

## 1.0 DATA DICTIONARY

The following subsections list the data content of ATL20. Each subsection corresponds to a HDF5 group on the data product. The ATLAS Standard Data Products are designed to be self-documenting and contain additional descriptive information not presented here. The descriptive information within the data dictionary is limited to preserve readability.

### 1.1.1 Attributes

|                      |                                                                                                                                                                                                                                                                                                                  |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| short_name           | ATL20                                                                                                                                                                                                                                                                                                            |
| title                | SET_BY_META                                                                                                                                                                                                                                                                                                      |
| level                | L3B                                                                                                                                                                                                                                                                                                              |
| description          | This data set (ATL20) contains daily and monthly gridded sea ice freeboards.                                                                                                                                                                                                                                     |
| Conventions          | CF-1.7                                                                                                                                                                                                                                                                                                           |
| citation             | SET_BY_META                                                                                                                                                                                                                                                                                                      |
| contributor_name     | Alek Petty (alek.a.petty@nasa.gov), Ron Kwok (rkwok01@uw.edu), Marco Bagnardi (marco.bagnardi@nasa.gov), Alvaro Ivanoff (alvaro.ivanoff-1@nasa.gov), Nathan Kurtz (nathan.t.kurtz@nasa.gov), Jeff Lee (jeffrey.e.lee@nasa.gov), Jesse Wimert (jesse.wimert@us.kbr.com), David Hancock (david.w.hancock@nasa.gov) |
| contributor_role     | Investigator, Investigator, Investigator, Investigator, Investigator, Algorithm Developer, Algorithm Developer, Algorithm Developer                                                                                                                                                                              |
| creator_name         | SET_BY_META                                                                                                                                                                                                                                                                                                      |
| date_created         | SET_BY_PGE                                                                                                                                                                                                                                                                                                       |
| date_type            | UTC                                                                                                                                                                                                                                                                                                              |
| geospatial_lat_max   | 0.0                                                                                                                                                                                                                                                                                                              |
| geospatial_lat_min   | 0.0                                                                                                                                                                                                                                                                                                              |
| geospatial_lat_units | degrees_north                                                                                                                                                                                                                                                                                                    |
| geospatial_lon_max   | 0.0                                                                                                                                                                                                                                                                                                              |
| geospatial_lon_min   | 0.0                                                                                                                                                                                                                                                                                                              |

|                                          |                                                                                                                                                                                                                                                         |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>geospatial_lon_units</b>              | degrees_east                                                                                                                                                                                                                                            |
| <b>granule_type</b>                      | ATL20                                                                                                                                                                                                                                                   |
| <b>hdfversion</b>                        | SET_BY_PGE                                                                                                                                                                                                                                              |
| <b>history</b>                           | SET_BY_PGE                                                                                                                                                                                                                                              |
| <b>identifier_product_doi</b>            | 10.5067/ATLAS/ATL20.001                                                                                                                                                                                                                                 |
| <b>identifier_product_doi_authority</b>  | <a href="http://dx.doi.org">http://dx.doi.org</a>                                                                                                                                                                                                       |
| <b>identifier_product_format_version</b> | SET_BY_PGE                                                                                                                                                                                                                                              |
| <b>identifier_product_type</b>           | ATL20                                                                                                                                                                                                                                                   |
| <b>institution</b>                       | SET_BY_META                                                                                                                                                                                                                                             |
| <b>instrument</b>                        | SET_BY_META                                                                                                                                                                                                                                             |
| <b>keywords</b>                          | SET_BY_META                                                                                                                                                                                                                                             |
| <b>keywords_vocabulary</b>               | SET_BY_META                                                                                                                                                                                                                                             |
| <b>license</b>                           | 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. |
| <b>naming_authority</b>                  | <a href="http://dx.doi.org">http://dx.doi.org</a>                                                                                                                                                                                                       |
| <b>platform</b>                          | SET_BY_META                                                                                                                                                                                                                                             |
| <b>processing_level</b>                  | L3B                                                                                                                                                                                                                                                     |
| <b>project</b>                           | SET_BY_META                                                                                                                                                                                                                                             |
| <b>publisher_email</b>                   | SET_BY_META                                                                                                                                                                                                                                             |
| <b>publisher_name</b>                    | SET_BY_META                                                                                                                                                                                                                                             |
| <b>publisher_url</b>                     | SET_BY_META                                                                                                                                                                                                                                             |
| <b>references</b>                        | SET_BY_META                                                                                                                                                                                                                                             |
| <b>source</b>                            | SET_BY_META                                                                                                                                                                                                                                             |
| <b>spatial_coverage_type</b>             | Horizontal                                                                                                                                                                                                                                              |
| <b>standard_name_vocabulary</b>          | CF-1.6                                                                                                                                                                                                                                                  |
| <b>summary</b>                           | SET_BY_META                                                                                                                                                                                                                                             |

|                               |             |
|-------------------------------|-------------|
| <b>time_coverage_duration</b> | SET_BY_PGE  |
| <b>time_coverage_end</b>      | SET_BY_PGE  |
| <b>time_coverage_start</b>    | SET_BY_PGE  |
| <b>time_type</b>              | CCSDS UTC-A |

### 1.1.2 Datasets

| <b>Name<br/>Standard Name</b>     | <b>Type(Dims)<br/>FillValue</b> | <b>Units</b>  | <b>Description</b>                                                                                                     |
|-----------------------------------|---------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------|
| crs                               | INTEGER_1<br>-                  | NOT_SET       | Coordinate reference system identification for NSIDC Sea Ice Polar Stereographic (Hughes ellipsoid).<br>Source: NetCDF |
| grid_lat                          | DOUBLE(:, :)<br>-               | degrees_north | gridded latitude<br>Source: Sea Ice ATBD                                                                               |
| grid_lon                          | DOUBLE(:, :)<br>-               | degrees_east  | gridded longitude<br>Source: Sea Ice ATBD                                                                              |
| grid_x<br>projection_x_coordinate | DOUBLE(:)<br>-                  | meters        | Center of grid cell X values<br>Source: Sea Ice ATBD                                                                   |
| grid_y<br>projection_y_coordinate | DOUBLE(:)<br>-                  | meters        | Center of grid cell Y values<br>Source: Sea Ice ATBD                                                                   |
| land_mask_map                     | INTEGER(:, :)<br>INVALID_I4B    | 1             | Provides a gridded map which describes each grid cell as land (=1) or ocean/sea ice (=0)<br>Source: Sea Ice ATBD       |

## 1.2 Group: /ancillary\_data

Contains information ancillary to the data product. This may include product characteristics, instrument characteristics and/or processing constants.

### 1.2.1 Datasets

| <b>Name<br/>Standard Name</b> | <b>Type(Dims)<br/>FillValue</b> | <b>Units</b>                              | <b>Description</b>                                                                                                                                                                                                                                                             |
|-------------------------------|---------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| atlas_sdp_gps_epoch           | DOUBLE(1)<br>-                  | 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 |

| Name<br>Standard Name  | Type(Dims)<br>FillValue | Units                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|-------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |                         |                          | point.<br>Source: Operations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| control                | STRING(1)<br>-          | 1                        | PGE-specific control file used to generate this granule. To re-use, replace breaks (BR) with linefeeds.<br>Source: Operations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| data_end_utc           | STRING(1)<br>-          | 1                        | UTC (in CCSDS-A format) of the last data point within the granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| data_start_utc         | STRING(1)<br>-          | 1                        | UTC (in CCSDS-A format) of the first data point within the granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| end_cycle              | INTEGER(1)<br>-         | 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.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| end_delta_time<br>time | DOUBLE(1)<br>-          | 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.<br>Source: Derived                                                                                                                                                                                                                                              |
| end_geoseg             | INTEGER(1)<br>-         | 1                        | The ending geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation.<br>Source: Derived |

| Name<br>Standard Name | Type(Dims)<br>FillValue | Units                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------|-------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| end_gpssow            | DOUBLE(1)<br>-          | seconds               | GPS seconds-of-week of the last data point in the granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                 |
| end_gpsweek           | INTEGER(1)<br>-         | weeks from 1980-01-06 | GPS week number of the last data point in the granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                     |
| end_orbit             | INTEGER(1)<br>-         | 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.<br>Source: Derived                                                                                                                                                                                                                                                                  |
| end_region            | INTEGER(1)<br>-         | 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.<br>Source: Derived |
| end_rgt               | INTEGER(1)<br>-         | 1                     | The ending reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle.<br>Source: Derived                                                                                                |
| granule_end_utc       | STRING(1)<br>-          | 1                     | Requested end time (in UTC CCSDS-A) of this granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                       |
| granule_start_utc     | STRING(1)<br>-          | 1                     | Requested start time (in UTC CCSDS-A) of this granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                     |
| release               | STRING(1)<br>-          | 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.<br>Source: Operations                                                                                                                                                                                                                                                                                       |
| start_cycle           | INTEGER(1)<br>-         | 1                     | The starting cycle number associated with the data contained within this granule. The cycle number is the counter of the number                                                                                                                                                                                                                                                                                                                               |

| Name<br>Standard Name    | Type(Dims)<br>FillValue | Units                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|-------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                         |                          | of 91-day repeat cycles completed by the mission.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| start_delta_time<br>time | DOUBLE(1)<br>-          | 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.<br>Source: Derived                                                                                                                                                                                                                                               |
| start_geoseg             | INTEGER(1)<br>-         | 1                        | The starting geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation.<br>Source: Derived |
| start_gpssow             | DOUBLE(1)<br>-          | seconds                  | GPS seconds-of-week of the first data point in the granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| start_gpsweek            | INTEGER(1)<br>-         | weeks from 1980-01-06    | GPS week number of the first data point in the granule.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| start_orbit              | INTEGER(1)<br>-         | 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.<br>Source: Derived                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| start_region             | INTEGER(1)<br>-         | 1                        | The starting product-specific region number associated with the data contained within this granule. ICESat-2 data products                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Name<br>Standard Name | Type(Dims)<br>FillValue | Units | Description                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|-------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                         |       | 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.<br>Source: Derived                             |
| start_rgt             | INTEGER(1)<br>-         | 1     | The starting reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle.<br>Source: Derived |
| version               | STRING(1)<br>-          | 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.<br>Source: Operations                                                                                                                                                                |

### 1.3 Group: /ancillary\_data/beam\_selection

These parameters control which beams from ATL10 are included in the output ATL20. Note that beams 1, 3, and 5 are strong beams, and beams 2, 4, and 6 are weak beams.

#### 1.3.1 Datasets

| Name<br>Standard Name | Type(Dims)<br>FillValue | Units | Description                                                                                                             |
|-----------------------|-------------------------|-------|-------------------------------------------------------------------------------------------------------------------------|
| proc_atl20_spot_1     | INTEGER_1(1)<br>-       | 1     | Indicates if spot 1 is processed for the ATL20 product<br>Source: Operations<br>Flags: 0()=not_processed, 1()=processed |
| proc_atl20_spot_2     | INTEGER_1(1)<br>-       | 1     | Indicates if spot 2 is processed for the ATL20 product<br>Source: Operations<br>Flags: 0()=not_processed, 1()=processed |
| proc_atl20_spot_3     | INTEGER_1(1)<br>-       | 1     | Indicates if spot 3 is processed for the ATL20 product<br>Source: Operations<br>Flags: 0()=not_processed, 1()=processed |

| Name<br>Standard Name | Type(Dims)<br>FillValue | Units | Description                                                                                                             |
|-----------------------|-------------------------|-------|-------------------------------------------------------------------------------------------------------------------------|
| proc_atl20_spot_4     | INTEGER_1(1)<br>-       | 1     | Indicates if spot 4 is processed for the ATL20 product<br>Source: Operations<br>Flags: 0()=not_processed, 1()=processed |
| proc_atl20_spot_5     | INTEGER_1(1)<br>-       | 1     | Indicates if spot 5 is processed for the ATL20 product<br>Source: Operations<br>Flags: 0()=not_processed, 1()=processed |
| proc_atl20_spot_6     | INTEGER_1(1)<br>-       | 1     | Indicates if spot 6 is processed for the ATL20 product<br>Source: Operations<br>Flags: 0()=not_processed, 1()=processed |

#### 1.4 Group: /daily

gridded daily averages

#### 1.5 Group: /daily/dayxx

Gridded daily averages

##### 1.5.1 Datasets

| Name<br>Standard Name  | Type(Dims)<br>FillValue | Units                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|-------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| delta_time_beg<br>time | DOUBLE(1)<br>-          | seconds<br>since<br>2018-<br>01-01 | Center time of the first freeboard height segment used in this gridded composite in seconds since the ATLAS SDP GPS Epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed.<br>Source: Derived via Time Tagging |
| delta_time_end<br>time | DOUBLE(1)<br>-          | seconds<br>since<br>2018-<br>01-01 | Center time of the last freeboard height segment used in this gridded composite in seconds since the ATLAS SDP GPS Epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative                                                                        |



| Name<br>Standard Name | Type(Dims)<br>FillValue      | Units  | Description                                                                                                                                                                                        |
|-----------------------|------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                              |        | to the GPS epoch can be computed.<br>Source: Derived via Time Tagging                                                                                                                              |
| length_sum            | FLOAT(:, :)<br>INVALID_R4B   | meters | sum of freeboard height segment lengths for each daily grid cell<br>Source: sea ice atbbd                                                                                                          |
| mean_fb               | FLOAT(:, :)<br>INVALID_R4B   | meters | Mean sea ice freeboard for each daily grid cell, calculated using the raw beam freeboards from the given beams (ancillary_data/beam_selection) weighted by segment length.<br>Source: Sea Ice ATBD |
| n_segs                | INTEGER(:, :)<br>INVALID_I4B | 1      | Number of sea ice segments for each daily grid cell<br>Source: Sea Ice ATBD                                                                                                                        |
| sigma                 | FLOAT(:, :)<br>INVALID_R4B   | meters | Standard deviation of daily gridded freeboard height, computed following ATBD section 6.2.<br>Source: Sea Ice ATBD                                                                                 |

## 1.6 Group: /monthly

Gridded Monthly averages

### 1.6.1 Datasets

| Name<br>Standard Name  | Type(Dims)<br>FillValue | Units                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|-------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| delta_time_beg<br>time | DOUBLE(1)<br>-          | seconds<br>since<br>2018-01-01 | Center time of the first freeboard height segment used in this gridded composite in seconds since the ATLAS SDP GPS Epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed.<br>Source: Derived via Time Tagging |
| delta_time_end<br>time | DOUBLE(1)<br>-          | seconds<br>since<br>2018-01-01 | Center time of the last freeboard height segment used in this gridded composite in seconds since the ATLAS SDP GPS Epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta                                                                                                                          |

| Name<br>Standard Name | Type(Dims)<br>FillValue      | Units  | Description                                                                                                                                                          |
|-----------------------|------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                              |        | time parameters, the time in gps_seconds relative to the GPS epoch can be computed.<br>Source: Derived via Time Tagging                                              |
| length_sum            | FLOAT(:, :)<br>INVALID_R4B   | meters | Sum of freeboard height segment lengths for each monthly grid cell<br>Source: Sea Ice ATBD                                                                           |
| mean_fb               | FLOAT(:, :)<br>INVALID_R4B   | meters | Mean sea ice freeboard for each monthly grid cell, calculated using all available daily mean freeboards and weighted by mean segment length.<br>Source: Sea Ice ATBD |
| n_segs                | INTEGER(:, :)<br>INVALID_I4B | 1      | number of sea ice segments for each monthly grid cell<br>Source: Sea Ice ATBD                                                                                        |
| sigma                 | FLOAT(:, :)<br>INVALID_R4B   | meters | Standard deviation of monthly gridded freeboard height, computed following ATBD section 6.2.<br>Source: Sea Ice ATBD                                                 |

## 1.7 Group: /orbit\_info

Contains orbit information.

### 1.7.1 Attributes

|           |                                                                                      |
|-----------|--------------------------------------------------------------------------------------|
| data_rate | Varies. Data are only provided when one of the stored values (besides time) changes. |
|-----------|--------------------------------------------------------------------------------------|

### 1.7.2 Datasets

| Name<br>Standard Name | Type(Dims)<br>FillValue | Units                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------|-------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| crossing_time<br>time | DOUBLE(:)<br>-          | seconds<br>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.<br>Source: POD/PPD |
| cycle_number          | INTEGER_1(:)<br>-       | 1                           | A count of the number of exact repeats of this reference orbit.<br>Source: Operations                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Name<br>Standard Name  | Type(Dims)<br>FillValue | Units                       | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------|-------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| lan                    | DOUBLE(:)<br>-          | degrees_east                | Longitude at the ascending node crossing.<br>Source: POD/PPD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| orbit_number           | UINT_2_LE(:)<br>-       | 1                           | Unique identifying number for each planned ICESat-2 orbit.<br>Source: Operations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| rgt                    | INTEGER_2(:)<br>-       | 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.<br>Source: POD/PPD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| sc_orient              | INTEGER_1(:)<br>-       | 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.<br>Source: POD/PPD<br>Flags: 0()=backward, 1()=forward, 2()=transition                                                                                                                                                                                                                                                                                                                                                                                     |
| sc_orient_time<br>time | DOUBLE(:)<br>-          | seconds<br>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<br>/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.<br>Source: POD/PPD |

## 1.8 Group: /quality\_assessment

Contains quality assessment data. This may include QA counters, QA along-track data and/or QA summary data.

### 1.8.1 Datasets

| Name<br>Standard Name  | Type(Dims)<br>FillValue | Units | Description                                                                                                                                                                                                                                                                                                    |
|------------------------|-------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| qa_granule_fail_reason | INTEGER(1)<br>-         | 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.<br>Source: Operations<br>Flags: 0()=no_failure, 1()=PROCESS_ERROR, 2()=INSUFFICIENT_OUTPUT, 3()=failure_3, 4()=failure_4, 5()=OTHER_FAILURE |
| qa_granule_pass_fail   | INTEGER(1)<br>-         | 1     | Flag indicating granule quality. 0=granule passes automatic QA. 1=granule fails automatic QA.<br>Source: Operations<br>Flags: 0()=PASS, 1()=FAIL                                                                                                                                                               |