ATL17 Product Data Dictionary

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description	(Attribute)	The ICESat-2 ATL17 atmosphere gridded standard data product reports monthly global cloud fraction, global aerosol fraction, total column optical depth over water, polar cloud fraction, polar blowing snow frequency, global and polar apparent surface reflectivity, global and polar ground detection frequency, unique global and polar observation counts, and atmosphere gridded parameter statistical values.
level	(Attribute)	L3B
short_name	(Attribute)	ATL17
title	(Attribute)	SET_BY_META
Group: /		The ICESat-2 ATL17 atmosphere gridded standard data product reports monthly global cloud fraction, global aerosol fraction, total column optical depth over water, polar cloud fraction, polar blowing snow frequency, global and polar apparent surface reflectivity, global and polar ground detection frequency, unique global and polar observation counts, and atmosphere gridded parameter statistical values.
Conventions	(Attribute)	CF-1.6
citation	(Attribute)	SET_BY_META
contributor_name	(Attribute)	Thomas A Neumann (thomas.neumann@nasa.gov), Stephen P Palm (stephen.p.palm@nasa.gov), Suneel K Bhardwaj (suneel.k.bhardwaj@nasa.gov), David W Hancock III (david.w.hancock@nasa.gov)
contributor_role	(Attribute)	Project Scientist, Atmosphere Scientist, SDMS Data Producer, ASAS Data Producer
creator_name	(Attribute)	SET_BY_META
date_created	(Attribute)	SET_BY_PGE
date_type	(Attribute)	UTC
featureType	(Attribute)	gridded
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)	ATL17
hdfversion	(Attribute)	SET_BY_PGE
history	(Attribute)	SET_BY_PGE
identifier_file_uuid	(Attribute)	SET_BY_PGE
identifier_product_doi	(Attribute)	10.5067/ATLAS/ATL17.001
identifier_product_doi_authority	(Attribute)	http://dx.doi.org
identifier_product_format_version	(Attribute)	SET_BY_PGE
identifier_product_type	(Attribute)	ATL17
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		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
data_qa_flag COMPACT	INTEGER_1([1])	data quality flag None	auxiliaryInformation	The data quality flag scalar parameter. This is a TBD flag that may be used to indicate data quality. Type: integer*1. (Source: L3B ATM ATBD, Section 5.0, Table 5.)
delta_time_beg COMPACT	DOUBLE([1])	start time time	seconds since 2018-01-01	The start time scalar parameter (start_time). The start time/date of the data used to make the product. Number of GPS seconds since the ATLAS SDP epoch at the beginning of the data collection. 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. Type: double precision. (Source: L3B ATM ATBD, Section 5.0, Table 5.)
delta_time_end COMPACT	DOUBLE([1])	end time time	seconds since 2018-01-01	The end time scalar parameter (end_time). The end time/date of the data used to make the product. Number of GPS seconds since the ATLAS SDP epoch at the end of the data collection. 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. Type: double precision. (Source: L3B ATM ATBD, Section 5.0, Table 5.)
global_aerosol_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	Global Aerosol Fraction None	fraction	The global aerosol fraction two-dimensional atmospheric gridded parameter. For each global grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one aerosol layer (layer_attr (,) = 2 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded global aerosol fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-

				rate profile processing. Grid array organization: global_aerosol_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly global_grid_lon_scale = 1.0 degrees and the global_grid_lat_scale = 1.0 degrees, the global gridded array dimension is: global_aerosol_frac (360,180), type: floating point. Reference: global_aerosol_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "global_aerosol_frac_img" in the ATL17 product. The applicable global observation counts for this atmosphere gridded parameter are available from: global_cloud_aerosol_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.1.1, Section 5.0, Table 5.)
global_asr CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	Global Apparent Surface Reflectance (0-1) None	1	The global average apparent surface reflectance (ASR) two-dimensional atmospheric gridded parameter. For each global grid cell this represents the ratio of the summation of the detected surface signal apparent surface reflectivity 25 Hz (high-rate profile) observations (apparent_surf_reflec () > 0.0) to the number of detected surface signal ASR 25 Hz (high-rate profile) observations (global_asr_obs_grid (i,j)) in the cell. The gridded average global ASR values are produced when the number of detected surface signal ASR 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (global_asr_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. ASR represents the true surface reflectivity modified by the two-way atmospheric transmission. Generally a number between 0.0 and 1.0. ASR is related to the ratio of the received energy to the transmitted energy, assuming a Lambertian surface reflectance. The ATL09 required surface signal apparent surface reflectance (apparent_surf_reflec ()) values are determined in the L3A ATM high-rate profile processing. Grid array organization: global_asr (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly global_grid_lon_scale = 1.0 degrees and the global_grid_lat_scale = 1.0 degrees, the gridded array dimension is: global_asr (360,180), type: floating point. Reference: global_asr (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "global_asr_img" in the ATL17 product. The applicable global observation counts for this atmosphere gridded parameter are available from: global_asr_obs_grid (i,j). Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.5737738). Image will be limited to the range of 0.0 to 1.0. (Source: ATM L3B ATBD, Section 3.5, Section 5.0, Table 5.)
global_asr_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	global apparent surface reflectance observation grid None	1	The global apparent surface reflectance (ASR) observation count two-dimensional gridded parameter. The number of observations used to compute the average global apparent surface reflectance (ASR). Only surface signal detected ASR 25 Hz (high-rate profile) observations (apparent_surf_reflec () > 0.0) in each grid cell are used to compute the cell global ASR (global_asr (i,j)). Grid array organization: global_asr_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the

				monthly global_grid_lon_scale = 1.0 degrees and the global_grid_lat_scale = 1.0 degrees, the monthly global gridded array dimension is: global_asr_obs_grid (360,180), type: floating point . Reference: global_asr_obs_grid (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. The global observation counts are applicable to the atmosphere gridded parameter: global_asr (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
global_cloud_aerosol_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	global cloud and aerosol fraction observation grid None	1	The global cloud fraction and aerosol fraction observation count two-dimensional gridded parameter. The number of observations used to compute the global cloud fraction and the global aerosol fraction. This number represents all 25 Hz (high-rate profile) observations in each cell. Only 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1) in each grid cell are used to compute the cell global cloud fraction (global_cloud_frac (i,j)). Only 25 Hz (high-rate profile) observations with at least one aerosol layer (layer_attr (,) = 2) in each grid cell are used to compute the cell global aerosol fraction (global_aerosol_frac (i,j)). Given equivalent 25 Hz (high-rate profile) observation counts for cloud fraction and aerosol fraction, this grid array is loaded from the global cloud fraction total observation counts. Grid array organization: global_cloud_aerosol_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly global_grid_lon_scale = 1.0 degrees and the global_grid_lat_scale = 1.0 degrees, the monthly global gridded array dimension is: global_cloud_aerosol_obs_grid (360,180), type: floating point. Reference: global_cloud_aerosol_obs_grid (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. The global observation counts are applicable to these atmosphere gridded parameters: global_cloud_frac (i,j), global_aerosol_frac (i,j), and global_grnd_detect (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
global_cloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	Global Cloud Fraction None	fraction	The global cloud fraction two-dimensional atmospheric gridded parameter. For each global grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations (global_cloud_aerosol_obs_grid (i,j)) in the cell. The gridded global cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (global_cloud_aerosol_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. A cloud fraction value of 0.0 represents a totally cloud free grid cell; a cloud fraction value of 1.0 indicates the grid cell is completely covered with clouds. Grid array organization: global_cloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given monthly global_grid_lon_scale = 1.0 degrees and global_grid_lat_scale = 1.0 degrees, gridded array dimension: global_cloud_frac (360,180), type: floating point. Reference: global_cloud_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. Post-processing by the

				"atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "global_cloud_frac_img" in the ATL17 product. The applicable global observation counts for this atmosphere gridded parameter are available from: global_cloud_aerosol_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.1, Section 5.0, Table 5.)
global_column_od CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	Global (Over Water) Total Column Optical Depth (0-1.5) None	1	The global (over water) average total column optical depth two-dimensional atmospheric gridded parameter. For each global grid cell this represents the ratio of the summation of the valid over-water (column_od_asr_qf () = 4 for water) column optical depth 25 Hz (high-rate profile) observations (column_od_asr () .ne. INVALID) to the number of valid over-water column optical depth 25 Hz (high-rate profile) observations (tcod_obs_grid (i,j)) in that cell. The average over-water global total column optical depth values are produced when the number of valid over-water column optical depth 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (tcod_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required total column optical depth (column_od_asr ()) is estimated from the apparent surface reflectance (ASR) and the assumed actual surface reflectance. The required total column optical depth from ASR quality flag (column_od_asr_qf ()) supplies the reflecting surface type for over-water surface determination. Both ATL09 parameters are supplied from the L3A ATM high-rate profile processing. The 0.0 to 1.5 value range constraint is applied to the global image, and is not applied to the gridded parameter values. Grid array organization: global_column_od (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given monthly global_grid_lon_scale = 1.0 degrees and global_grid_lat_scale = 1.0 degrees, gridded array dimension: global_column_od (360,180), type: floating point. Reference: global_column_od (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "global_column_od_img" in the ATL17 product. The applicable global observation counts for this atmosphere gridded parameter are available from: tcod_obs_grid (i,j). Expected value range: minimum: 0.0, maximum: 1.5. Maximum value may exceed 1.5 (e.g., 2.94870949). Image will be limited to the range of 0.0 to 1.5. (Source: ATM L3B ATBD, Section 3.2, Section 5.0, Table 5.)
global_grid_lat CHUNKED	DOUBLE(['Unlimited'])	global grid latitude latitude	degrees_north	The global grid latitude one-dimensional array parameter, with the latitudes applicable to each global grid cell. ATL09 ATM histogram top latitude (latitude ()) derived from the ATM range window geolocation. Based on WGS84 Earth-centered, Earth-fixed terrestrial reference system and geodetic data. Direction: North=+ values. Range of latitude values: -90.0 to +90.0 degrees, with a step size of global_grid_lat_scale. Grid array organization: global_grid_lat (j), where j=latitude index, as per ATBD Section 2.0. Given monthly global_grid_lat_scale = 1.0 degrees, array dimension: global_grid_lat (180), type: double precision. Comprises the y-grid axis for global gridded parameters. Reference: global_grid_lat (1) = -90.0 degrees, at the lower left corner of a global gridded parameter cell location (i,j) = (1,1). (Source: ATM L3B ATBD, Section 2.0, Section 5.0, Table 5.)

global_grid_lon CHUNKED	DOUBLE(['Unlimited'])	global grid longitude longitude	degrees_east	The global grid longitude one-dimensional array parameter, with the longitudes applicable to each global grid cell. The ATL09 ATM histogram top longitude (longitude()) derived from the ATM range window geolocation. Based on WGS84 Earth-centered, Earth-fixed terrestrial reference system and geodetic data. Direction: East=+ values. Range of longitude values: -180.0 to +180.0 degrees, with a step size of global_grid_lon_scale. Grid array organization: global_grid_lon (i), where i=longitude index, as per ATBD Section 2.0. Given monthly global_grid_lon_scale = 1.0 degrees, array dimension: global_grid_lon (360), type: double precision. Comprises the x-grid axis for global gridded parameters. Reference: global_grid_lon (1) = -180.0 degrees, at the lower left corner of a global gridded parameter cell location (i,j) = (1,1). (Source: ATM L3B ATBD, Section 2.0, Section 5.0, Table 5.)
global_grnd_detect CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	Global Ground Detection Frequency (fraction) None	fraction	The global ground detection frequency two-dimensional atmospheric gridded parameter. For each global grid cell this represents the number of detected surface signal 25 Hz (high-rate profile) observations (surface_sig () > 0.0) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded global ground detection values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The calculation results in a fractional value. The ATL09 required detected surface signal (surface_sig ()) is determined from the surface signal count of the number of photons in the detected surface bin in the L3A ATM high-rate profile processing. Grid array organization: global_grnd_detect (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given monthly global_grid_lon_scale = 1.0 degrees and global_grid_lat_scale = 1.0 degrees, gridded array dimension: global_grnd_detect (360,180), type: floating point. Reference: global_grnd_detect (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "global_ground_detect_img" in the ATL17 product. The applicable global observation counts for this atmosphere gridded parameter are available from: global_cloud_aerosol_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.6, Section 5.0, Table 5.)
npolar_asr CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Apparent Surface Reflectance (0-1) None	1	The north polar apparent surface reflectance (ASR) two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the ratio of the summation of the detected surface signal apparent surface reflectivity 25 Hz (high-rate profile) observations (apparent_surf_reflec () > 0.0) to the number of detected surface signal ASR 25 Hz (high-rate profile) observations (npolar_asr_obs_grid (i,j)) in the cell. The gridded average north polar ASR values are produced when the number of detected surface signal ASR 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (npolar_asr_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. ASR represents the true surface reflectivity modified by the two-way atmospheric transmission. Generally a number between 0.0 and 1.0. ASR is related to the ratio of the received energy to the transmitted energy, assuming a Lambertian surface

				reflectance. The ATL09 required surface signal apparent surface reflectance (apparent_surf_reflec ()) values are determined in the L3A ATM high-rate profile processing. Grid array organization: npolar_asr (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given monthly polar_grid_lon_scale = 1.5 degrees and polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the gridded array dimension: is npolar_asr (240,60), type: floating point. Reference: npolar_asr (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_asr_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_asr_obs_grid (i,j). Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.19374275). Image will be limited to the range of 0.0 to 1.0. (Source: ATM L3B ATBD, Section 3.5, Section 5.0, Table 5.)
npolar_asr_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	north polar apparent surface reflectance observation grid None	1	The north polar apparent surface reflectance (ASR) observation count two-dimensional gridded parameter. The number of observations used to compute the average north polar apparent surface reflectance (ASR). Only surface signal detected ASR 25 Hz (high-rate profile) observations (apparent_surf_reflec () > 0.0) in each grid cell are used to compute the cell north polar ASR (npolar_asr (i,j)). Grid array organization: npolar_asr_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_asr_obs_grid (240,60), type: floating point. Reference: npolar_asr_obs_grid (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. The north polar observation counts are applicable to to the atmosphere gridded parameter: npolar_asr (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
npolar_cloud_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	north polar cloud observation grid None	1	The north polar total cloud fraction observation count two-dimensional gridded parameter. The number of observations used to compute the north polar total cloud fraction. This number represents all 25 Hz (high-rate profile) observations in each cell. Only 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1) in each grid cell are used to compute the cell north polar total cloud fraction (npolar_totlcloud_frac (i,j)). Grid array organization: npolar_cloud_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_cloud_obs_grid (240,60), type: floating point. Reference: npolar_cloud_obs_grid (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. The north polar observation counts are applicable to these atmosphere gridded parameters: npolar_lowcloud_frac (i,j), npolar_midcloud_frac (i,j), npolar_highcloud_frac (i,j), npolar_totalcloud_frac (i,j), npolar_transcloud_frac

				(i,j), npolar_opaquecloud_frac (i,j), and npolar_grnd_detect (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
npolar_grid_lat CHUNKED	DOUBLE(['Unlimited'])	north polar grid latitude latitude	degrees_north	The north polar grid latitude one-dimensional array parameter, with the latitudes applicable to each north polar grid cell. ATL09 ATM histogram top latitude (latitude ()) derived from the ATM range window geolocation. Based on WGS84 Earth-centered, Earth-fixed terrestrial reference system and geodetic data. Direction: North=+ values. Range of latitude values: +90.0 down to +60.0 degrees, with a step size of polar_grid_lat_scale. Grid array organization: npolar_grid_lat (j), where j=latitude index, as per ATBD Section 2.0. Given monthly polar_grid_lat_scale = 0.5 degrees, the monthly array dimension is: npolar_grid_lat (60), type: double precision. Comprises the y-grid axis for north polar gridded parameters. Reference: npolar_grid_lat (1) = +90.0 degrees, at the upper left corner of a north polar gridded parameter cell location (i,j) = (1,1). (Source: ATM L3B ATBD, Section 2.0, Section 5.0, Table 5.)
npolar_grid_lon CHUNKED	DOUBLE(['Unlimited'])	north polar grid longitude longitude	degrees_east	The north polar grid longitude one-dimensional array parameter, with the longitudes applicable to each north polar grid cell. ATL09 ATM histogram top longitude (longitude ()) derived from the ATM range window geolocation. Based on WGS84 Earth-centered, Earth-fixed terrestrial reference system and geodetic data. Direction: East=+ values. Range of longitude values: -180.0 to +180.0 degrees, with a step size of polar_grid_lon_scale. Grid array organization: npolar_grid_lon (i), where i=longitude index, as per ATBD Section 2.0. Given monthly polar_grid_lon_scale = 1.5 degrees, the monthly array dimension is: npolar_grid_lon (240), type: double precision. Comprises the x-grid axis for north polar gridded parameters. Reference: npolar_grid_lon (1) = -180.0 degrees, at the upper left corner of a north polar gridded parameter cell location (i,j) = (1,1). (Source: ATM L3B ATBD, Section 2.0, Section 5.0, Table 5.)
npolar_grnd_detect CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Ground Detection Frequency (fraction) None	fraction	The north polar ground detection frequency two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the number of detected surface signal 25 Hz (high-rate profile) observations (surface_sig () > 0.0) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded north polar ground detection values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The calculation results in a fractional value. The ATL09 required detected surface signal (surface_sig ()) is determined from the surface signal count of the number of photons in the detected surface bin in the L3A ATM high-rate profile processing. Grid array organization: npolar_grnd_detect (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_grnd_detect (240,60), type: floating point. Reference: npolar_grnd_detect (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified

				as "npolar_grnd_detect_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.6, Section 5.0, Table 5.)
npolar_highcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar High Cloud Fraction (> 8km) None	fraction	The north polar high (> 8km) cloud fraction two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) that occurs above 8 km from the layer top (layer_top(,) > 8.0 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded north polar high cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()), the layer attribute flag (layer_attr (,)), and the height of the detected layers (layer_top (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: npolar_highcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_highcloud_frac (240,60), type: floating point. Reference: npolar_highcloud_frac (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_highcloud_frac_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
npolar_hirate_blowing_snow_freq CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar High-Rate Blowing Snow Frequency (percent) None	percent	The north polar high-rate blowing snow frequency two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the ratio of the number of the valid detected blowing snow layer top height 25 Hz (high-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) to the number of valid blowing snow confidence flag (bsnow_con () .ne. INVALID, exceeds the surface not detected value, i.e., bsnow_con () > -3, and is implemented as bsnow_con () => -2) 25 Hz (high-rate profile) observations (npolar_hirate_bsnow_obs_grid (i,j)); the ratio is multiplied by 100.0 to obtain percent. The gridded north polar high-rate blowing snow frequency values are produced when the number of valid blowing snow confidence flag 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (npolar_hirate_bsnow_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required blowing snow height (bsnow_h ()) and blowing snow confidence (bsnow_con ()) values are determined in the L3A ATM high-rate profile processing. Grid array organization: npolar_hirate_blowing_snow_freq (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5

				degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_hirate_blowing_snow_freq (240,60), type: floating point. Reference: npolar_hirate_blowing_snow_freq (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_hirate_blowing_snow_freq_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_hirate_bsnow_obs_grid (i,j). Value range: minimum: 0.0, maximum: 100.0. (Source: ATM L3B ATBD, Section 3.4, Section 5.0, Table 5.)
npolar_hirate_bsnow_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	north polar high-rate blowing snow frequency observation grid None	1	The north polar high-rate blowing snow observation count two-dimensional gridded parameter. The number of high-rate profile blowing snow observations used in the computation of high-rate blowing snow frequency for the Arctic. For each north polar grid cell this represents the number of valid blowing snow confidence 25 Hz (high-rate profile) observations (bsnow_con () .ne. INVALID), where the high-rate profile blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is actually implemented as bsnow_con () => -2). Only valid detected blowing snow layer top height 25 Hz (high-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) and only valid blowing snow confidence 25 Hz (high-rate profile) observations (bsnow_con () .ne. INVALID), where the high-rate blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is implemented as bsnow_con () => -2) in each grid cell are used to compute the cell north polar high-rate blowing snow frequency (npolar_hirate_blowing_snow_freq (i,j)). Grid array organization: npolar_hirate_bsnow_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_hirate_bsnow_obs_grid (240,60), type: floating point. Reference: npolar_hirate_bsnow_obs_grid (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. The north polar observation counts are applicable to the atmosphere gridded parameter: npolar_hirate_blowing_snow_freq (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
npolar_lorate_blowing_snow_freq CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Low-Rate Blowing Snow Frequency (percent) None	percent	The north polar low-rate blowing snow frequency two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the ratio of the number of the valid detected blowing snow layer top height 1 Hz (low-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) to the number of valid blowing snow confidence flag (bsnow_con () .ne. INVALID, exceeds the surface not detected value, i.e., bsnow_con () > -3, and is implemented as bsnow_con () => -2) 1 Hz (low-rate profile) observations (npolar_lorate_bsnow_obs_grid (i,j)); the ratio is multiplied by 100.0 to obtain percent. The gridded north polar low-rate blowing snow frequency values are produced when the number of valid blowing snow confidence flag 1 Hz (low-rate profile) observations is

				equal to or greater than the minimum number of observations required for each grid cell (npolar_lorate_bsnow_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required blowing snow height (bsnow_h ()) and blowing snow confidence (bsnow_con ()) values are determined in the L3A ATM low-rate profile processing. Grid array organization: npolar_lorate_blowing_snow_freq (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_lorate_blowing_snow_freq (240,60), type: floating point. Reference: npolar_lorate_blowing_snow_freq (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_lorate_blowing_snow_freq_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_lorate_bsnow_obs_grid (i,j). Value range: minimum: 0.0, maximum: 100.0. (Source: ATM L3B ATBD, Section 3.4, Section 5.0, Table 5.)
npolar_lorate_bsnow_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	north polar low-rate blowing snow frequency observation grid None	1	The north polar low-rate blowing snow observation count two-dimensional gridded parameter. The number of low-rate profile blowing snow observations used in the computation of low-rate blowing snow frequency for the Arctic. For each north polar grid cell this represents the number of valid blowing snow confidence 1 Hz (low-rate profile) observations (bsnow_con () .ne. INVALID), where the low-rate profile blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is actually implemented as bsnow_con () => -2). Only valid detected blowing snow layer top height 1 Hz (low-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) and only valid blowing snow confidence 1 Hz (low-rate profile) observations (bsnow_con () .ne. INVALID), where the low-rate blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is implemented as bsnow_con () => -2) in each grid cell are used to compute the cell north polar low-rate blowing snow frequency (npolar_lorate_blowing_snow_freq (i,j)). Grid array organization: npolar_lorate_bsnow_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_lorate_bsnow_obs_grid (240,60), type: floating point. Reference: npolar_lorate_bsnow_obs_grid (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. The north polar observation counts are applicable to the atmosphere gridded parameter: npolar_lorate_blowing_snow_freq (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
npolar_lowcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Low Cloud Fraction (<= 4km) None	fraction	The north polar low (<= 4km) cloud fraction two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) that occurs below and up to

				and including 4 km from the layer top (layer_top (,) <= 4.0 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded north polar low cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALD. The ATL09 required number of layers (cloud_flag_atm ()), the layer attribute flag (layer_attr (,)), and the height of the detected layers (layer_top (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: npolar_lowcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_lowcloud_frac (240,60), type: floating point. Reference: npolar_lowcloud_frac (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_lowcloud_frac_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
npolar_midcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Mid Cloud Fraction (> 4km and <= 8km) None	fraction	The north polar middle (> 4km and <= 8km) cloud fraction two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) that occurs above 4 km and up to and including 8 km from the layer top (layer_top (,) > 4.0 and <= 8.0 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded north polar middle cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()), the layer attribute flag (layer_attr (,)), and the height of the detected layers (layer_top (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: npolar_midcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_midcloud_frac (240,60), type: floating point. Reference: npolar_midcloud_frac (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_midcloud_frac_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0.

				(Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
npolar_opaquecloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Opaque Cloud Fraction None	fraction	The north polar opaque cloud fraction two-dimensional atmospheric gridded parameter. For each north polar cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) without surface signal detection (surface_sig () = 0.0) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded north polar opaque cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The fraction of opaque clouds covering the entire grid cell. Opaque clouds are clouds that inhibit or absorb transmission of downward radiation through the cloud. The cloud layer with opaque characteristics exhibits no surface signal count return (=0.0), indicating that no transmitted photons reached the surface. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder, and the required surface signal (surface_sig ()) is determined from the surface signal count of the number of photons in the detected surface bin, all in the L3A ATM high-rate profile processing. Grid array organization: npolar_opaquecloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_opaquecloud_frac (240,60), type: floating point. Reference: npolar_opaquecloud_frac (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_opaquecloud_frac_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.2, Section 5.0, Table 5.)
npolar_totalcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Total Cloud Fraction None	fraction	The north polar total cloud fraction two-dimensional atmospheric gridded parameter. For each north polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations (npolar_cloud_obs_grid (i,j)) in the cell. The gridded north polar total cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (npolar_cloud_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: npolar_totalcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_totalcloud_frac (240,60), type: floating point.

				Reference: npolar_totalcloud_frac (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_totalcloud_frac_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
npolar_transcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	North Polar Transmissive Cloud Fraction None	fraction	The north polar transmissive cloud fraction two-dimensional atmospheric gridded parameter. For each north polar cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) with surface signal detection (surface_sig () > 0.0) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded north polar transmissive cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The fraction of transmissive clouds covering the entire grid cell. Transmissive clouds are clouds that permit or allow transmission of downward radiation through the cloud. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder, and the required detected surface signal (surface_sig ()) is determined from the surface signal count of the number of photons in the detected surface bin, all in the L3A ATM high-rate profile processing. Grid array organization: npolar_transcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the north polar latitude range is: +90.0 down to +60.0 degrees, the monthly gridded array dimension is: npolar_transcloud_frac (240,60), type: floating point. Reference: npolar_transcloud_frac (1,1) = (-180.0 degrees longitude, +90.0 degrees latitude), representing the upper left corner of the gridded parameter cell in the north polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "npolar_transcloud_frac_img" in the ATL17 product. The applicable north polar observation counts for this atmosphere gridded parameter are available from: npolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.2, Section 5.0, Table 5.)
spolar_asr CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar Apparent Surface Reflectance (0-1) None	1	The south polar apparent surface reflectance (ASR) two-dimensional atmospheric gridded parameter. For each south polar grid cell this represents the ratio of the summation of the detected surface signal apparent surface reflectivity 25 Hz (high-rate profile) observations (apparent_surf_reflec () > 0.0) to the number of detected surface signal ASR 25 Hz (high-rate profile) observations (spolar_asr_obs_grid (i,j)) in the cell. The gridded average south polar ASR values are produced when the number of detected surface signal ASR 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (spolar_asr_obs_grid (i,j) => obs_minimum); otherwise

				set to INVALID. ASR represents the true surface reflectivity modified by the two-way atmospheric transmission. Generally a number between 0.0 and 1.0. ASR is related to the ratio of the received energy to the transmitted energy, assuming a Lambertian surface reflectance. The ATL09 required surface signal apparent surface reflectance (apparent_surf_reflec ()) values are determined in the L3A ATM high-rate profile processing. Grid array organization: spolar_asr (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given monthly polar_grid_lon_scale = 1.5 degrees and polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the gridded array dimension: is spolar_asr (240,60), type: floating point. Reference: spolar_asr (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_asr_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_asr_obs_grid (i,j). Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). Image will be limited to the range of 0.0 to 1.0. (Source: ATM L3B ATBD, Section 3.5, Section 5.0, Table 5.)
spolar_asr_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	south polar apparent surface reflectance observation grid None	1	The south polar apparent surface reflectance (ASR) observation count two-dimensional gridded parameter. The number of observations used to compute the average south polar apparent surface reflectance (ASR). Only surface signal detected ASR 25 Hz (high-rate profile) observations (apparent_surf_reflec () > 0.0) in each grid cell are used to compute the cell south polar ASR (spolar_asr (i,j)). Grid array organization: spolar_asr_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_asr_obs_grid (240,60), type: floating point. Reference: spolar_asr_obs_grid (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. The south polar observation counts are applicable to to the atmosphere gridded parameter: spolar_asr (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
spolar_cloud_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	south polar cloud observation grid None	1	The south polar total cloud fraction observation count two-dimensional gridded parameter. The number of observations used to compute the south polar total cloud fraction. This number represents all 25 Hz (high-rate profile) observations in each cell. Only 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1) in each grid cell are used to compute the cell south polar total cloud fraction (spolar_totlcloud_frac (i,j)). Grid array organization: spolar_cloud_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_cloud_obs_grid (240,60), type: floating point. Reference: spolar_cloud_obs_grid (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the

				south polar projection array. The south polar observation counts are applicable to these atmosphere gridded parameters: spolar_lowcloud_frac (i,j), spolar_midcloud_frac (i,j), spolar_highcloud_frac (i,j), spolar_totalcloud_frac (i,j), spolar_transcloud_frac (i,j), spolar_opaquecloud_frac (i,j), and spolar_grnd_detect (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
spolar_grid_lat CHUNKED	DOUBLE(['Unlimited'])	south polar grid latitude latitude	degrees_south	The south polar grid latitude one-dimensional array parameter, with the latitudes applicable to each south polar grid cell. ATL09 ATM histogram top latitude (latitude ()) derived from the ATM range window geolocation. Based on WGS84 Earth-centered, Earth-fixed terrestrial reference system and geodetic data. Direction: South=- values. Range of latitude values: -90.0 up to -60.0 degrees, with a step size of polar_grid_lat_scale. Grid array organization: spolar_grid_lat (j), where j=latitude index, as per ATBD Section 2.0. Given monthly polar_grid_lat_scale = 0.5 degrees, the monthly array dimension is: spolar_grid_lat (60), type: double precision. Comprises the y-grid axis for south polar gridded parameters. Reference: spolar_grid_lat (1) = -90.0 degrees, at the lower left corner of a south polar gridded parameter cell location (i,j) = (1,1). (Source: ATM L3B ATBD, Section 2.0, Section 5.0, Table 5.)
spolar_grid_lon CHUNKED	DOUBLE(['Unlimited'])	south polar grid longitude longitude	degrees_east	The south polar grid longitude one-dimensional array parameter, with the longitudes applicable to each south polar grid cell. ATL09 ATM histogram top longitude (longitude ()) derived from the ATM range window geolocation. Based on WGS84 Earth-centered, Earth-fixed terrestrial reference system and geodetic data. Direction: East=+ values. Range of longitude values: -180.0 to +180.0 degrees, with a step size of polar_grid_lon_scale. Grid array organization: spolar_grid_lon (i), where i=longitude index, as per ATBD Section 2.0. Given monthly polar_grid_lon_scale = 1.5 degrees, the monthly array dimension is: spolar_grid_lon (240), type: double precision. Comprises the x-grid axis for south polar gridded parameters. Reference: spolar_grid_lon (1) = -180.0 degrees, at the lower left corner of a south polar gridded parameter cell location (i,j) = (1,1). (Source: ATM L3B ATBD, Section 2.0, Section 5.0, Table 5.)
spolar_grnd_detect CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar Ground Detection Frequency (fraction) None	fraction	The south polar ground detection frequency two-dimensional atmospheric gridded parameter. For each south polar grid cell this represents the number of detected surface signal 25 Hz (high-rate profile) observations (surface_sig () > 0.0) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded south polar ground detection values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The calculation results in a fractional value. The ATL09 required detected surface signal (surface_sig ()) is determined from the surface signal count of the number of photons in the detected surface bin in the L3A ATM high-rate profile processing. Grid array organization: spolar_grnd_detect (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_grnd_detect (240,60), type: floating point. Reference: spolar_grnd_detect (1,1) = (-180.0 degrees longitude,

				-90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_grnd_detect_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.6, Section 5.0, Table 5.)
spolar_highcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar High Cloud Fraction (> 8km) None	fraction	The south polar high (> 8km) cloud fraction two-dimensional atmospheric gridded parameter. For each south polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) that occurs above 8 km from the layer top (layer_top (,) > 8.0 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded south polar high cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()), the layer attribute flag (layer_attr (,)), and the height of the detected layers (layer_top (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: spolar_highcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_highcloud_frac (240,60), type: floating point. Reference: spolar_highcloud_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_highcloud_frac_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
spolar_hirate_blowing_snow_freq CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar High-Rate Blowing Snow Frequency (percent) None	percent	The south polar high-rate blowing snow frequency two-dimensional atmospheric gridded parameter. For each south polar grid cell this represents the ratio of the number of the valid detected blowing snow layer top height 25 Hz (high-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) to the number of valid blowing snow confidence flag (bsnow_con () .ne. INVALID, exceeds the surface not detected value, i.e., bsnow_con () > -3, and is implemented as bsnow_con () => -2) 25 Hz (high-rate profile) observations (spolar_hirate_bsnow_obs_grid (i,j)); the ratio is multiplied by 100.0 to obtain percent. The gridded south polar high-rate blowing snow frequency values are produced when the number of valid blowing snow confidence flag 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (spolar_hirate_bsnow_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required blowing snow height (bsnow_h ()) and blowing snow confidence (bsnow_con ()) values are determined in the L3A ATM

				high-rate profile processing. Grid array organization: spolar_hirate_blowing_snow_freq (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_hirate_blowing_snow_freq (240,60), type: floating point. Reference: spolar_hirate_blowing_snow_freq (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_hirate_blowing_snow_freq_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_hirate_bsnow_obs_grid (i,j). Value range: minimum: 0.0, maximum: 100.0. (Source: ATM L3B ATBD, Section 3.4, Section 5.0, Table 5.)
spolar_hirate_bsnow_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	south polar high-rate blowing snow frequency observation grid None	1	The south polar high-rate blowing snow observation count two-dimensional gridded parameter. The number of high-rate profile blowing snow observations used in the computation of high-rate blowing snow frequency for the Antarctic. For each south polar grid cell this represents the number of valid blowing snow confidence 25 Hz (high-rate profile) observations (bsnow_con () .ne. INVALID), where the high-rate profile blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is actually implemented as bsnow_con () => -2). Only valid detected blowing snow layer top height 25 Hz (high-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) and only valid blowing snow confidence 25 Hz (high-rate profile) observations (bsnow_con () .ne. INVALID), where the high-rate blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is implemented as bsnow_con () => -2) in each grid cell are used to compute the cell south polar high-rate blowing snow frequency (spolar_hirate_blowing_snow_freq (i,j)). Grid array organization: spolar_hirate_bsnow_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_hirate_bsnow_obs_grid (240,60), type: floating point. Reference: spolar_hirate_bsnow_obs_grid (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. The south polar observation counts are applicable to the atmosphere gridded parameter: spolar_hirate_blowing_snow_freq (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
spolar_lorate_blowing_snow_freq CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar Low-Rate Blowing Snow Frequency (percent) None	percent	The south polar low-rate blowing snow frequency two-dimensional atmospheric gridded parameter. For each south polar grid cell this represents the ratio of the number of the valid detected blowing snow layer top height 1 Hz (low-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) to the number of valid blowing snow confidence flag (bsnow_con () .ne. INVALID, exceeds the surface not detected value, i.e., bsnow_con () > -3, and is implemented as bsnow_con () => -2) 1 Hz (low-rate profile) observations (spolar_lorate_bsnow_obs_grid (i,j)); the ratio is

				multiplied by 100.0 to obtain percent. The gridded south polar low-rate blowing snow frequency values are produced when the number of valid blowing snow confidence flag 1 Hz (low-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (spolar_lorate_bsnow_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required blowing snow height (bsnow_h ()) and blowing snow confidence (bsnow_con ()) values are determined in the L3A ATM low-rate profile processing. Grid array organization: spolar_lorate_blowing_snow_freq (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_lorate_blowing_snow_freq (240,60), type: floating point. Reference: spolar_lorate_blowing_snow_freq (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_lorate_blowing_snow_freq_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_lorate_bsnow_obs_grid (i,j). Value range: minimum: 0.0, maximum: 100.0. (Source: ATM L3B ATBD, Section 3.4, Section 5.0, Table 5.)
spolar_lorate_bsnow_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	south polar low-rate blowing snow frequency observation grid None	1	The south polar low-rate blowing snow observation count two-dimensional gridded parameter. The number of low-rate profile blowing snow observations used in the computation of low-rate blowing snow frequency for the Antarctic. For each south polar grid cell this represents the number of valid blowing snow confidence 1 Hz (low-rate profile) observations (bsnow_con () .ne. INVALID), where the low-rate profile blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is actually implemented as bsnow_con () => -2). Only valid detected blowing snow layer top height 1 Hz (low-rate profile) observations (bsnow_h () .ne. INVALID and bsnow_h () > 0.0) and only valid blowing snow confidence 1 Hz (low-rate profile) observations (bsnow_con () .ne. INVALID), where the low-rate blowing snow confidence value exceeds the surface not detected value (bsnow_con () > -3, and is implemented as bsnow_con () => -2) in each grid cell are used to compute the cell south polar low-rate blowing snow frequency (spolar_lorate_blowing_snow_freq (i,j)). Grid array organization: spolar_lorate_bsnow_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_lorate_bsnow_obs_grid (240,60), type: floating point. Reference: spolar_lorate_bsnow_obs_grid (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. The south polar observation counts are applicable to the atmosphere gridded parameter: spolar_lorate_blowing_snow_freq (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
spolar_lowcloud_frac	FLOAT(['Unlimited',	South Polar	fraction	The south polar low (<= 4km) cloud fraction two-

CHUNKED	'Unlimited']) INVALID_R4B	Low Cloud Fraction (<= 4km) None		dimensional atmospheric gridded parameter. For each south polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) that occurs below and up to and including 4 km from the layer top (layer_top(,) <= 4.0 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded south polar low cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()), the layer attribute flag (layer_attr (,)), and the height of the detected layers (layer_top (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: spolar_lowcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_lowcloud_frac (240,60), type: floating point. Reference: spolar_lowcloud_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_lowcloud_frac_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
spolar_midcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar Mid Cloud Fraction (> 4km and <= 8km) None	fraction	The south polar middle (> 4km and <= 8km) cloud fraction two-dimensional atmospheric gridded parameter. For each south polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) that occurs above 4 km and up to and including 8 km from the layer top (layer_top (,) > 4.0 and <= 8.0 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded south polar middle cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()), the layer attribute flag (layer_attr (,)), and the height of the detected layers (layer_top (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: spolar_midcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_midcloud_frac (240,60), type: floating point. Reference: spolar_midcloud_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_midcloud_frac_img" in the ATL17 product. The applicable south polar

				observation counts for this atmosphere gridded parameter are available from: spolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
spolar_opaquecloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar Opaque Cloud Fraction None	fraction	The south polar opaque cloud fraction two-dimensional atmospheric gridded parameter. For each south polar cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr () = 1 within cloud_flag_atm () layers) without surface signal detection (surface_sig () = 0.0) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded south polar opaque cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The fraction of opaque clouds covering the entire grid cell. Opaque clouds are clouds that inhibit or absorb transmission of downward radiation through the cloud. The cloud layer with opaque characteristics exhibits no surface signal count return (=0.0), indicating that no transmitted photons reached the surface. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder, and the required surface signal (surface_sig ()) is determined from the surface signal count of the number of photons in the detected surface bin, all in the L3A ATM high-rate profile processing. Grid array organization: spolar_opaquecloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_opaquecloud_frac (240,60), type: floating point. Reference: spolar_opaquecloud_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_opaquecloud_frac_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.2, Section 5.0, Table 5.)
spolar_totalcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar Total Cloud Fraction None	fraction	The south polar total cloud fraction two-dimensional atmospheric gridded parameter. For each south polar grid cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) to the number of all 25 Hz (high-rate profile) observations (spolar_cloud_obs_grid (i,j)) in the cell. The gridded south polar total cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (spolar_cloud_obs_grid (i,j) => obs_minimum); otherwise set to INVALID. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder in the L3A ATM high-rate profile processing. Grid array organization: spolar_totalcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar

				latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_totalcloud_frac (240,60), type: floating point. Reference: spolar_totalcloud_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_totalcloud_frac_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.1, Section 5.0, Table 5.)
spolar_transcloud_frac CHUNKED	FLOAT(['Unlimited', 'Unlimited']) INVALID_R4B	South Polar Transmissive Cloud Fraction None	fraction	The south polar transmissive cloud fraction two-dimensional atmospheric gridded parameter. For each south polar cell this represents the ratio of the number of 25 Hz (high-rate profile) observations with at least one cloud layer (layer_attr (,) = 1 within cloud_flag_atm () layers) with surface signal detection (surface_sig () > 0.0) to the number of all 25 Hz (high-rate profile) observations in the cell. The gridded south polar transmissive cloud fraction values are produced when the number of all 25 Hz (high-rate profile) observations is equal to or greater than the minimum number of observations required for each grid cell (=> obs_minimum); otherwise set to INVALID. The fraction of transmissive clouds covering the entire grid cell. Transmissive clouds are clouds that permit or allow transmission of downward radiation through the cloud. The ATL09 required number of layers (cloud_flag_atm ()) and the layer attribute flag (layer_attr (,)) are determined from the backscatter profile using the DDA layer finder, and the required detected surface signal (surface_sig ()) is determined from the surface signal count of the number of photons in the detected surface bin, all in the L3A ATM high-rate profile processing. Grid array organization: spolar_transcloud_frac (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly polar_grid_lon_scale = 1.5 degrees and the polar_grid_lat_scale = 0.5 degrees, and the south polar latitude range is: -90.0 up to -60.0 degrees, the monthly gridded array dimension is: spolar_transcloud_frac (240,60), type: floating point. Reference: spolar_transcloud_frac (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the south polar projection array. Post-processing by the "atlas_plot" utility program using "plot_atl16.py" will generate and embed the image for this gridded parameter identified as "spolar_transcloud_frac_img" in the ATL17 product. The applicable south polar observation counts for this atmosphere gridded parameter are available from: spolar_cloud_obs_grid (i,j). Value range: minimum: 0.0, maximum: 1.0. (Source: ATM L3B ATBD, Section 3.3.2, Section 5.0, Table 5.)
tcod_obs_grid CHUNKED	FLOAT(['Unlimited', 'Unlimited'])	global total column optical depth (over water) observation grid None	1	The global total column optical depth (over water) observation count two-dimensional gridded parameter. The number of observations used to compute the average global total column optical depth over water. Only valid surface return over-water (column_od_asr_qf () = 4 for water) column optical depth (column_od_asr () .ne. INVALID and column_od_asr () > 0.0) 25 Hz (high-rate profile) observations in each grid cell are used to compute the cell average over-water total column optical depth (global_column_od (i,j)). Grid array organization: tcod_obs_grid (i,j), where i=longitude index, j=latitude index, as per ATBD Section 2.0. Given the monthly global_grid_lon_scale = 1.0 degrees and

				the global_grid_lat_scale = 1.0 degrees, the monthly global gridded array dimension is: tcod_obs_grid (360,180), type: floating point. Reference: tcod_obs_grid (1,1) = (-180.0 degrees longitude, -90.0 degrees latitude), representing the lower left corner of the gridded parameter cell in the global projection array. The global observation counts are applicable to the atmosphere gridded parameter: global_column_od (i,j). (Source: ATM L3B ATBD, Section 3.9, Table 4., Section 5.0, Table 5.)
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. Type: double precision. (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. Type: character string. (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. Type: character string. (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. Type: character string. (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. Type: integer. (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. Type: double precision. (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-2 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. Type: integer. (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. Type: double precision. (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. Type: integer. (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. Type: integer. (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. Type: integer. (Source: Derived)
end_rgt COMPACT	INTEGER([1])	Ending Reference Groundtrack None	1	The ending reference ground track (RGT) number associated with the data contained within this granule. There are 1387 reference ground track in the ICESat-2 repeat orbit. The reference ground track increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. Type: integer. (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. Type: character string. (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. Type: character string. (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. Type: character string. (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. Type: integer. (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. Type: double precision. (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-2 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. Type: integer. (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. Type: double precision. (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. Type: integer. (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. Type: integer. (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. Type: integer. (Source: Derived)
start_rgt COMPACT	INTEGER([1])	Starting Reference Groundtrack None	1	The starting reference ground track (RGT) number associated with the data contained within this granule. There are 1387 reference ground track in the ICESat-2 repeat orbit. The reference ground track increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. Type: integer. (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. Type: character string. (Source: Operations)
Group: /ancillary_data/atmosphere		Contains general ancillary and processing control parameters.		
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
center_weight COMPACT	FLOAT([1])	gridded image smoothing center weight factor None	1	The center_weight is a scalar control parameter. When the gridded image data parameters are smoothed, the center weight value is used to calculate the weight factor used to scale each cell in the smoothed image production. The nominal [default] center_weight value is 0.6. An execution override is provided within the production environment for replacement of the control parameter value. Type: floating point. (Source: L3B ATM ATBD, Section 4.0, Section 5.0, Table 6.)

data_type_flag COMPACT	INTEGER_1([1])	data type flag control None	1	The data type flag is a scalar control parameter. The data_type_flag value =0 [default] indicates both night and day data were used to generate the product; the data_type_flag value =1 indicates night-only data were used to generate the product. An execution override is provided within the production environment for replacement of the control parameter value. Type: integer*1. (Source: L3B ATM ATBD, Section 1.0, Section 5.0, Table 6.); (Meanings: [0 1]) (Values: ['process_both_day_and_night_profile_data_DEFAULT' 'process_night_only_profile_data'])
global_grid_lat_scale COMPACT	FLOAT([1])	global grid latitude scale control None	degrees/cell	The global_grid_lat_scale is a scalar control parameter presenting the global grid cell latitude resolution (scale), in degrees per cell. The nominal [default] global_grid_lat_scale value is 1.0 degrees global latitude grid cell size for the monthly ATL17 product. An execution override is provided within the production environment for replacement of the control parameter value. Type: floating point. (Source: Atmosphere ATBD, Section 1.0, Table 2., Section 5.0, Table 6.)
global_grid_lon_scale COMPACT	FLOAT([1])	global grid longitude scale control None	degrees/cell	The global_grid_lon_scale is a scalar control parameter presenting the global grid cell longitude resolution (scale), in degrees per cell. The nominal [default] global_grid_lon_scale value is 1.0 degrees global longitude grid cell size for the monthly ATL17 product. An execution override is provided within the production environment for replacement of the control parameter value. Type: floating point. (Source: Atmosphere ATBD, Section 1.0, Table 2., Section 5.0, Table 6.)
obs_minimum COMPACT	INTEGER_1([1])	observation count minimum value control None	1	The obs_minimum is a scalar control parameter Indicating the minimum acceptable observation count value required to compute the specific atmosphere parameter grid cell value based on the observation count in the corresponding parameter denominator cell to be used in the rational calculation. The nominal [default] obs_minimum value is 4 for the monthly minimum observation cell count for the ATL17 product. An execution override is provided within the production environment for replacement of the control parameter value. Type: integer*1. (Source: L3B ATM ATBD, Section 3.8, Section 5.0, Table 6.)
polar_grid_lat_scale COMPACT	FLOAT([1])	polar grid latitude scale control None	degrees/cell	The polar_grid_lat_scale is a scalar control parameter presenting the north or south polar grid latitude resolution (scale), in degrees per cell. The nominal [default] polar_grid_lat_scale value is 0.5 degrees polar latitude grid cell size for the monthly ATL17 product. An execution override is provided within the production environment for replacement of the control parameter value. Type: floating point. (Source: Atmosphere ATBD, Section 1.0, Table 2., Section 5.0, Table 6.)
polar_grid_lon_scale COMPACT	FLOAT([1])	polar grid longitude scale control None	degrees/cell	The polar_grid_lon_scale is a scaler control parameter presenting the north or south polar longitude grid resolution (scale), in degrees per cell. The nominal [default] polar_grid_lon_scale value is 1.5 degrees polar longitude grid cell size for the monthly ATL17 product. An execution override is provided within the production environment for replacement of the control parameter value. Type: floating point. (Source: Atmosphere ATBD, Section 1.0, Table 2., Section 5.0, Table 6.)
smooth_grid COMPACT	INTEGER_1([1])	global and polar gridded image smoothing	1	The smooth_grid is a scalar control parameter for the application of the Section 4.0 smoothing algorithm to the product global, north polar, and south polar Images. The nominal [default] smooth_grid value is 1 indicates

		control None		to apply the smoothing algorithm to the data used to generate the images; the smooth_grid value is 0 indicates do not apply the smoothing algorithm to the data used to generate the images. When image gridded data smoothing is selected the smoothing algorithm is applied to intermediate working data arrays for each parameter, and is NOT applied to the actual product gridded parameter arrays content (i.e., the gridded data parameters remain un-smoothed). An execution override is provided within the production environment for replacement of the control parameter value. Type: integer*1. (Source: L3B ATM ATBD, Section 4.0, Section 5.0, Table 6.); (Meanings: [1 0]) (Values: ['apply_smoothing_to_image_data_DEFAULT' 'do_not_apply_smoothing_to_image_data'])
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. Type: double precision. (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. Type: integer*1. (Source: Operations)
lan CHUNKED	DOUBLE(['Unlimited'])	Ascending Node Longitude None	degrees_east	Longitude at the ascending node crossing. Type: double precision. (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. Type: integer*2. (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. Type: integer*1. (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. Type: double precision. (Source: POD/PPD)
Group: /quality_assessment		Contains quality assessment data. This may include QA counters, QA along-track data and/or QA summary data. Also contains atmosphere gridded parameter statistical 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. Type: integer. (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. Type: integer. (Source: Operations); (Meanings: [0 1]) (Values: ['PASS' 'FAIL'])
Group: /quality_assessment/atmosphere		Contains statistical parameters (including minimum, maximum, mean, and standard deviation) for each atmosphere gridded parameter.		
Label (Layout)	Datatype(Dims) Fillvalue	long_name standard_name	units	description
global_aerosol_frac_max CONTIGUOUS	FLOAT([1]) 	global aerosol fraction maximum value None	fraction	The global aerosol fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_aerosol_frac_mean CONTIGUOUS	FLOAT([1]) 	global aerosol fraction mean value None	fraction	The global aerosol fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_aerosol_frac_min CONTIGUOUS	FLOAT([1]) 	global aerosol fraction minimum value None	fraction	The global aerosol fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_aerosol_frac_sdev CONTIGUOUS	FLOAT([1]) 	global aerosol fraction standard deviation value None	fraction	The global aerosol fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_asr_max CONTIGUOUS	FLOAT([1]) 	global apparent surface reflectance maximum value None	1	The global apparent surface reflectance gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)

global_asr_mean CONTIGUOUS	FLOAT([1])	global apparent surface reflectance mean value None	1	The global apparent surface reflectance gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_asr_min CONTIGUOUS	FLOAT([1])	global apparent surface reflectance minimum value None	1	The global apparent surface reflectance gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_asr_sdev CONTIGUOUS	FLOAT([1])	global apparent surface reflectance standard deviation value None	1	The global apparent surface reflectance gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_cloud_frac_max CONTIGUOUS	FLOAT([1])	global cloud fraction maximum value None	fraction	The global cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_cloud_frac_mean CONTIGUOUS	FLOAT([1])	global cloud fraction mean value None	fraction	The global cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_cloud_frac_min CONTIGUOUS	FLOAT([1])	global cloud fraction minimum value None	fraction	The global cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_cloud_frac_sdev CONTIGUOUS	FLOAT([1])	global cloud fraction standard deviation value None	fraction	The global cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_column_od_max CONTIGUOUS	FLOAT([1])	global (over water) total column optical depth maximum value None	1	The global (over water) total column optical depth gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.5. Maximum value may exceed 1.5 (e.g., 2.94870949). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_column_od_mean CONTIGUOUS	FLOAT([1])	global (over water) total column optical depth mean value None	1	The global (over water) total column optical depth gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.5. Maximum value may exceed 1.5 (e.g., 2.94870949). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_column_od_min CONTIGUOUS	FLOAT([1])	global (over water) total column optical depth minimum value None	1	The global (over water) total column optical depth gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.5. Maximum value may exceed 1.5 (e.g., 2.94870949). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_column_od_sdev	FLOAT([1])	global (over	1	The global (over water) total column optical depth

CONTIGUOUS		water) total column optical depth standard deviation value None		gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.5. Maximum value may exceed 1.5 (e.g., 2.94870949). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_grnd_detect_max CONTIGUOUS	FLOAT([1])	global ground detection frequency maximum value None	fraction	The global ground detection frequency gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_grnd_detect_mean CONTIGUOUS	FLOAT([1])	global ground detection frequency mean value None	fraction	The global ground detection frequency gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_grnd_detect_min CONTIGUOUS	FLOAT([1])	global ground detection frequency minimum value None	fraction	The global ground detection frequency gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
global_grnd_detect_sdev CONTIGUOUS	FLOAT([1])	global ground detection frequency standard deviation value None	fraction	The global ground detection frequency gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_asr_max CONTIGUOUS	FLOAT([1])	north polar apparent surface reflectance maximum value None	1	The north polar apparent surface reflectance gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.19374275). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_asr_mean CONTIGUOUS	FLOAT([1])	north polar apparent surface reflectance mean value None	1	The north polar apparent surface reflectance gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g.,1.19374275). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_asr_min CONTIGUOUS	FLOAT([1])	north polar apparent surface reflectance minimum value None	1	The north polar apparent surface reflectance gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.19374275). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_asr_sdev CONTIGUOUS	FLOAT([1])	north polar apparent surface reflectance standard deviation value None	1	The north polar apparent surface reflectance gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.19374275). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_grnd_detect_max CONTIGUOUS	FLOAT([1])	north polar ground detection frequency maximum value None	fraction	The north polar ground detection frequency gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_grnd_detect_mean	FLOAT([1])	north polar	fraction	The north polar ground detection frequency gridded

CONTIGUOUS		ground detection frequency mean value None		array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_grnd_detect_min CONTIGUOUS	FLOAT([1])	north polar ground detection frequency minimum value None	fraction	The north polar ground detection frequency gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_grnd_detect_sdev CONTIGUOUS	FLOAT([1])	north polar ground detection frequency standard deviation value None	fraction	The north polar ground detection frequency gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_highcloud_frac_max CONTIGUOUS	FLOAT([1])	north polar high (> 8km) cloud fraction maximum value None	fraction	The north polar high (> 8km) cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_highcloud_frac_mean CONTIGUOUS	FLOAT([1])	north polar high (> 8km) cloud fraction mean value None	fraction	The north polar high (> 8km) cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_highcloud_frac_min CONTIGUOUS	FLOAT([1])	north polar high (> 8km) cloud fraction minimum value None	fraction	The north polar high (> 8km) cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_highcloud_frac_sdev CONTIGUOUS	FLOAT([1])	north polar high (> 8km) cloud fraction standard deviation value None	fraction	The north polar high (> 8km) cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_hirate_blowing_snow_freq_max CONTIGUOUS	FLOAT([1])	north polar high-rate blowing snow frequency maximum value None	percent	The north polar high-rate blowing snow frequency gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_hirate_blowing_snow_freq_mean CONTIGUOUS	FLOAT([1])	north polar high-rate blowing snow frequency mean value None	percent	The north polar high-rate blowing snow frequency gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_hirate_blowing_snow_freq_min CONTIGUOUS	FLOAT([1])	north polar high-rate blowing snow frequency minimum value None	percent	The north polar high-rate blowing snow frequency gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_hirate_blowing_snow_freq_sdev CONTIGUOUS	FLOAT([1])	north polar high-rate blowing snow frequency standard deviation value	percent	The north polar high-rate blowing snow frequency gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)

		None		
npolar_lorate_blowing_snow_freq_max CONTIGUOUS	FLOAT([1])	north polar low-rate blowing snow frequency maximum value None	percent	The north polar low-rate blowing snow frequency gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_lorate_blowing_snow_freq_mean CONTIGUOUS	FLOAT([1])	north polar low-rate blowing snow frequency mean value None	percent	The north polar low-rate blowing snow frequency gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_lorate_blowing_snow_freq_min CONTIGUOUS	FLOAT([1])	north polar low-rate blowing snow frequency minimum value None	percent	The north polar low-rate blowing snow frequency gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_lorate_blowing_snow_freq_sdev CONTIGUOUS	FLOAT([1])	north polar low-rate blowing snow frequency standard deviation value None	percent	The north polar low-rate blowing snow frequency gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_lowcloud_frac_max CONTIGUOUS	FLOAT([1])	north polar low (<= 4km) cloud fraction maximum value None	fraction	The north polar low (<= 4km) cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_lowcloud_frac_mean CONTIGUOUS	FLOAT([1])	north polar low (<= 4km) cloud fraction mean value None	fraction	The north polar low (<= 4km) cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_lowcloud_frac_min CONTIGUOUS	FLOAT([1])	north polar low (<= 4km) cloud fraction minimum value None	fraction	The north polar low (<= 4km) cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_lowcloud_frac_sdev CONTIGUOUS	FLOAT([1])	north polar low (<= 4km) cloud fraction standard deviation value None	fraction	The north polar low (<= 4km) cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_midcloud_frac_max CONTIGUOUS	FLOAT([1])	north polar middle (> 4km and <= 8km) cloud fraction maximum value None	fraction	The north polar middle (> 4km and <= 8km) cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_midcloud_frac_mean CONTIGUOUS	FLOAT([1])	north polar middle (> 4km and <= 8km) cloud fraction mean value None	fraction	The north polar middle (> 4km and <= 8km) cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_midcloud_frac_min CONTIGUOUS	FLOAT([1])	north polar lmiddle (> 4km	fraction	The north polar middle (> 4km and <= 8km) cloud fraction gridded array minimum value for all VALID cells

		and <= 8km) cloud fraction minimum value None		as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_midcloud_frac_sdev CONTIGUOUS	FLOAT([1])	north polar middle (> 4km and <= 8km) cloud fraction standard deviation value None	fraction	The north polar middle (> 4km and <= 8km) cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_opaquecloud_frac_max CONTIGUOUS	FLOAT([1])	north polar opaque cloud fraction maximum value None	fraction	The north polar opaque cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_opaquecloud_frac_mean CONTIGUOUS	FLOAT([1])	north polar opaque cloud fraction mean value None	fraction	The north polar opaque cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_opaquecloud_frac_min CONTIGUOUS	FLOAT([1])	north polar opaque cloud fraction minimum value None	fraction	The north polar opaque cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_opaquecloud_frac_sdev CONTIGUOUS	FLOAT([1])	north polar opaque cloud fraction standard deviation value None	fraction	The north polar opaque cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_totalcloud_frac_max CONTIGUOUS	FLOAT([1])	north polar total cloud fraction maximum value None	fraction	The north polar total cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_totalcloud_frac_mean CONTIGUOUS	FLOAT([1])	north polar total cloud fraction mean value None	fraction	The north polar total cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_totalcloud_frac_min CONTIGUOUS	FLOAT([1])	north polar total cloud fraction minimum value None	fraction	The north polar total cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_totalcloud_frac_sdev CONTIGUOUS	FLOAT([1])	north polar total cloud fraction standard deviation value None	fraction	The north polar total cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_transcloud_frac_max CONTIGUOUS	FLOAT([1])	north polar transmissive cloud fraction maximum value None	fraction	The north polar transmissive cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_transcloud_frac_mean	FLOAT([1])	north polar	fraction	The north polar transmissive cloud fraction gridded

CONTIGUOUS		transmissive cloud fraction mean value None		array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_transcloud_frac_min CONTIGUOUS	FLOAT([1])	north polar transmissive cloud fraction minimum value None	fraction	The north polar transmissive cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
npolar_transcloud_frac_sdev CONTIGUOUS	FLOAT([1])	north polar transmissive cloud fraction standard deviation value None	fraction	The north polar transmissive cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_asr_max CONTIGUOUS	FLOAT([1])	south polar apparent surface reflectance maximum value None	1	The south polar apparent surface reflectance gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_asr_mean CONTIGUOUS	FLOAT([1])	south polar apparent surface reflectance mean value None	1	The south polar apparent surface reflectance gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_asr_min CONTIGUOUS	FLOAT([1])	south polar apparent surface reflectance minimum value None	1	The south polar apparent surface reflectance gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_asr_sdev CONTIGUOUS	FLOAT([1])	south polar apparent surface reflectance standard deviation value None	1	The south polar apparent surface reflectance gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Expected value range: minimum: 0.0, maximum: 1.0. Maximum value may exceed 1.0 (e.g., 1.57377338). (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_grnd_detect_max CONTIGUOUS	FLOAT([1])	south polar ground detection frequency maximum value None	fraction	The south polar ground detection frequency gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_grnd_detect_mean CONTIGUOUS	FLOAT([1])	south polar ground detection frequency mean value None	fraction	The south polar ground detection frequency gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_grnd_detect_min CONTIGUOUS	FLOAT([1])	south polar ground detection frequency minimum value None	fraction	The south polar ground detection frequency gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_grnd_detect_sdev CONTIGUOUS	FLOAT([1])	south polar ground detection	fraction	The south polar ground detection frequency gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value

		frequency standard deviation value None		range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_highcloud_frac_max CONTIGUOUS	FLOAT([1])	south polar high (> 8km) cloud fraction maximum value None	fraction	The south polar high (> 8km) cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_highcloud_frac_mean CONTIGUOUS	FLOAT([1])	south polar high (> 8km) cloud fraction mean value None	fraction	The south polar high (> 8km) cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_highcloud_frac_min CONTIGUOUS	FLOAT([1])	south polar high (> 8km) cloud fraction minimum value None	fraction	The south polar high (> 8km) cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_highcloud_frac_sdev CONTIGUOUS	FLOAT([1])	south polar high (> 8km) cloud fraction standard deviation value None	fraction	The south polar high (> 8km) cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_hirate_blowing_snow_freq_max CONTIGUOUS	FLOAT([1])	south polar high-rate blowing snow frequency maximum value None	percent	The south polar high-rate blowing snow frequency gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_hirate_blowing_snow_freq_mean CONTIGUOUS	FLOAT([1])	south polar high-rate blowing snow frequency mean value None	percent	The south polar high-rate blowing snow frequency gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_hirate_blowing_snow_freq_min CONTIGUOUS	FLOAT([1])	south polar high-rate blowing snow frequency minimum value None	percent	The south polar high-rate blowing snow frequency gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_hirate_blowing_snow_freq_sdev CONTIGUOUS	FLOAT([1])	south polar high-rate blowing snow frequency standard deviation value None	percent	The south polar high-rate blowing snow frequency gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_lorate_blowing_snow_freq_max CONTIGUOUS	FLOAT([1])	south polar low-rate blowing snow frequency maximum value None	percent	The south polar low-rate blowing snow frequency gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_lorate_blowing_snow_freq_mean CONTIGUOUS	FLOAT([1])	south polar low-rate blowing snow frequency mean value None	percent	The south polar low-rate blowing snow frequency gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)

spolar_lorate_blowing_snow_freq_min CONTIGUOUS	FLOAT([1])	south polar low-rate blowing snow frequency minimum value None	percent	The south polar low-rate blowing snow frequency gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_lorate_blowing_snow_freq_sdev CONTIGUOUS	FLOAT([1])	south polar low-rate blowing snow frequency standard deviation value None	percent	The south polar low-rate blowing snow frequency gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 100.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_lowcloud_frac_max CONTIGUOUS	FLOAT([1])	south polar low (<= 4km) cloud fraction maximum value None	fraction	The south polar low (<= 4km) cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_lowcloud_frac_mean CONTIGUOUS	FLOAT([1])	south polar low (<= 4km) cloud fraction mean value None	fraction	The south polar low (<= 4km) cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_lowcloud_frac_min CONTIGUOUS	FLOAT([1])	south polar low (<= 4km) cloud fraction minimum value None	fraction	The south polar low (<= 4km) cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_lowcloud_frac_sdev CONTIGUOUS	FLOAT([1])	south polar low (<= 4km) cloud fraction standard deviation value None	fraction	The south polar low (<= 4km) cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_midcloud_frac_max CONTIGUOUS	FLOAT([1])	south polar middle (> 4km and <= 8km) cloud fraction maximum value None	fraction	The south polar middle (> 4km and <= 8km) cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_midcloud_frac_mean CONTIGUOUS	FLOAT([1])	south polar middle (> 4km and <= 8km) cloud fraction mean value None	fraction	The south polar middle (> 4km and <= 8km) cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_midcloud_frac_min CONTIGUOUS	FLOAT([1])	south polar lmiddle (> 4km and <= 8km) cloud fraction minimum value None	fraction	The south polar middle (> 4km and <= 8km) cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_midcloud_frac_sdev CONTIGUOUS	FLOAT([1])	south polar middle (> 4km and <= 8km) cloud fraction standard deviation value None	fraction	The south polar middle (> 4km and <= 8km) cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_opaquecloud_frac_max CONTIGUOUS	FLOAT([1])	south polar opaque cloud fraction	fraction	The south polar opaque cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum:

		maximum value None		0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_opaquecloud_frac_mean CONTIGUOUS	FLOAT([1])	south polar opaque cloud fraction mean value None	fraction	The south polar opaque cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_opaquecloud_frac_min CONTIGUOUS	FLOAT([1])	south polar opaque cloud fraction minimum value None	fraction	The south polar opaque cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_opaquecloud_frac_sdev CONTIGUOUS	FLOAT([1])	south polar opaque cloud fraction standard deviation value None	fraction	The south polar opaque cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_totalcloud_frac_max CONTIGUOUS	FLOAT([1])	south polar total cloud fraction maximum value None	fraction	The south polar total cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_totalcloud_frac_mean CONTIGUOUS	FLOAT([1])	south polar total cloud fraction mean value None	fraction	The south polar total cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_totalcloud_frac_min CONTIGUOUS	FLOAT([1])	south polar total cloud fraction minimum value None	fraction	The south polar total cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_totalcloud_frac_sdev CONTIGUOUS	FLOAT([1])	south polar total cloud fraction standard deviation value None	fraction	The south polar total cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_transcloud_frac_max CONTIGUOUS	FLOAT([1])	south polar transmissive cloud fraction maximum value None	fraction	The south polar transmissive cloud fraction gridded array maximum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_transcloud_frac_mean CONTIGUOUS	FLOAT([1])	south polar transmissive cloud fraction mean value None	fraction	The south polar transmissive cloud fraction gridded array mean value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_transcloud_frac_min CONTIGUOUS	FLOAT([1])	south polar transmissive cloud fraction minimum value None	fraction	The south polar transmissive cloud fraction gridded array minimum value for all VALID cells as a scalar statistical parameter. Type: floating point. Value range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)
spolar_transcloud_frac_sdev CONTIGUOUS	FLOAT([1])	south polar transmissive cloud fraction	fraction	The south polar transmissive cloud fraction gridded array standard deviation value for all VALID cells as a scalar statistical parameter. Type: floating point. Value

		standard deviation value None		range: minimum: 0.0, maximum: 1.0. (Source: L3B ATM ATBD, Section 3.10, Section 5.0, Table 7.)