligned profile where data are valid. Bin number starts at 1.
nrb_profile (Chunked Dataset)	FLOAT (700, :)	NRB Profile (not_set)	1 Atmosphere ATBD section 2.3	Normalize relative backscatter (NRB) profile vertically aligned to 20 to -1 km with vertical resolution of 30 m. (Photons km ² /Joule)
nrb_top_bin (Chunked Dataset)	INTEGER_4 (:)	NRB Profile top valid bin (not_set)	counts Atmosphere ATBD section 2.3	The starting (top) bin number within the 20 to -1 km vertically aligned profile where data are valid. Bin number starts at 1.
pce_mframe_cnt (Chunked Dataset)	UINT_4_LE (:)	PCE Major frame counter (not_set)	counts ATL02	Major Frame Counter - The major frame counter is read from the DFC and starts counting at DFC POR. The counter is used to identify individual major frames across diag and science packets. This counter can go for about 2.7 years before rolling over. It is in the first time tag science packet. Used as part of the photon ID
prof_dist_x (Chunked Dataset)	DOUBLE (:)	Along Track Distance (not_set)	meters ATL03g ATBD, Section 3.4	Along-track distance from the equator crossing.
prof_dist_y (Chunked Dataset)	FLOAT (:)	Across Track Distance from RGT (not_set)	meters ATL03g ATBD, Section 3.4	Across-Track distance from the reference ground track.
range_to_top (Chunked Dataset)	FLOAT (:)	Range (not_set)	meters Atmosphere ATBD	Range from the spacecraft to the top of the atmosphere range window.
ret_sensitivity (Chunked Dataset)	FLOAT (:)	Return Sensitivity (not_set)	events/pulse ATL02 ATBD, Section 5.5.2	Receiver response per joule/return pulse in the field of view, in the absence of any deadtime effects.
sc_alt (Chunked Dataset)	DOUBLE (:)	Altitude (not_set)	meters ATL03g ATBD, Section 3.4	Height of the spacecraft above the WGS84 ellipsoid.
segment_id (Chunked Dataset)	INTEGER_4 (:)	along-track segment ID number. (not_set)	1 ATL03 ATBD, Section 3.1	A 7 digit number identifying the along-track geolocation segment number. These are sequential, starting with 1 for the first segment after an ascending equatorial crossing node.
sig_count_hi (Chunked Dataset)	INTEGER_4 (:)	Count of Signa Heightsl - High (not_set)	counts ATL03 ATBD, Section 5	Count of high-confidence signal photons
sig_count_low (Chunked Dataset)	INTEGER_4 (:)	Count of Signal Heights - Low (not_set)	counts ATL03 ATBD, Section 5	Count of low-confidence signal photons
sig_count_med (Chunked Dataset)	INTEGER_4 (:)	Count of Signal Heights - Medium (not_set)	counts ATL03 ATBD, Section 5	Count of medium-confidence signal photons
sig_h_mean_hi (Chunked Dataset)	FLOAT (:)	Mean of SignalHeights - High (not_set)	meters ATL03 ATBD, Section 5	Mean height of high-confidence signal photons
sig_h_mean_low (Chunked Dataset)	FLOAT (:)	Mean of Signal Heights - Low (not_set)	meters ATL03 ATBD, Section 5	Mean height of low-confidence signal photons
sig_h_mean_med (Chunked Dataset)	FLOAT (:)	Mean of Signa Heightsl - Med (not_set)	meters ATL03 ATBD, Section 5	Mean height of medium-confidence signal photons
sig_h_sdev_hi (Chunked Dataset)	FLOAT (:)	SDev of Signal Heights -High (not_set)	meters ATL03 ATBD, Section 5	SDev of the heights of high-confidence signal photons
sig_h_sdev_low (Chunked Dataset)	FLOAT (:)	SDev of Signal Heights -Low (not_set)	meters ATL03 ATBD, Section 5	SDev of the heights of low-confidence signal photons

sig_h_sdev_med (Chunked Dataset)	FLOAT (:)	SDev of Signa Heights -Med (not_set)	meters ATL03 ATBD, Section 5	SDev of the heights of medium-confidence signal photons
solar_azimuth (Chunked Dataset)	FLOAT (:)	solar azimuth (not_set)	degrees_east ATL03g ATBD	The direction, eastwards from north, of the sun vector as seen by an observer at the laser ground spot.
solar_elevation (Chunked Dataset)	FLOAT (:)	solar elevation (not_set)	degrees ATL03g ATBD	Solar Angle above or below the plane tangent to the ellipsoid surface at the laser spot. Positive values mean the sun is above the horizon, while negative values mean it is below the horizon. The effect of atmospheric refraction is not included. This is a low precision value, with approximately TBD degree accuracy.
surf_type (Chunked Dataset)	INTEGER_1 (5, :)	surface type (not_set)	1 ATL03 ATBD, Section 4	Flags describing which surface types this interval is associated with. 0=not type, 1=is type. Order of array is land, ocean, sea ice, land ice, inland water. flag_values: 0, 1 flag_meanings : not_type is_type
surf_type_igbp (Chunked Dataset)	INTEGER_1 (:)	IGBP Surface Type (not_set)	1 Atmosphere ATBD, IGBP Surface Type	IGBP Surface Type
surface_bin (Chunked Dataset)	INTEGER_4 (:)	Surface bin (not_set)	1 Atmosphere ATBD section 3.3.5	Vertially aligned, NRB bin number of the detected surface return.
surface_height (Chunked Dataset)	FLOAT (:)	Surface height (not_set)	meters Atmosphere ATBD section 3.3.5	Height of the detected surface bin.
surface_sig (Chunked Dataset)	FLOAT (:)	Surface signal count (not_set)	counts Atmosphere ATBD section 3.3.5	Number of photons in the detected surface bin.
surface_thres (Chunked Dataset)	FLOAT (:)	Surface signal threshold (not_set)	photons Atmosphere ATBD section 3.3.5	Surface signal threshold
tx_pulse_energy (Chunked Dataset)	FLOAT (:)	Transmit Pulse Energy (not_set)	Joules ATL02 ATBD, Section 7.2	Transmit energy, from the laser internal energy monitor, split into per-beam measurements.

Group: /profile_x/bckgrd_atlas

Description	(Attribute)	Contains the ATLAS 50-shot background data and derivations.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
bckgrd_counts (Chunked Dataset)	INTEGER_4 (:)	ATLAS 50-shot background count (not_set)	counts ATL03 ATBD Section 7.3	Onboard 50 shot background (200 Hz) sum of photon events within the altimetric range window.
bckgrd_counts_reduced (Chunked Dataset)	INTEGER_4 (:)	ATLAS 50-shot background count - reduced (not_set)	counts ATL03 ATBD Section 7.3	Number of photon counts in the 50-shot sum after subtracting the number of signal photon events, defined as in ATBD Section 5, in that span.
bckgrd_hist_top (Chunked Dataset)	FLOAT (:)	Top of the altimetric range window (not_set)	meters ATL03 ATBD Section 7.3	The height of the top of the altimetric histogram, in meters above the WGS-84 ellipsoid, with all geophysical corrections applied. Parameter is ingested at 50-Hz, and values are repeated to form a 200-Hz array.
bckgrd_int_height (Chunked Dataset)	FLOAT (:)	Altimetric range window width (not_set)	meters ATL03 ATBD Section 7.3	The height of the altimetric range window. This is the height over which the 50-shot sum is generated. Parameter is ingested at 50-Hz, and values are repeated to form a 200-Hz array.
bckgrd_int_height_reduced (Chunked Dataset)	FLOAT (:)	Altimetric range window height - reduced (not_set)	meters ATL03 ATBD Section 7.3	The height of the altimetric range window after subtracting the height span of the signal photon events in the 50-shot span.
bckgrd_rate (Chunked Dataset)	FLOAT (:)	Background count rate based on the ATLAS 50-shot sum (not_set)	counts / second ATL03 ATBD Section 7.3	The background count rate from the 50-shot altimetric histogram after removing the number of likely signal photons based on Section 5.
delta_time (Chunked Dataset)	DOUBLE (:)	Elapsed GPS seconds (time)	seconds since 2018-01-01 Derived via Time Tagging	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.
pce_mframe_cnt (Chunked Dataset)	UINT_4_LE (:)	PCE Major frame counter (not_set)	counts ATL02	Major Frame ID - The major frame ID is read from the DFC and starts counting at DFC POR. The counter is used to identify individual major frames across diag and science packets. This counter can go for about 2.7 years before rolling over. It is in the first time tag science packet. Used as part of the photon ID

Group: /profile_x/calibration				
Description	(Attribute)	Contains calibration data associated with a PCE strong beam.		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
data_rate	(Attribute)	Data within this group stored at a low rate corresponding to the number of times ATLAS passes with the calibration boundary conditions (lat > 60 and solar_angle > 90)/		
cal_c (Chunked Dataset)	FLOAT (:)	Calculated Calibration constant (not_set)	Photons*m ³ *sr / J Atmosphere ATBD	Calculated calibration constant (one per beam, Defined by Atmosphere ATBD eqn 3.27)
cal_c_trans (Chunked Dataset)	FLOAT (:)	total transmission used (not_set)	1 Atmosphere ATBD	The total transmission used to compute cal_const.
cal_con (Chunked Dataset)	INTEGER_4 (:)	Calibration Confidence (not_set)	1 Atmosphere ATBD	Calibration Confidence
cal_molec (Chunked Dataset)	FLOAT (:)	Molecular Backscatter used (not_set)	m-1 sr-1 Atmosphere ATBD	Molecular Backscatter value used to compute cal_const.
cal_nrb (Chunked Dataset)	FLOAT (:)	NRB value used (not_set)	1 Atmosphere ATBD	NRB value used to compute cal_const.
cal_ozone_trans (Chunked Dataset)	FLOAT (:)	Ozone transmission used (not_set)	1 Atmosphere ATBD	Ozone transmission term used to compute cal_const.
delta_time (Chunked Dataset)	DOUBLE (:)	Calibration interval start time (time)	seconds since 2018-01-01 Derived via Time Tagging	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.
delta_time_end (Chunked Dataset)	DOUBLE (:)	Calibration interval end time (time)	seconds since 2018-01-01 Atmosphere ATBD	Number of GPS seconds since the ATLAS SDP epoch where the cal interval ended. The corresponding start time of the interval is delta_time. 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 (:)	Calibration interval start Latitude (latitude)	degrees_north Atmosphere ATBD	Start Latitude of calibration interval.
latitude_end (Chunked Dataset)	DOUBLE (:)	Calibration interval end latitude (not_set)	degrees_north Atmosphere ATBD	Stop Latitude of calibration interval.
longitude (Chunked Dataset)	DOUBLE (:)	Calibration interval start longitude (longitude)	degrees_east Atmosphere ATBD	Start Longitude of calibration interval.
longitude_end (Chunked Dataset)	DOUBLE (:)	Calibration interval end longitude (not_set)	degrees_east Atmosphere ATBD	Stop Longitude of calibration interval.
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/profile_x				
Description	(Attribute)	Contains quality assessment data for each profile		
Label (Layout)	Datatype (Dimensions)	long_name (standard_name)	units source	description
back1_avg (Contiguous Dataset)	FLOAT (1)	Background Method 1 Avg (not_set)	counts Atmosphere ATBD	Background method 1 average
back1_max (Contiguous Dataset)	FLOAT (1)	Background Method 1 Max (not_set)	counts Atmosphere ATBD	Background method 1 max
back1_min	FLOAT	Background Method 1 Min	counts	Background method 1 min

(Contiguous Dataset)	(1)	(not_set)	Atmosphere ATBD	
back2_avg (Contiguous Dataset)	FLOAT (1)	Background Method 2 Avg (not_set)	counts Atmosphere ATBD	Background method 2 average
back2_max (Contiguous Dataset)	FLOAT (1)	Background Method 2 Max (not_set)	counts Atmosphere ATBD	Background method 2 max
back2_min (Contiguous Dataset)	FLOAT (1)	Background Method 2 Min (not_set)	counts Atmosphere ATBD	Background method 2 min
back3_avg (Contiguous Dataset)	FLOAT (1)	Background Method 3 Avg (not_set)	counts Atmosphere ATBD	Background method 3 average
back3_max (Contiguous Dataset)	FLOAT (1)	Background Method 3 Max (not_set)	counts Atmosphere ATBD	Background method 3 max
back3_min (Contiguous Dataset)	FLOAT (1)	Background Method 3 Min (not_set)	counts Atmosphere ATBD	Background method 3 min
cal_c_avg (Contiguous Dataset)	FLOAT (1)	Average of the Calibration constant (not_set)	Photons*m ³ *sr / J Atmosphere ATBD	Average of the calculated calibration constant (Defined by Atmosphere ATBD eqn 3.27)
cal_c_std (Contiguous Dataset)	FLOAT (1)	Standard Deviation of the Calibration constant (not_set)	Photons*m ³ *sr / J Atmosphere ATBD	Standard Deviation of the calculated calibration constant (Defined by Atmosphere ATBD eqn 3.27)
delta_time (Contiguous Dataset)	DOUBLE (1)	QA start time (time)	seconds since 2018-01-01 Derived via Time Tagging	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.
ht_diff_avg (Contiguous Dataset)	FLOAT (1)	Ht Diff Avg (not_set)	meters Atmosphere ATBD	Average of the surface height minus the DEM height
n_val_cal (Contiguous Dataset)	INTEGER_4 (1)	Number valid calibration constants (not_set)	counts Atmosphere ATBD	Number valid calibration constants
surf_pct (Contiguous Dataset)	FLOAT (1)	Surface Percentage (not_set)	percent Atmosphere ATBD	Percent time surface height was detected
surf_sig_avg (Contiguous Dataset)	FLOAT (1)	Surface signal average (not_set)	photons Atmosphere ATBD	Surface signal average
surf_sig_max (Contiguous Dataset)	FLOAT (1)	Surface signal max (not_set)	photons Atmosphere ATBD	Surface signal max
surf_sig_min (Contiguous Dataset)	FLOAT (1)	Surface signal min (not_set)	photons Atmosphere ATBD	Surface signal min
tx_nrg_avg (Contiguous Dataset)	FLOAT (1)	Average of the laser energy (not_set)	joules Atmosphere ATBD	Average of the laser energy
tx_nrg_std (Contiguous Dataset)	FLOAT (1)	Standard Deviation of the laser energy (not_set)	joules Atmosphere ATBD	Standard Deviation of the laser energy