ATL22 Product Data Dictionary

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description	(Attribute)	This data set (ATL22) contains mean transect parameters and estimates of mean water body height, maximum slope and aspect, for approximately equilateral triangular planar surfaces.
level	(Attribute)	L3B
short_name	(Attribute)	ATL22
title	(Attribute)	SET_BY_META
Group: /		This data set (ATL22) contains mean transect parameters and estimates of mean water body height, maximum slope and aspect, for approximately equilateral triangular planar surfaces.
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)	ATL22
hdfversion	(Attribute)	SET_BY_PGE
history	(Attribute)	SET_BY_PGE
identifier_file_uuid	(Attribute)	SET_BY_PGE
identifier_product_doi	(Attribute)	10.5067/ATLAS/ATL22.001
identifier_product_doi_authority	(Attribute)	http://dx.doi.org
identifier_product_format_version	(Attribute)	SET_BY_PGE
identifier_product_type	(Attribute)	ATL22
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)	L3B

project	(Attribute)	SET_BY_META
publisher_email	(Attribute)	SET_BY_META
publisher_name	(Attribute)	SET_BY_META
publisher_url	(Attribute)	SET_BY_META
references	(Attribute)	SET_BY_META
source	(Attribute)	SET_BY_META
spatial_coverage_type	(Attribute)	Horizontal
standard_name_vocabulary	(Attribute)	CF-1.6
summary	(Attribute)	SET_BY_META
time_coverage_duration	(Attribute)	SET_BY_PGE
time_coverage_end	(Attribute)	SET_BY_PGE
time_coverage_start	(Attribute)	SET_BY_PGE
time_type	(Attribute)	CCSDS UTC-A

Group: /ancillary_data		Contains information ancillary to the data product. This may include product characteristics, instrument characteristics and/or processing constants.
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 COMPACT	STRING(1)	End UTC Time of Granule (CCSDS-A, Actual) None	1	UTC (in CCSDS-A format) of the last data point within the granule. (Source: Derived)
data_start_utc COMPACT	STRING(1)	Start UTC Time of Granule (CCSDS-A, Actual) None	1	UTC (in CCSDS-A format) of the first data point within the granule. (Source: Derived)
end_cycle COMPACT	INTEGER(1)	Ending Cycle None	1	The ending cycle number associated with the data contained within this granule. The cycle number is the counter of the number of 91-day repeat cycles completed by the mission. (Source: Derived)
end_delta_time COMPACT	DOUBLE(1)	ATLAS End Time (Actual) time	seconds since 2018-01-01	Number of GPS seconds since the ATLAS SDP epoch at the last data point in the file. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. (Source: Derived)
end_geoseg COMPACT	INTEGER(1)	Ending Geolocation Segment None	1	The ending geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation

				segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation. (Source: Derived)
end_gpssow COMPACT	DOUBLE(1)	Ending GPS SOW of Granule (Actual) None	seconds	GPS seconds-of-week of the last data point in the granule. (Source: Derived)
end_gpsweek COMPACT	INTEGER(1)	Ending GPSWeek of Granule (Actual) None	weeks from 1980-01-06	GPS week number of the last data point in the granule. (Source: Derived)
end_orbit COMPACT	INTEGER(1)	Ending Orbit Number None	1	The ending orbit number associated with the data contained within this granule. The orbit number increments each time the spacecraft completes a full orbit of the Earth. (Source: Derived)
end_region COMPACT	INTEGER(1)	Ending Region None	1	The ending product-specific region number associated with the data contained within this granule. ICESat-2 data products are separated by geographic regions. The data contained within a specific region are the same for ATL01 and ATL02. ATL03 regions differ slightly because of different geolocation segment locations caused by the irregular shape of the Earth. The region indices for other products are completely independent. (Source: Derived)
end_rgt COMPACT	INTEGER(1)	Ending Reference Groundtrack None	1	The ending reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. (Source: Derived)
granule_end_utc COMPACT	STRING(1)	End UTC Time of Granule (CCSDS-A, Requested) None	1	Requested end time (in UTC CCSDS-A) of this granule. (Source: Derived)
granule_start_utc COMPACT	STRING(1)	Start UTC Time of Granule (CCSDS-A, Requested) None	1	Requested start time (in UTC CCSDS-A) of this granule. (Source: Derived)
release COMPACT	STRING(1)	Release Number None	1	Release number of the granule. The release number is incremented when the software or ancillary data used to create the granule has been changed. (Source: Operations)
start_cycle COMPACT	INTEGER(1)	Starting Cycle None	1	The starting cycle number associated with the data contained within this granule. The cycle number is the counter of the number of 91-day repeat cycles completed by the mission. (Source: Derived)
start_delta_time COMPACT	DOUBLE(1)	ATLAS Start Time (Actual) time	seconds since 2018-01-01	Number of GPS seconds since the ATLAS SDP epoch at the first data point in the file. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
				06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. (Source: Derived)
start_geoseg COMPACT	INTEGER(1)	Starting Geolocation Segment None	1	The starting geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation. (Source: Derived)
start_gpssow COMPACT	DOUBLE(1)	Start GPS SOW of Granule (Actual) None	seconds	GPS seconds-of-week of the first data point in the granule. (Source: Derived)
start_gpsweek COMPACT	INTEGER(1)	Start GPSWeek of Granule (Actual) None	weeks from 1980-01-06	GPS week number of the first data point in the granule. (Source: Derived)
start_orbit COMPACT	INTEGER(1)	Starting Orbit Number None	1	The starting orbit number associated with the data contained within this granule. The orbit number increments each time the spacecraft completes a full orbit of the Earth. (Source: Derived)
start_region COMPACT	INTEGER(1)	Starting Region None	1	The starting product-specific region number associated with the data contained within this granule. ICESat-2 data products are separated by geographic regions. The data contained within a specific region are the same for ATL01 and ATL02. ATL03 regions differ slightly because of different geolocation segment locations caused by the irregular shape of the Earth. The region indices for other products are completely independent. (Source: Derived)
start_rgt COMPACT	INTEGER(1)	Starting Reference Groundtrack None	1	The starting reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. (Source: Derived)
version COMPACT	STRING(1)	Version None	1	Version number of this granule within the release. It is a sequential number corresponding to the number of times the granule has been reprocessed for the current release. (Source: Operations)
Group: /ancillary_data/inland_water		Contains general ancillary parameters.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
sig_threshold COMPACT	INTEGER(1)	Signal Confidence Threshold None	1	Minimum signal confidence required for photon to be included in analysis (Source: ATBD Table 5-2)
Group: /gtx		Contains mean transect data product parameters and subgroups pertaining to a specific groundtrack.		

ATL22 Product Data Dictionary

data_rate	(Attribute)	Data within this group are stored at the transect rate.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
atl13_gran_ndx CHUNKED	INTEGER(:) INVALID_I4B	Granule Index None	1	ATL13 granule index, indicating from which ATL13 granule in /METADATA/Lineage/ATL13/fileName an ATL22 transect product was derived. (Source: Section 5.4)
atl13refid CHUNKED	INTEGER_8(:) INVALID_I8B	ATL13 Reference ID None	1	Unique aggregate reference number for each shape in the ATL13 Inland Water Body Mask, where digit 1 = type, digit 2 = size, digit 3 = source, and digits 4-10 = shape id (Source: Section 5.4)
inland_water_body_id CHUNKED	INTEGER(:) INVALID_I4B	Body ID None	1	Identifying signature of an individual inland water body. Each body of water is represented by a unique numeric value. (Source: Section 5.4)
inland_water_body_region CHUNKED	INTEGER(:) INVALID_I4B	Body region None	1	ATL13-created shapefile representing relevant bodies of water over which to implement the ATL13 water surface finding algorithm only within a region of processing interest. (Source: Section 5.4)
inland_water_body_type CHUNKED	INTEGER_1(:) INVALID_I1B	Body type None	1	Type of Inland Water Body, where 1=Lake, 2=Known Reservoir, 3=(Reserved for future use), 4=Ephemeral Water, 5=River, 6=Estuary or Bay, 7=Coastal Water, 8=Reserved, 9=Reserved (Source: Section 5.4); (Meanings: [1 2 3 4 5 6 7 8 9]) (Values: ['Lake', 'Known_Reservoir', 'Reserved_for_future_use', 'Ephemeral_Water', 'River', 'Estuary_or_Bay', 'Coastal_Water', 'Reserved', 'Reserved'])
transect_end_lat CHUNKED	DOUBLE(:)	End Latitude latitude	degrees_north	Latitude of the transect end, determined by the latitude of the last photon in the last short segment in the transect. (Source: Section 5.4)
transect_end_lon CHUNKED	DOUBLE(:)	End Longitude longitude	degrees_east	Longitude of the transect end, determined by the longitude of the last photon in the last short segment in the transect. (Source: Section 5.4)
transect_end_sseg_idx CHUNKED	INTEGER(:) INVALID_I4B	Index of final entry None	1	Index of final entry in ATL13 short segment rate output data contributing to transect summary. (Source: Section 5.4)
transect_end_time CHUNKED	DOUBLE(:) INVALID_R8B	Transect end time time	seconds since 2018-01-01	Time of the transect end, determined by the time of the last photon in the last short segment in the transect. (Source: Section 5.4)
transect_id CHUNKED	INTEGER(:) INVALID_I4B	Transect ID None	1	Transect within a water body to which the short segment rate output belongs. (Source: Section 5.4)
transect_lat CHUNKED	DOUBLE(:)	Latitude latitude	degrees_north	Reporting latitude of transect statistics. (Source: Section 5.4)
transect_length CHUNKED	DOUBLE(:) INVALID_R8B	Transect length None	meters	Length of the transect, determined as the distance from the first observed reference photon in the water body to the final observed photon in the body. (Source: Section 5.4)
transect_lon CHUNKED	DOUBLE(:)	Longitude longitude	degrees_east	Reporting longitude of transect statistics. (Source: Section 5.4)
transect_lseg2_cnt CHUNKED	INTEGER(:) INVALID_I4B	Very long segment count None	1	Number of complete very long segments in the transect. (Source: Section 5.4)
transect_lseg_cnt CHUNKED	INTEGER(:) INVALID_I4B	Long segment count None	1	Number of complete long segments in the transect. (Source: Section 5.4)
transect_mean_ht_WGS84 CHUNKED	FLOAT(:) INVALID_R4B	Transect mean height None	meters	Mean geodetic height of the transect with respect to the WGS84 ellipsoid, determined as the mean of all reported short segment height values in the transect.

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
				(Source: Section 5.4)
transect_mean_ht_ortho CHUNKED	FLOAT(:) INVALID_R4B	Transect mean orthometric height None	meters	Mean orthometric height of the transect with respect to the EGM2008 geoid, determined as the mean of all reported short segment height values in the transect. (Source: Section 5.4)
transect_mean_lat CHUNKED	DOUBLE(:) INVALID_R8B	Mean Latitude latitude	degrees_north	Mean latitude of the transect, calculated as mean of all reported sseg latitudes in the transect. (Source: Section 5.4)
transect_mean_lon CHUNKED	DOUBLE(:) INVALID_R8B	Mean Longitude longitude	degrees_east	Mean longitude of the transect, calculated as mean of all reported sseg longitudes in the transect. (Source: Section 5.4)
transect_mean_stdev_water_surf CHUNKED	FLOAT(:) INVALID_R4B	Surface StDev None	meters	Mean standard deviation of the transect water surface. (Deferred; populated with invalid values in rel001) (Source: Section 5.4)
transect_mean_subsurf_atten CHUNKED	FLOAT(:) INVALID_R4B	Subsurface Attenuation None	m^-1	Mean subsurface attenuation (alpha) of the transect, determined as the mean of all reported alphas along the transect. (Source: Section 5.4)
transect_mean_time CHUNKED	DOUBLE(:) INVALID_R8B	Mean Time time	seconds since 2018-01-01	Mean time of the transect, calculated as mean of all reported sseg times in the transect. (Source: Section 5.4)
transect_mean_time_utc CHUNKED	STRING(:)	Mean UTC Time (CCSDS-A) time	1	Mean time of the transect in UTC format YYYY-MM-DDTHH:MM:SS.SSSSSSZ. (Source: Derived)
transect_sseg_cnt CHUNKED	INTEGER(:) INVALID_I4B	Short segment count None	1	Number of non-anomalous short segments in the transect. (Source: Section 5.4)
transect_start_lat CHUNKED	DOUBLE(:)	Start Latitude latitude	degrees_north	Latitude of the transect start, determined by the latitude of the first photon in the first short segment in the transect. (Source: Section 5.4)
transect_start_lon CHUNKED	DOUBLE(:)	Start Longitude longitude	degrees_east	Longitude of the transect start, determined by the longitude of the first photon in the first short segment in the transect. (Source: Section 5.4)
transect_start_sseg_idx CHUNKED	INTEGER(:) INVALID_I4B	Index of first entry None	1	Index of first entry in ATL13 short segment rate output data contributing to transect summary (Source: Section 5.4)
transect_start_time CHUNKED	DOUBLE(:) INVALID_R8B	Transect start time time	seconds since 2018-01-01	Time of the transect start, determined by the time of the first photon in the first short segment in the transect. (Source: Section 5.4)
transect_time CHUNKED	DOUBLE(:)	Delta Time time	seconds since 2018-01-01	Reporting time of transect statistics. (Source: Derived)
Group: /multibeam			Contains Multi-Beam Water Height Data Products	
data_rate	(Attribute)		Data within this group are stored per inland water body (where data availability permits).	
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
aspect CHUNKED	FLOAT(:) INVALID_R4B	Aspect None	radians	Direction of slope of planar surface with respect to North between adjacent strong beams. (Source: section 5.3.5 (B))
delta_time CHUNKED	DOUBLE(:)	Delta Time time	seconds since 2018-01-01	Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. (Source: ATL03)

Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
err_aspect CHUNKED	FLOAT(:) INVALID_R4B	Error in Aspect None	radians	Error included in aspect reported. (Source: section 5.3.5 (C))
err_slope_bdy CHUNKED	FLOAT(:) INVALID_R4B	Error in Slope None	1	Error included in segment_slope_trk_bdy. (Source: section 5.3.5 (C))
inland_water_body_id CHUNKED	INTEGER(:) INVALID_I4B	Body ID None	1	Identifying signature of an individual inland water body. Each body of water is represented by a unique numeric value. (Source: Section 5.3.1 (C))
max_slope CHUNKED	FLOAT(:) INVALID_R4B	Maximum Slope None	1	Maximum slope of planar triangular surface between adjacent strong beams. (Source: section 5.3.5 (B))
plan_lat CHUNKED	DOUBLE(:)	Latitude latitude	degrees_north	Latitude of reporting location for multi-beam planar statistics (Source: section 5.3.5 (B))
plan_lon CHUNKED	DOUBLE(:)	Longitude longitude	degrees_east	Longitude of reporting location for multi-beam planar statistics (Source: section 5.3.5 (B))
Group: /orbit_info		Contains orbit information.		
data_rate	(Attribute)	Varies. Data are only provided when one of the stored values (besides time) changes.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
crossing_time CHUNKED	DOUBLE(:)	Ascending Node Crossing Time time	seconds since 2018-01-01	The time, in seconds since the ATLAS SDP GPS Epoch, at which the ascending node crosses the equator. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. (Source: POD/PPD)
cycle_number CHUNKED	INTEGER_1(:)	Cycle Number None	1	A count of the number of exact repeats of this reference orbit. (Source: Operations)
lan CHUNKED	DOUBLE(:)	Ascending Node Longitude None	degrees_east	Longitude at the ascending node crossing. (Source: POD/PPD)
orbit_number CHUNKED	UINT_2_LE(:)	Orbit Number None	1	Unique identifying number for each planned ICESat-2 orbit. (Source: Operations)
rgt CHUNKED	INTEGER_2(:)	Reference Ground track None	1	The reference ground track (RGT) is the track on the earth at which a specified unit vector within the observatory is pointed. Under nominal operating conditions, there will be no data collected along the RGT, as the RGT is spanned by GT3 and GT4. During slews or off-pointing, it is possible that ground tracks may intersect the RGT. The ICESat-2 mission has 1387 RGTs. (Source: POD/PPD)
sc_orient CHUNKED	INTEGER_1(:)	Spacecraft Orientation None	1	This parameter tracks the spacecraft orientation between forward, backward and transitional flight modes. ICESat-2 is considered to be flying forward when the weak beams are leading the strong beams; and backward when the strong beams are leading the weak beams. ICESat-2 is considered to be in transition while it is maneuvering between the two orientations. Science quality is potentially degraded while in transition mode. (Source: POD/PPD); (Meanings: [0 1 2]) (Values: ['backward', 'forward', 'transition'])
sc_orient_time CHUNKED	DOUBLE(:)	Time of Last Spacecraft Orientation Change	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

		time		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 failure; 2=insufficient data; 3=TBD3; 4=TBD4; 5=TBD5 (Source: Operations); (Meanings: [0 1 2 3 4 5]) (Values: ['no_failure', 'processing_failure', 'insufficient_data', 'TBD3', 'TBD4', 'TBD5'])
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'])