# ATL02 Product Data Dictionary

Date Generated : 2019-07-23T20:30:07.000000Z
Product Type: ATL02, Format Version : SET_BY_PGE

| Group: / | | |
|---|---|---|
| Conventions | (Attribute) | CF-1.6 |
| citation | (Attribute) | SET_BY_META |
| contributor_name | (Attribute) | Thomas E Neumann (thomas.neumann@nasa.gov), Thorsten Markus (thorsten.markus@nasa.gov), Suneel Bhardwaj (suneel.bhardwaj@nasa.gov) David W Hancock III (david.w.hancock@nasa.gov) |
| contributor_role | (Attribute) | Instrument Engineer, Investigator, Principle Investigator, Data Producer, Data Producer |
| creator_name | (Attribute) | SET_BY_META |
| data_rate | (Attribute) | Data within this group pertain to the granule in its entirety. |
| date_created | (Attribute) | SET_BY_PGE |
| date_type | (Attribute) | UTC |
| description | (Attribute) | Science unit converted time ordered telemetry calibrated for instrument effects. All photon events per channel per transmit pulse. Includes Atmosphere raw profiles. Contains s/c location data. |
| featureType | (Attribute) | trajectory |
| geospatial_lat_max | (Attribute) | 0.0000000000000000 |
| geospatial_lat_min | (Attribute) | 0.0000000000000000 |
| geospatial_lat_units | (Attribute) | degrees_north |
| geospatial_lon_max | (Attribute) | 0.0000000000000000 |
| geospatial_lon_min | (Attribute) | 0.0000000000000000 |
| geospatial_lon_units | (Attribute) | degrees_east |
| granule_type | (Attribute) | ATL02 |
| hdfversion | (Attribute) | SET_BY_PGE |
| history | (Attribute) | SET_BY_PGE |
| identifier_file_uuid | (Attribute) | SET_BY_PGE |
| identifier_product_doi | (Attribute) | 10.5067/ATLAS/ATL02.001 |
| identifier_product_doi_authority | (Attribute) | http://dx.doi.org |
| identifier_product_format_version | (Attribute) | SET_BY_PGE |
| identifier_product_type | (Attribute) | ATL02 |
| institution | (Attribute) | SET_BY_META |
| instrument | (Attribute) | SET_BY_META |
| keywords | (Attribute) | SET_BY_META |
| keywords_vocabulary | (Attribute) | SET_BY_META |
| level | (Attribute) | 1B |
| 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) | L1B |
| project | (Attribute) | SET_BY_META |
| publisher_email | (Attribute) | SET_BY_META |
| publisher_name | (Attribute) | SET_BY_META |
| publisher_url | (Attribute) | SET_BY_META |

| | | | |
|---|---|---|---|
| references | (Attribute) | SET_BY_META | |
| short_name | (Attribute) | ATL02 | |
| source | (Attribute) | SET_BY_META | |
| spatial_coverage_type | (Attribute) | Horizontal | |
| standard_name_vocabulary | (Attribute) | CF-1.6 | |
| summary | (Attribute) | SET_BY_META | |
| time_coverage_duration | (Attribute) | SET_BY_PGE | |
| time_coverage_end | (Attribute) | SET_BY_PGE | |
| time_coverage_start | (Attribute) | SET_BY_PGE | |
| time_type | (Attribute) | CCSDS UTC-A | |
| title | (Attribute) | SET_BY_META | |

**Group: /ancillary_data**

| | | | |
|---|---|---|---|
| Description | (Attribute) | Contains information ancillary to the data product. This may include product characteristics, instrument characteristics and/or processing constants. | |
| data_rate | (Attribute) | Data within this group pertain to the granule in its entirety. | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| atlas_sdp_gps_epoch<br>(Compact Dataset) | DOUBLE<br>(1) | ATLAS Epoch Offset<br>(not_set) | seconds since 1980-01-06T00:00:00.000000Z<br>Operations | Number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS Standard Data Product (SDP) epoch (2018-01-01:T00.00.00.000000 UTC). Add this value to delta time parameters to compute full gps_seconds (relative to the GPS epoch) for each data point. |
| control<br>(Contiguous Dataset) | STRING:100000<br>(1) | Control File<br>(not_set) | 1<br>Operations | PGE-specific control file used to generate this granule. To re-use, replace breaks (BR) with linefeeds. |
| data_end_utc<br>(Compact Dataset) | STRING:27<br>(1) | End UTC Time of Granule (CCSDS-A, Actual)<br>(not_set) | 1<br>Derived | UTC (in CCSDS-A format) of the last data point within the granule. |
| data_start_utc<br>(Compact Dataset) | STRING:27<br>(1) | Start UTC Time of Granule (CCSDS-A, Actual)<br>(not_set) | 1<br>Derived | UTC (in CCSDS-A format) of the first data point within the granule. |
| end_cycle<br>(Compact Dataset) | INTEGER_4<br>(1) | Ending Cycle<br>(not_set) | 1<br>Derived | The ending cycle number associated with the data contained within this granule. The cycle number is the counter of the number of 91-day repeat cycles completed by the mission. |
| end_delta_time<br>(Compact Dataset) | DOUBLE<br>(1) | ATLAS End Time (Actual)<br>(time) | seconds since 2018-01-01<br>Derived | Number of GPS seconds since the ATLAS SDP epoch at the last data point in the file. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| end_geoseg<br>(Compact Dataset) | INTEGER_4<br>(1) | Ending Geolocation Segment<br>(not_set) | 1<br>Derived | The ending geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation. |
| end_gpssow<br>(Compact Dataset) | DOUBLE<br>(1) | Ending GPS SOW of Granule (Actual)<br>(not_set) | seconds<br>Derived | GPS seconds-of-week of the last data point in the granule. |
| end_gpsweek<br>(Compact Dataset) | INTEGER_4<br>(1) | Ending GPSWeek of Granule (Actual)<br>(not_set) | weeks from 1980-01-06<br>Derived | GPS week number of the last data point in the granule. |
| end_orbit<br>(Compact Dataset) | INTEGER_4<br>(1) | Ending Orbit Number<br>(not_set) | 1<br>Derived | The ending orbit number associated with the data contained within this granule. The orbit number increments each time the spacecraft completes a full orbit of the Earth. |
| end_region<br>(Compact Dataset) | INTEGER_4<br>(1) | Ending Region<br>(not_set) | 1<br>Derived | The ending product-specific region number associated with the data contained within this granule. ICESat-2 data products are separated by geographic regions. The data contained within a specific region are the same for ATL01 and ATL02. ATL03 regions differ slightly because of different geolocation segment locations caused by the irregular shape of the Earth. The region indices for other products are completely independent. |
| end_rgt | INTEGER_4 | Ending Reference | 1 | The ending reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| (Compact Dataset) | (1) | Groundtrack<br>(not_set) | Derived | reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. |
| granule_end_utc<br>(Compact Dataset) | STRING:27<br>(1) | End UTC Time of Granule (CCSDS-A, Requested)<br>(not_set) | 1<br>Derived | Requested end time (in UTC CCSDS-A) of this granule. |
| granule_start_utc<br>(Compact Dataset) | STRING:27<br>(1) | Start UTC Time of Granule (CCSDS-A, Requested)<br>(not_set) | 1<br>Derived | Requested start time (in UTC CCSDS-A) of this granule. |
| qa_at_interval<br>(Compact Dataset) | DOUBLE<br>(1) | QA Along-Track Interval<br>(not_set) | 1<br>control | Statistics time interval for along-track QA data. |
| release<br>(Compact Dataset) | STRING:80<br>(1) | Release Number<br>(not_set) | 1<br>Operations | Release number of the granule. The release number is incremented when the software or ancillary data used to create the granule has been changed. |
| start_cycle<br>(Compact Dataset) | INTEGER_4<br>(1) | Starting Cycle<br>(not_set) | 1<br>Derived | The starting cycle number associated with the data contained within this granule. The cycle number is the counter of the number of 91-day repeat cycles completed by the mission. |
| start_delta_time<br>(Compact Dataset) | DOUBLE<br>(1) | ATLAS Start Time (Actual)<br>(time) | seconds since 2018-01-01<br>Derived | Number of GPS seconds since the ATLAS SDP epoch at the first data point in the file. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| start_geoseg<br>(Compact Dataset) | INTEGER_4<br>(1) | Starting Geolocation Segment<br>(not_set) | 1<br>Derived | The starting geolocation segment number associated with the data contained within this granule. ICESat granule geographic regions are further refined by geolocation segments. During the geolocation process, a geolocation segment is created approximately every 20m from the start of the orbit to the end. The geolocation segments help align the ATLAS strong a weak beams and provide a common segment length for the L2 and higher products. The geolocation segment indices differ slightly from orbit-to-orbit because of the irregular shape of the Earth. The geolocation segment indices on ATL01 and ATL02 are only approximate because beams have not been aligned at the time of their creation. |
| start_gpssow<br>(Compact Dataset) | DOUBLE<br>(1) | Start GPS SOW of Granule (Actual)<br>(not_set) | seconds<br>Derived | GPS seconds-of-week of the first data point in the granule. |
| start_gpsweek<br>(Compact Dataset) | INTEGER_4<br>(1) | Start GPSWeek of Granule (Actual)<br>(not_set) | weeks from 1980-01-06<br>Derived | GPS week number of the first data point in the granule. |
| start_orbit<br>(Compact Dataset) | INTEGER_4<br>(1) | Starting Orbit Number<br>(not_set) | 1<br>Derived | The starting orbit number associated with the data contained within this granule. The orbit number increments each time the spacecraft completes a full orbit of the Earth. |
| start_region<br>(Compact Dataset) | INTEGER_4<br>(1) | Starting Region<br>(not_set) | 1<br>Derived | The starting product-specific region number associated with the data contained within this granule. ICESat-2 data products are separated by geographic regions. The data contained within a specific region are the same for ATL01 and ATL02. ATL03 regions differ slightly because of different geolocation segment locations caused by the irregular shape of the Earth. The region indices for other products are completely independent. |
| start_rgt<br>(Compact Dataset) | INTEGER_4<br>(1) | Starting Reference Groundtrack<br>(not_set) | 1<br>Derived | The starting reference groundtrack (RGT) number associated with the data contained within this granule. There are 1387 reference groundtrack in the ICESat-2 repeat orbit. The reference groundtrack increments each time the spacecraft completes a full orbit of the Earth and resets to 1 each time the spacecraft completes a full cycle. |
| version<br>(Compact Dataset) | STRING:80<br>(1) | Version<br>(not_set) | 1<br>Operations | Version number of this granule within the release. It is a sequential number corresponding to the number of times the granule has been reprocessed for the current release. |
| **Group: /ancillary_data/calibrations** | | | | |
| Description | (Attribute) | This group contains calibrations derived from the ATLAS CAL products. | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| ds_channel<br>(Contiguous Dataset) | INTEGER_1<br>(20) | Channel<br>(not_set) | 1<br>not_set | Dimension scale for ATLAS PCE channels (1-16=strong, 17-20=weak) |
| ds_fine_counts<br>(Contiguous Dataset) | INTEGER_1<br>(75) | Fine Counts<br>(not_set) | 1<br>not_set | Dimension scale for ATLAS Time-of-flight fine counts. |
| **Group: /ancillary_data/calibrations/dead_time** | | | | |
| Description | (Attribute) | CAL42 - Dead-time. Estimates dead time for each ATLAS receiver channel accompanied by an estimated standard deviation for that measurement. photoelectrons/spot/shot, channel-to-channel basis. | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| cal42_product (Compact Dataset) | STRING:80 (1) | CAL Product Name (not_set) | 1 CAL42 | Name of ATLAS CAL Product containing the calibration data |
| side (Compact Dataset) | INTEGER_4 (1) | Detector Bank Side (not_set) | 1 CAL42 | A or B side of the detector bank flag_values: 1, 2 flag_meanings : A B |
| temperature (Compact Dataset) | FLOAT (1) | Temperature (not_set) | degreesC CAL42 | Temperature for which calibrations are provided. |
| **Group: /ancillary_data/calibrations/dead_time/pcex** | | | | |
| Description | (Attribute) | CAL42 - Dead-time. Estimates dead time for each ATLAS receiver channel accompanied by an estimated standard deviation for that measurement. photoelectrons/spot/shot, channel-to-channel basis. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| dead_time (Compact Dataset) | DOUBLE (20) | DeadTime (not_set) | seconds CAL42 | Dead Time (channel) |
| sigma (Compact Dataset) | DOUBLE (20) | Sigma (not_set) | seconds CAL42 | Sigma (channel) |
| **Group: /ancillary_data/calibrations/dead_time_radiometric_signal_loss** | | | | |
| Description | (Attribute) | CAL34 - Dead-time Radiometric Signal Loss. Contains a table of radiometric corrections versus apparent return strength and width for several dead-time values. Correction is to be multiplied by raw return strength to get corrected return strength | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal34_product (Chunked Dataset) | STRING:80 (:) | CAL Product Name (not_set) | 1 CAL34 | Name of ATLAS CAL Products containing the calibration data |
| dead_time (Chunked Dataset) | FLOAT (:) | Dead Time (not_set) | ns CAL34 | Dead time value |
| rad_corr (Chunked Dataset) | DOUBLE (:, :, :) | Radiometric Correction (not_set) | 1 CAL34 | Radiometric Correction (width, strength, deadtime) |
| strength_strong (Chunked Dataset) | DOUBLE (:, :) | Strong Beam Strength (not_set) | events/shot CAL34 | Strong spot strength in events/shot (strength, deadtime) |
| strength_weak (Chunked Dataset) | DOUBLE (:, :) | Weak Beam Strength (not_set) | events/shot CAL34 | Weak spot strength in events/shot (strength, deadtime) |
| width (Chunked Dataset) | DOUBLE (:, :) | Apparent Width (not_set) | ns CAL34 | Apparent width (width, deadtime) |
| **Group: /ancillary_data/calibrations/effective_cell_delay** | | | | |
| Description | (Attribute) | CAL17 - PCE Effective Cell Delay. Calibration product for PCE Unit Cell Delay -- a matrix of effective fine counts as a function of temperature, voltage, PCE card, channel, and event edge (rising, falling). | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal17_product (Chunked Dataset) | STRING:80 (:) | CAL Product Name (not_set) | 1 CAL17 | Name of ATLAS CAL Product containing the calibration data |
| **Group: /ancillary_data/calibrations/effective_cell_delay/pcex** | | | | |
| Description | (Attribute) | CAL17 - PCE Effective Cell Delay. Calibration product for PCE Unit Cell Delay -- a matrix of effective fine counts as a function of temperature, voltage, PCE card, channel, and event edge (rising, falling). | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal_fall (Chunked Dataset) | FLOAT (:) | Call Falling (not_set) | 1 CAL17 | Cal_fall value which calibrations are provided (indexed by raw_cal_fall/256) |
| cal_rise (Chunked Dataset) | FLOAT (:) | Call Rising (not_set) | 1 CAL17 | Cal_rise value which calibrations are provided (index to raw_cal_rise/256) |
| efc_fall (Chunked Dataset) | FLOAT (75,20, :) | EFC Falling (not_set) | counts CAL17 | Effective Rx falling fine cell count (cell, channel, temp) |
| efc_ll (Chunked Dataset) | FLOAT (75, :) | EFC LL (not_set) | counts CAL17 | Effective Tx fine cell count for leading lower (cell, temp) |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| efc_ot (Chunked Dataset) | FLOAT (75, :) | EFC Other (not_set) | counts CAL17 | Effective Tx fine cell count for other (cell, temp) |
| efc_rise (Chunked Dataset) | FLOAT (75,20, :) | EFC Rising (not_set) | counts CAL17 | Effective rising Rx fine cell count (cell, channel, temp) |
| temperature (Chunked Dataset) | FLOAT (:) | Temperature (not_set) | degreesC CAL17 | Temperature for which calibrations are provided. |

| Group: /ancillary_data/calibrations/first_photon_bias | | | | |
|---|---|---|---|---|
| Description | (Attribute) | CAL19 -First Photon Bias. Provides a correction for first photon bias. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal19_product (Chunked Dataset) | STRING:80 (:) | CAL Product Name (not_set) | 1 Derived | Name of ATLAS CAL Products containing the calibration data |
| dead_time (Chunked Dataset) | FLOAT (:) | Dead Time (not_set) | ns Derived | Dead time value |
| ffb_corr (Chunked Dataset) | DOUBLE (:, :, :) | FFB Correction (not_set) | 1 Derived | First Photon Bias Correction (width, strength, deadtime) |
| strength_strong (Chunked Dataset) | DOUBLE (:, :) | Strong Beam Strength (not_set) | events/shot Derived | Strong spot strength in events/shot (strength, deadtime) |
| strength_weak (Chunked Dataset) | DOUBLE (:, :) | Weak Beam Strength (not_set) | events/shot Derived | Weak spot strength in events/shot (strength, deadtime) |
| width (Chunked Dataset) | DOUBLE (:, :) | Apparent Width (not_set) | ns Derived | Apparent width (width, deadtime) |

| Group: /ancillary_data/calibrations/hv_bias_receiver_radiometric_sensitivity | | | | |
|---|---|---|---|---|
| Description | (Attribute) | CAL46 - Relationship describing detector responsivity as the PMT high voltage deviates from nominal high voltage setting (V0). | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal46_product (Compact Dataset) | STRING:80 (1) | CAL Product Name (not_set) | 1 CAL46 | Name of ATLAS CAL Product containing the calibration data |
| side (Compact Dataset) | INTEGER_4 (1) | Detector Bank Side (not_set) | 1 CAL46 | A or B side of the detector bank flag_values: 1, 2 flag_meanings : A B |

| Group: /ancillary_data/calibrations/hv_bias_receiver_radiometric_sensitivity/pcex | | | | |
|---|---|---|---|---|
| Description | (Attribute) | CAL46 - Per-PCE. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| b_strong (Compact Dataset) | FLOAT (1) | b_strong (not_set) | 1/v CAL46 | Strong spot coefficient b |
| b_weak (Compact Dataset) | FLOAT (1) | b_weak (not_set) | 1/v CAL46 | Weak spot coefficient b |
| c_strong (Compact Dataset) | FLOAT (1) | c_strong (not_set) | 1/v^2 CAL46 | Strong spot coefficient c |
| c_weak (Compact Dataset) | FLOAT (1) | c_weak (not_set) | 1/v^2 CAL46 | Weak spot coefficient c |
| npoints_strong (Compact Dataset) | FLOAT (1) | npoints_strong (not_set) | 1 CAL46 | Strong spot number of points |
| npoints_weak (Compact Dataset) | FLOAT (1) | npoints_weak (not_set) | 1 CAL46 | Weak spot number of points |
| rnom_strong (Compact Dataset) | FLOAT (1) | r_nom (not_set) | 1 CAL46 | Strong spot Rnom |
| rnom_weak (Compact Dataset) | FLOAT (1) | r_nom (not_set) | 1 CAL46 | Weak spot Rnom |
| sigma_b_strong (Compact Dataset) | FLOAT (1) | sigma_b_strong (not_set) | 1/v CAL46 | Strong spot sigma of coefficient b |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| sigma_b_weak (Compact Dataset) | FLOAT (1) | sigma_b_weak (not_set) | 1/v CAL46 | Weak spot sigma of coefficient b |
| sigma_c_strong (Compact Dataset) | FLOAT (1) | sigma_c_strong (not_set) | 1/v^2 CAL46 | Strong spot sigma of coefficient c |
| sigma_c_weak (Compact Dataset) | FLOAT (1) | sigma_c_weak (not_set) | 1/v^2 CAL46 | Weak spot sigma of coefficient c |
| sigma_fit_strong (Compact Dataset) | FLOAT (1) | sigma_fit_strong (not_set) | 1 CAL46 | Strong spot sigma of fit |
| sigma_fit_weak (Compact Dataset) | FLOAT (1) | sigma_fit_weak (not_set) | 1 CAL46 | Weak spot sigma of fit |
| vnom_strong (Compact Dataset) | FLOAT (1) | v_nom (not_set) | v CAL46 | Strong spot nominal voltage |
| vnom_weak (Compact Dataset) | FLOAT (1) | v_nom (not_set) | v CAL46 | Weak spot nominal voltage |

**Group: /ancillary_data/calibrations/laser_energy_conversion**

| Description | (Attribute) | Contains CAL54 - absolute, energy monitor | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| base_temp (Compact Dataset) | FLOAT (1) | Base Temperature (not_set) | degC CAL54 | Base temperature coefficient. |
| cal54_product (Compact Dataset) | STRING:80 (1) | CAL File Name (not_set) | 1 CAL54 | Name of source file containing the calibration data |
| internal (Compact Dataset) | DOUBLE (8) | Laser Internal Coeffs (not_set) | 1 CAL54 | Internal laser monitor coefficients (a_(J),b0_(J/count),b1_(J/degC_count),c0_(J/count^2),c1_(J/degC_count^2),d_(J/count^3),e_(J/count^4),std_of_residuals) |
| lrs (Compact Dataset) | DOUBLE (8) | LRS Coeffs (not_set) | 1 CAL54 | LRS coefficients a_(J),b0_(J/count),b1_(J/degC_count),c0_(J/count^2),c1_(J/degC_count^2),d_(J/count^3),e_(J/count^4),std_of_residuals |
| spd (Compact Dataset) | DOUBLE (8) | SPD Coeffs (not_set) | 1 CAL54 | SPD laser monitor coefficients a_(J),b0_(J/count),b1_(J/degC_count),c0_(J/count^2),c1_(J/degC_count^2),d_(J/count^3),e_(J/count^4),std_of_residuals |

**Group: /ancillary_data/calibrations/laser_energy_fraction**

| Description | (Attribute) | Contains CAL45 data - Transmit Energy Fraction per Beam | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal45_product (Compact Dataset) | STRING:80 (1) | CAL File Name (not_set) | 1 CAL45 | Name of source file containing the calibration data |
| energy_fract (Compact Dataset) | FLOAT (6) | Energy Fraction (not_set) | 1 CAL45 | Energy Fraction, Per Spot |
| optics_throughput (Compact Dataset) | FLOAT (3) | Optics Throughput (not_set) | 1 CAL45 | Optics Throughput, Per PCE |

**Group: /ancillary_data/calibrations/low_link_impulse_response**

| Description | (Attribute) | CAL20 - System low link impulse response. Calibrates receiver impulse response, including optical and electrically introduced reflections. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| bin_width (Compact Dataset) | FLOAT (1) | Bin Width (not_set) | seconds CAL20 | Histogram bin width |
| cal20_product (Compact Dataset) | STRING:80 (1) | CAL Product Name (not_set) | 1 CAL20 | Name of ATLAS CAL Product containing the calibration data |
| hist_x (Contiguous Dataset) | DOUBLE (2000) | Histogram Bin X Values (not_set) | 1 CAL20 | Histogram bin x-values |
| laser (Compact Dataset) | INTEGER_4 (1) | Laser (not_set) | 1 CAL20 | Laser Number |
| mode (Compact Dataset) | INTEGER_4 (1) | Laser Power Setting (not_set) | 1 CAL20 | Laser Power Setting |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| num_bins (Compact Dataset) | INTEGER_4 (1) | Number of Bins (not_set) | 1 CAL20 | Number of bins in the histogram |
| return_source (Compact Dataset) | INTEGER_4 (1) | Return Source (not_set) | 1 CAL20 | Source of the events from which the data are derived. flag_values: 0, 1, 2, 3 flag_meanings : none tep maat echo |
| side (Compact Dataset) | INTEGER_4 (1) | A_or_B (not_set) | 1 CAL20 | A or B Side Component flag_values: 1, 2 flag_meanings : A B |
| temperature (Compact Dataset) | FLOAT (1) | Temperature (not_set) | degreesC CAL20 | Temperature for which calibrations are provided. |

**Group: /ancillary_data/calibrations/low_link_impulse_response/pcex**

| Description | (Attribute) | CAL20 - System low link impulse response. Calibrates receiver impulse response, including optical and electrically introduced reflections. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| hist (Contiguous Dataset) | DOUBLE (2000,20) | Histogram (not_set) | 1 CAL20 | Per-Channel Histogram |
| total_events (Compact Dataset) | INTEGER_8 (20) | Total Events (not_set) | 1 CAL20 | Number of events used in constructing the per-channel histogram |

**Group: /ancillary_data/calibrations/nominal_rx_sensitivity**

| Description | (Attribute) | CAL30 - Nominal Rx Sensitivity. Receiver radiometric sensitivity, in an absolute measurement, with all variables (temperature, bias, alignment) set to nominal values. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal30_product (Compact Dataset) | STRING:80 (1) | CAL Product Name (not_set) | 1 CAL30 | Name of ATLAS CAL Product containing the calibration data |
| side (Compact Dataset) | INTEGER_4 (1) | Detector Bank Side (not_set) | 1 CAL30 | A or B side of the detector bank flag_values: 1, 2 flag_meanings : A B |
| temperature (Compact Dataset) | FLOAT (1) | Temperature (not_set) | degreesC CAL30 | Temperature for which calibrations are provided. |

**Group: /ancillary_data/calibrations/nominal_rx_sensitivity/pcex**

| Description | (Attribute) | CAL30 - Nominal Rx Sensitivity. Receiver radiometric sensitivity, in an absolute measurement, with all variables (temperature, bias, alignment ) set to nominal values. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| rms_resid_strong (Compact Dataset) | DOUBLE (1) | RMS Residual (not_set) | 1 CAL30 | Strong spot RMS Residual fraction |
| rms_resid_weak (Compact Dataset) | DOUBLE (1) | RMS Residual (not_set) | 1 CAL30 | Weak spot RMS Residual fraction |
| sdev_strong (Compact Dataset) | DOUBLE (1) | sdev_strong (not_set) | counts/s/pW CAL30 | Strong spot standard deviation |
| sdev_weak (Compact Dataset) | DOUBLE (1) | sdev_weak (not_set) | counts/s/pW CAL30 | Weak spot standard deviation |
| slope_strong (Compact Dataset) | DOUBLE (1) | Slope (not_set) | counts/s/pW CAL30 | Strong spot Slope |
| slope_weak (Compact Dataset) | DOUBLE (1) | Slope (not_set) | counts/s/pW CAL30 | Weak spot Slope |

**Group: /ancillary_data/calibrations/receiver_channel_skews**

| Description | (Attribute) | CAL49 - Receiver Channel Skews. Timing skews for every rising/fall channel on ATLAS. | | |
|---|---|---|---|---|

**Group: /ancillary_data/calibrations/receiver_channel_skews/pcex**

| Description | (Attribute) | CAL49 - Receiver Channel Skews. Timing skews for every rising/fall channel on ATLAS. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal49_product | STRING:80 | CAL Product Name | 1 | Name of ATLAS CAL Product containing the calibration data |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Compact Dataset) | (1) | (not_set) | CAL49 | |
| side (Compact Dataset) | INTEGER_4 (1) | Primary_Redundant (not_set) | 1 CAL49 | Primary or Redundant Component flag_values: 1, 2 flag_meanings : PRIM REDU |
| skew_fall (Compact Dataset) | FLOAT (20) | Skew_Fall (not_set) | seconds CAL49 | Per-channel skew (Fall) |
| skew_fall_stderr (Compact Dataset) | FLOAT (20) | Skew_Fall StdErr (not_set) | seconds CAL49 | Standard error of the calculated skew (Fall) |
| skew_rise (Contiguous Dataset) | FLOAT (20) | Skew_Rise (not_set) | seconds CAL49 | Per-channel skew (Rise) |
| skew_rise_stderr (Compact Dataset) | FLOAT (20) | Skew_Rise StdErr (not_set) | seconds CAL49 | Standard error of the calculated skew (Rise) |
| temperature (Compact Dataset) | FLOAT (1) | Temperature (not_set) | degreesC CAL49 | Temperature for which calibrations are retrieved. |

**Group: /ancillary_data/calibrations/rx_sensitivity_to_misalignment**

| Description | (Attribute) | CAL47 - Provides a calibration for Receiver Sensitivity as a function of Transmit-to-Receiver Beam Misalignment. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| azimuth (Chunked Dataset) | DOUBLE (:) | Azimuth (not_set) | microradians CAL47_IMG | Azimuth |
| azimuth_grid_range (Compact Dataset) | FLOAT (2) | Azimuth Grid Range (not_set) | microradians CAL47_IMG | Azimuth Grid Range |
| cal47_product (Compact Dataset) | STRING:80 (6) | CAL Product Name (not_set) | 1 CAL47_IMG | Name of ATLAS CAL Product containing the calibration data |
| elevation (Chunked Dataset) | DOUBLE (:) | Elevation (not_set) | microradians CAL47_IMG | Elevation |
| elevation_grid_range (Compact Dataset) | FLOAT (2) | Elevation Grid Range (not_set) | microradians CAL47_IMG | Elevation Grid Range |
| grid_spacing (Compact Dataset) | FLOAT (1) | Grid Spacing (not_set) | microradians CAL47_IMG | GridSpacing |
| temperature (Compact Dataset) | FLOAT (1) | Temperature (not_set) | degC CAL47_IMG | Reference temperature within the CAL47 product. |

**Group: /ancillary_data/calibrations/rx_sensitivity_to_misalignment/pcex**

| Description | (Attribute) | CAL47 - Rx Sensitivity as a function of TX-to-IFOV Misalignments. Correlates the residual misalignment of the total 6 beams (given the single BSM AZ/El mirror) interspersed among AMCS calibrations, to apparent shifts in signal gain. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| rel_intensity_strong (Chunked Dataset) | DOUBLE (:, :) | Relative intensity (not_set) | 1 CAL47_IMG | Strong spot relative intensity |
| rel_intensity_weak (Chunked Dataset) | DOUBLE (:, :) | Relative intensity (not_set) | 1 CAL47_IMG | Weak spot relative intensity |

**Group: /ancillary_data/calibrations/rx_sensitivity_vs_wtom**

| Description | (Attribute) | CAL61 - Rx Sensitivity vs. WTOM Ratio. Provides parameter values, for each spot, for the fit of Relative Sensitivity based on the reported WTEM through a quadratic curve. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal61_product (Compact Dataset) | STRING:80 (1) | CAL Product Name (not_set) | 1 CAL61 | Name of ATLAS CAL Product containing the calibration data |
| laser (Compact Dataset) | INTEGER_4 (1) | Laser (not_set) | 1 CAL61 | Laser Number |
| mode (Compact Dataset) | INTEGER_4 (1) | Laser Power Setting (not_set) | 1 CAL61 | Laser Power Setting |
| side (Compact Dataset) | INTEGER_4 (1) | Detector Bank Side (not_set) | 1 CAL61 | A or B side of the detector bank flag_values: 1, 2 |

| | | | flag_meanings : A B | |
|---|---|---|---|---|
| temperature<br>(Compact Dataset) | FLOAT<br>(1) | Temperature<br>(not_set) | degreesC<br>CAL61 | Temperature for which calibrations are provided. |

**Group: /ancillary_data/calibrations/rx_sensitivity_vs_wtom/pcex**

| Description | (Attribute) | CAL61 - Rx Sensitivity vs. WTOM Ratio. Calibration of receiver throughput as a function of the WTOM/WTEM diode signals (D1, D2) to indicate quality of the spectral tuning of the OFMs (etalons) for each receiver IFOV. | | |
|---|---|---|---|---|
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| h_strong<br>(Compact Dataset) | DOUBLE<br>(1) | h_strong<br>(not_set) | 1<br>CAL61 | h_strong; used in Eqn 5-17. |
| h_weak<br>(Compact Dataset) | DOUBLE<br>(1) | h_weak<br>(not_set) | 1<br>CAL61 | h_weak; used in Eqn 5-17. |
| rms_of_fit_strong<br>(Compact Dataset) | DOUBLE<br>(1) | rms_of_fit_strong<br>(not_set) | 1<br>CAL61 | rms_of_fit_strong |
| rms_of_fit_weak<br>(Compact Dataset) | DOUBLE<br>(1) | rms_of_fit_weak<br>(not_set) | 1<br>CAL61 | rms_of_fit_weak |
| sdev_h_strong<br>(Compact Dataset) | DOUBLE<br>(1) | sdev_h_strong<br>(not_set) | 1<br>CAL61 | sdev_h_strong |
| sdev_h_weak<br>(Compact Dataset) | DOUBLE<br>(1) | sdev_h_weak<br>(not_set) | 1<br>CAL61 | sdev_h_weak |
| sdev_xpeak_strong<br>(Compact Dataset) | DOUBLE<br>(1) | sdev_xpeak_strong<br>(not_set) | 1<br>CAL61 | sdev_xpeak_strong |
| sdev_xpeak_weak<br>(Compact Dataset) | DOUBLE<br>(1) | sdev_xpeak_weak<br>(not_set) | 1<br>CAL61 | sdev_xpeak_weak |
| sdev_ypeak_strong<br>(Compact Dataset) | DOUBLE<br>(1) | sdev_ypeak_strong<br>(not_set) | counts/s<br>CAL61 | sdev_ypeak_strong |
| sdev_ypeak_weak<br>(Compact Dataset) | DOUBLE<br>(1) | sdev_ypeak_weak<br>(not_set) | counts/s<br>CAL61 | sdev_ypeak_weak |
| xpeak_strong<br>(Compact Dataset) | DOUBLE<br>(1) | xpeak_strong<br>(not_set) | 1<br>CAL61 | xpeak_strong; used in Eqn 5-17. |
| xpeak_weak<br>(Compact Dataset) | DOUBLE<br>(1) | xpeak_weak<br>(not_set) | 1<br>CAL61 | xpeak_weak; used in Eqn 5-17. |
| ypeak_strong<br>(Compact Dataset) | DOUBLE<br>(1) | ypeak_strong<br>(not_set) | counts/s<br>CAL61 | ypeak_strong |
| ypeak_weak<br>(Compact Dataset) | DOUBLE<br>(1) | ypeak_weak<br>(not_set) | counts/s<br>CAL61 | ypeak_weak |

**Group: /ancillary_data/calibrations/start_timing_skews**

| Description | (Attribute) | CAL44 - Start Timing Skews. Produces START pulse timing skews within & among PCEs to properly align all start pulse timing channels. | | |
|---|---|---|---|---|
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| cal44_product<br>(Chunked Dataset) | STRING:80<br>(:) | CAL Product Name<br>(not_set) | 1<br>CAL44 | Name of ATLAS CAL Product containing the calibration data |
| ll1<br>(Chunked Dataset) | FLOAT<br>(:) | LL1<br>(not_set) | seconds<br>CAL44 | Leading Lower Skew, PCE1 |
| ll2_ll1<br>(Chunked Dataset) | FLOAT<br>(:) | LL2-LL1<br>(not_set) | seconds<br>CAL44 | LL2-LL1 |
| ll3_ll1<br>(Chunked Dataset) | FLOAT<br>(:) | LL3-LL1<br>(not_set) | seconds<br>CAL44 | LL3-LL1 |
| lu_ll1<br>(Chunked Dataset) | FLOAT<br>(:) | LU-LL1<br>(not_set) | seconds<br>CAL44 | LU-LL1 |
| side<br>(Compact Dataset) | INTEGER_4<br>(1) | SPD Side<br>(not_set) | 1<br>CAL44 | A or B side of the Start Pulse Detector<br>flag_values: 1, 2<br>flag_meanings : A B |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| spd_temp (Chunked Dataset) | FLOAT (:) | SPD_Temp (not_set) | degreesC CAL44 | SPD Temperature |
| tl_ll3 (Chunked Dataset) | FLOAT (:) | TL-LL3 (not_set) | seconds CAL44 | TL-LL3 |
| tu_ll2 (Chunked Dataset) | FLOAT (:) | TU-LL2 (not_set) | seconds CAL44 | TU-LL2 |

| **Group: /ancillary_data/housekeeping** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Constants and calibrations related to ATLAS housekeeping data. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| det_ab_flag (Compact Dataset) | INTEGER_4 (1) | Detector Side, A or B (not_set) | 1 Derived, L1B ATBD | Indicates if the active detector (DET) is side A (1) or side B (2). flag_values: 1, 2 flag_meanings : a b |
| hvpc_ab_flag (Compact Dataset) | INTEGER_4 (1) | HVPC Side, A or B (not_set) | 1 Derived, L1B ATBD | Indicates if the active High Voltage Power Converter (HVPC) is side A (1) or side B (2). flag_values: 1, 2 flag_meanings : a b |
| laser_12_flag (Compact Dataset) | INTEGER_4 (1) | Laser 1 or Laser 2 (not_set) | 1 Derived, L1B ATBD | Indicates if the active Laser is laser 1 or laser 2. flag_values: 1, 2 flag_meanings : 1 2 |
| lrs_ab_flag (Compact Dataset) | INTEGER_4 (1) | LRS Side A or B (not_set) | 1 Derived, L1B ATBD | Indicates if the active LRS is side A (1) or side B (2). flag_values: 1, 2 flag_meanings : a b |
| pdu_ab_flag (Compact Dataset) | INTEGER_4 (1) | PDU Side A or B (not_set) | 1 Derived, L1B ATBD | Indicates if the active PDU is side a (1) or side b (2). flag_values: 1, 2 flag_meanings : a b |
| spd_ab_flag (Compact Dataset) | INTEGER_4 (1) | SPD A or B (not_set) | 1 Derived, L1B ATBD | Indicates if the active Start Pulse Detector (SPD) is side a (1) or side b (2). flag_values: 1, 2 flag_meanings : a b |
| tams_ab_flag (Compact Dataset) | INTEGER_4 (1) | TAMS Side A or B (not_set) | 1 Derived, L1B ATBD | Indicates if the active TAMS is side a (1) or side b (2). flag_values: 1, 2 flag_meanings : a b |

| **Group: /ancillary_data/isf** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Constants and calibrations provided by the ICESat-2 Instrument Support Facility (via ANC27) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| bias_offset_x (Compact Dataset) | DOUBLE (2) | AMCS Bias Offset X (not_set) | microradians ANC27 (ATBD Section 5.3.3.1) | Zero is center of BSM range: (x,y)=(8000,8000). Used in Eqn 5-13 to generate coordinates that are used in Eqn 5-11 to interpolate CAL 47, which has 1 R grid spacing. |
| bias_offset_y (Compact Dataset) | DOUBLE (2) | AMCS Bias Offset Y (not_set) | microradians ANC27 (ATBD Section 5.3.3.1) | Zero is center of BSM range: (x,y)=(8000,8000). Used in Eqn 5-13 to generate coordinates that are used in Eqn 5-11 to interpolate CAL 47, which has 1 R grid spacing. |
| bias_rate (Compact Dataset) | DOUBLE (1) | AMCS bias rate (not_set) | microradians/undefined_time ANC27 (ATBD Section 5.3.3.1) | Currently a placeholder, not used in calculations. |
| bias_time (Compact Dataset) | DOUBLE (2) | AMCS Bias Time (not_set) | seconds since 2018-01-01 ANC27 (ATBD Section 5.3.3.1) | Times of surrounding AMCS bias corrections |
| cal46_aging (Compact Dataset) | DOUBLE (1) | CAL46 Aging Factor (not_set) | 1 ANC27 (ATBD Section 5.3.14) | CAL46 Aging correction factor |
| start_time_coeff (Compact Dataset) | DOUBLE (4,8) | Start Time Coefficients (not_set) | ns ANC27 (ATBD Section 3.5.6) | Start time coefficients for TOF center correction (coeffecent x scenario) |
| uso_freq_dev (Compact Dataset) | DOUBLE (1) | USO Frequence Deviation (not_set) | hz ANC27 | USO frequency deviation; Used in Eqn 2-4. |
| wtom_alt_tune_corr (Compact Dataset) | DOUBLE (1) | WTOM Alt Tuning Correction (not_set) | 1 ANC27 (ATBD Section 5.3.3.2) | W" in Eqn 5-15. Used only for alternate tuning; method for calculating not defined. |
| wtom_lambda_off (Compact Dataset) | DOUBLE (1) | WTOM Wavelength Offset (not_set) | 1 ANC27 (ATBD Section 5.3.3.2) | WTOM Wavelength Offset. Currently zero. An "off-tuning" value to be used with alternate tuning; method for calculating not defined. |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| wtom_tune_flag (Compact Dataset) | INTEGER_4 (1) | WTOM Tuning Flag (not_set) | 1 ANC27 (ATBD Section 5.3.3.2) | WTOM Tuning Flag (1=standard method, 2=alternate method) flag_values: 1, 2 flag_meanings : std alt |

| **Group: /ancillary_data/tep** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains ancillary values related to TEP detection. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| tep_check_pce1 (Compact Dataset) | INTEGER_4 (1) | TEP flag for PCE1. (not_set) | 1 ATLAS L1B ATBD | Flag indicating that the PCE1 strong channels should be checked for TEP events. Default value is 1 (indicating that TEP is possible on PCE1). A value of 0 indicates that PCE1 data are not examined for TEP. flag_values: 0, 1 flag_meanings : do_not_check check |
| tep_check_pce2 (Compact Dataset) | INTEGER_4 (1) | TEP flag for PCE2. (not_set) | 1 ATLAS L1B ATBD | Flag indicating that the PCE2 strong channels should be checked for TEP events. Default value is 1 (indicating that TEP is possible on PCE2). A value of 0 indicates that PCE2 data are not examined for TEP. flag_values: 0, 1 flag_meanings : do_not_check check |
| tep_check_pce3 (Compact Dataset) | INTEGER_4 (1) | TEP flag for PCE3. (not_set) | 1 ATLAS L1B ATBD | Flag indicating that the PCE3 strong channels should be checked for TEP events. Default value is 0 (indicating that TEP is not possible on PCE3). A value of 1 indicates that PCE3 data are examined for TEP (even though the hardware does not support this possibility). flag_values: 0, 1 flag_meanings : do_not_check check |
| thres_tep_max (Compact Dataset) | DOUBLE (1) | TEP Detection Maximum (not_set) | seconds ATLAS L1B ATBD | Maximum value used to classify TEP photons. Default value per ATBD is 100ns. (100e-9 sec) |
| thres_tep_min (Compact Dataset) | DOUBLE (1) | TEP Detection Minimum (not_set) | seconds ATLAS L1B ATBD | Minimum value used to classify TEP photons. Default value per ATBD is 0ns. (0e-9 sec) |

| **Group: /ancillary_data/tod_tof** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains ancillary parameters related to Time-of-Flight and/or Time-of-Day calculations. | | |
| data_rate | (Attribute) | Data within this group pertain to the granule in its entirety. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cal_risefall_box_int (Compact Dataset) | DOUBLE (1) | cal_risefall boxcar interval (not_set) | counts ATLAS L1B ATBD | Boxcar averaging interval for cal_risefall averaging, in major-frame counts. Boxcar averages are using to generate 1D spline coefficients. The spline coefficients are used to create smoothed, interpolated cal_risefall values at the full data rate. |
| cal_uso_scale (Compact Dataset) | DOUBLE (1) | Calibration value for USO (not_set) | 1 ATLAS L1B ATBD | Calibration value for the Ultra Stable Oscillator (USO). Computed using the number of coarse clock ticks measurement generated by the USO between sequential 1PPS time stamps from the on-orbit GPS to estimate the coarse clock ruler scale factor. |
| corr_rx_coarse_pce1 (Compact Dataset) | INTEGER_4 (20) | Correction value for PCE1 Rx coarse clock offset (not_set) | counts ATLAS L1B ATBD | Correction for the PCE1 Receive coarse clock offset. This corrects for the offset between the actual number of coarse clock cycles and the reported number of coarse clock cycles (for each channel). Default value is -1. |
| corr_rx_coarse_pce2 (Compact Dataset) | INTEGER_4 (20) | Correction value for PCE2 Rx coarse clock offset (not_set) | counts ATLAS L1B ATBD | Correction for the PCE2 Receive coarse clock offset. This corrects for the offset between the actual number of coarse clock cycles and the reported number of coarse clock cycles (for each channel). Default value is -1. |
| corr_rx_coarse_pce3 (Compact Dataset) | INTEGER_4 (20) | Correction value for PCE3 Rx coarse clock offset (not_set) | counts ATLAS L1B ATBD | Correction for the PCE3 Receive coarse clock offset. This corrects for the offset between the actual number of coarse clock cycles and the reported number of coarse clock cycles (for each channel). Default value is -1. |
| corr_tx_coarse_pce1 (Compact Dataset) | INTEGER_4 (1) | Correction value for PCE1 Tx coarse clock offset (not_set) | counts ATLAS L1B ATBD | Correction for the PCE1 Transmit coarse clock offset. This corrects for the offset between the actual number of coarse clock cycles and the reported number of coarse clock cycles. Default value is -1. |
| corr_tx_coarse_pce2 (Compact Dataset) | INTEGER_4 (1) | Correction value for PCE2 Tx coarse clock offset (not_set) | counts ATLAS L1B ATBD | Correction for the PCE2 Transmit coarse clock offset. This corrects for the offset between the actual number of coarse clock cycles and the reported number of coarse clock cycles. Default value is -1. |
| corr_tx_coarse_pce3 | INTEGER_4 | Correction value for | counts | Correction for the PCE3 Transmit coarse clock offset. This corrects for the offset between the actual number of coarse |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Compact Dataset) | (1) | PCE3 Tx coarse clock offset (not_set) | ATLAS L1B ATBD | clock cycles and the reported number of coarse clock cycles. Default value is -1. |
| dt_imet (Compact Dataset) | DOUBLE (1) | IMET Clock Tick (not_set) | seconds/count ATLAS L1B ATBD, Section 4.2.1 | IMET clock tick. |
| dt_t0 (Compact Dataset) | DOUBLE (1) | T0 Clock Tick (not_set) | seconds/count ATLAS L1B ATBD, Section 4.2.1 | T0 clock tick. |
| dt_uso (Compact Dataset) | DOUBLE (1) | USO (AMET) Clock Tick (not_set) | seconds/count ATLAS L1B ATBD, Section 4.2.1 | The AMET clock tick |
| lrs_clock (Compact Dataset) | DOUBLE (1) | LRS Clock Rate (not_set) | seconds/count ATLAS L1B ATBD | The nominal rate of the LRS internal 27 MHz oscillator (divided by 32). |

**Group: /atlas**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Group contains the ATLAS EU-converted data | | |
| data_rate | (Attribute) | Data within this group are stored at the nominal rate of the corresponding ATLAS APIDs (varies per APID). | | |

**Group: /atlas/housekeeping**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Group contains the ATLAS EU-converted housekeeping data | | |
| data_rate | (Attribute) | Data within this group are stored at the nominal rate of the corresponding ATLAS APIDs (varies per APID). | | |

**Group: /atlas/housekeeping/laser_energy_internal**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Internal laser energy from APID 1032 SLA_HK. Packet Frequency is 1 Hertz. | | |
| data_rate | (Attribute) | Data within this group are provided at the packet rate of 1hz. | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. The timestamp is computed based on the housekeeping design to sample laser near the asc 1pps internal pulse. (See the L1B ATBD section 5 Radiometric Corrections ) |
| e_tx (Chunked Dataset) | FLOAT (:) | total laser energy (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Total laser energy derived from the internal laser energy monitor (APID 1032). |
| e_tx_pce1_s (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE1, strong (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE1 strong spot, derived from the internal laser energy monitor and split by calibration. |
| e_tx_pce1_w (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE1, weak (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE1 weak spot, derived from the internal laser energy monitor and split by calibration. |
| e_tx_pce2_s (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE2, strong (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE2 strong spot, derived from the internal laser energy monitor and split by calibration. |
| e_tx_pce2_w (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE2, weak (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE2 weak spot, derived from the internal laser energy monitor and split by calibration. |
| e_tx_pce3_s (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE3, strong (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE3 strong spot, derived from the internal laser energy monitor and split by calibration. |
| e_tx_pce3_w (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE3, weak (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE3 weak spot, derived from the internal laser energy monitor and split by calibration. |
| laser_mode (Chunked Dataset) | INTEGER_1 (:) | Laser Mode Setting (not_set) | 1 ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser Mode setting reported in A_SLA_HK (APID 1032). |
| laser_temp (Chunked Dataset) | FLOAT (:) | Laser Temperature (not_set) | degreesC ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser Temperature. From SLA_HK Telemetry packet (APID 1032, Laser Cmd Code 0xFE LAS-14, raw_lem_temp). |

| Group: /atlas/housekeeping/laser_energy_lrs | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Laser energy derived from LRS Centroid Magnitudes. Packet Frequency is 50 Hertz. | | |
| data_rate | (Attribute) | Data within this group are provided at the packet rate of 50hz. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. The timestamp is computed based on the housekeeping design to sample laser near the asc 1pps internal pulse. (See the L1B ATBD section 5 Radiometric Corrections ) |
| e_tx (Chunked Dataset) | FLOAT (:) | total laser energy (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Total laser energy from derived from LRS laser centroid magnitudes. |
| e_tx_pce1_s (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE1, strong (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE1 strong spot, derived from LRS laser centroids and split by calibration. |
| e_tx_pce1_w (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE1, weak (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE1 weak spot, derived from LRS laser centroids and split by calibration. |
| e_tx_pce2_s (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE2, strong (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE2 strong spot, derived from LRS laser centroids and split by calibration. |
| e_tx_pce2_w (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE2, weak (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE2 weak spot, derived from LRS laser centroids and split by calibration. |
| e_tx_pce3_s (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE3, strong (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE3 strong spot, derived from LRS laser centroids and split by calibration. |
| e_tx_pce3_w (Chunked Dataset) | FLOAT (:) | Spot laser energy for PCE3, weak (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE3 weak spot, derived from LRS laser centroids and split by calibration. |
| lrs_temp (Chunked Dataset) | FLOAT (:) | Laser Temperature (not_set) | degreesC ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | LRS Temperature. From A_HKT_C Telemetry packet |
| Group: /atlas/housekeeping/laser_energy_spd | | | | |
| Description | (Attribute) | Laser energy from APID 1063 Analog HK Telemetry. Packet Frequency is 1 Hertz. | | |
| data_rate | (Attribute) | Data within this group are provided at the packet rate of 1hz. | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. The timestamp is computed based on the housekeeping design to sample laser near the asc 1pps internal pulse. (See the L1B ATBD section 5 Radiometric Corrections ) |
| ds_10 (Contiguous Dataset) | INTEGER_1 (10) | DS for 10 measurements (not_set) | 1 not_set | Dimension scale for10 measurements. |
| e_tx (Chunked Dataset) | FLOAT (10, :) | total laser energy (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Total laser energy from Analog HK Telemetry packet E (APID 1063). |
| e_tx_pce1_s (Chunked Dataset) | FLOAT (10, :) | Spot laser energy for PCE1, strong (not_set) | joules ICESat-2 L1B ATBD, Section 5.2, Transmitted Energy | Laser energy for the PCE1 strong spot, derived from the analog HK telemetry and split by calibration. |
| e_tx_pce1_w (Chunked Dataset) | FLOAT (10, :) | Spot laser energy for PCE1, weak | joules ICESat-2 L1B ATBD, Section 5.2, | Laser energy for the PCE1 weak spot derived from the analog HK telemetry and split by calibration. |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| | | | (not_set) | Transmitted Energy |
| e_tx_pce2_s<br>(Chunked Dataset) | FLOAT<br>(10, :) | Spot laser energy for PCE2, strong<br>(not_set) | joules<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | Laser energy for the PCE2 strong spot, derived from the analog HK telemetry and split by calibration. |
| e_tx_pce2_w<br>(Chunked Dataset) | FLOAT<br>(10, :) | Spot laser energy for PCE2, weak<br>(not_set) | joules<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | Laser energy for the PCE2 weak spot, derived from the analog HK telemetry and split by calibration. |
| e_tx_pce3_s<br>(Chunked Dataset) | FLOAT<br>(10, :) | Spot laser energy for PCE3, strong<br>(not_set) | joules<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | Laser energy for the PCE3 strong spot, derived from the analog HK telemetry and split by calibration. |
| e_tx_pce3_w<br>(Chunked Dataset) | FLOAT<br>(10, :) | Spot laser energy for PCE3, weak<br>(not_set) | joules<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | Laser energy for the PCE3 weak spot, derived from the analog HK telemetry and split by calibration. |
| edge_xmtnc<br>(Chunked Dataset) | FLOAT<br>(:) | SPD Edge<br>(not_set) | mV<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | edge_xmtnc. From Analog HK Telemetry packet E (APID 1063). |
| laser_temp<br>(Chunked Dataset) | FLOAT<br>(:) | Laser Temperature<br>(not_set) | degreesC<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | Laser Temperature. From A_HKT_C PRIMARY SPD THERMISTOR MED_34 chan[74] or REDUNDANT SPD THERMISTOR MED_35 chan[81] |
| peak_xmtnc<br>(Chunked Dataset) | FLOAT<br>(:) | SPD Peak<br>(not_set) | mV<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | peak_xmtnc. From Analog HK Telemetry packet E (APID 1063). |
| thrhi_rdbk<br>(Chunked Dataset) | FLOAT<br>(:) | SPD Upper Thres<br>(not_set) | volts<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | Start Pulse Detector (SPD) upper threshold readback value. Reported as an analog voltage whose nominal setting puts the threshold at 80% of full laser energy. From Analog HK Telemetry packet E (APID 1063). |
| thrlo_rdbk<br>(Chunked Dataset) | FLOAT<br>(:) | SPD Lower Thres<br>(not_set) | volts<br>ICESat-2 L1B ATBD, Section 5.2,<br>Transmitted Energy | Start Pulse Detector (SPD) lower threshold readback value. Reported as an analog voltage whose nominal setting puts the threshold at 20% of full laser energy. From Analog HK Telemetry packet E (APID 1063). |
| **Group: /atlas/housekeeping/mce_position** | | | | |
| Description | (Attribute) | MCE Position A/D Packet. Packet Frequency is 200 in Hertz. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APID. (Nominally 200HZ). | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| ds_50<br>(Contiguous Dataset) | INTEGER_1<br>(50) | DS for 50 measurements<br>(not_set) | 1<br>not_set | Dimension scale for 50 measurements. |
| mce_az<br>(Chunked Dataset) | FLOAT<br>(50, :) | A MCE AZ<br>(not_set) | microradians<br>ATL01/atlas/a_mce_pos_1057 and L1B ATBD section MCE | MCE azimuth values. |
| mce_el<br>(Chunked Dataset) | FLOAT<br>(50, :) | MCE EL<br>(not_set) | microradians<br>ATL01/atlas/a_mce_pos_1057 and L1B ATBD section MCE | MCE elevation values. |
| mce_total_cycles<br>(Chunked Dataset) | UINT_4_LE<br>(:) | A MCE total cycles<br>(not_set) | counts<br>ATL01/atlas/a_mce_pos_1057 | MCE reported total number of cycles |
| **Group: /atlas/housekeeping/meb** | | | | |
| Description | (Attribute) | Data from APID 1062 Analog HK Telemetry. Packet Frequency is 1 in Hertz. Voltage and current data | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APID. (Nominally 1HZ). | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to |

| | | | | delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
|---|---|---|---|---|
| hkt_ground_check<br>(Chunked Dataset) | FLOAT<br>(:) | Ground check<br>(not_set) | counts<br>ATL01/atlas/a_hkt_d_1062 converted | Ground check - A_HKT_D.chan[30] |
| hkt_meb_1p5v_asc_v<br>(Chunked Dataset) | FLOAT<br>(:) | 1P5VTLM-ASC<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 1P5VTLM-ASC - A_HKT_D.chan[22] |
| hkt_meb_1p5v_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | HKT 1.5V Monitor<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | HKT 1.5V Monitor - A_HKT_D.chan[5] |
| hkt_meb_1p5va_pce1_v<br>(Chunked Dataset) | FLOAT<br>(:) | 1P5VATLM-PCE1<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 1P5VATLM-PCE1 - A_HKT_D.chan[23] |
| hkt_meb_1p5va_pce2_v<br>(Chunked Dataset) | FLOAT<br>(:) | 1P5VATLM-PCE2<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 1P5VATLM-PCE2 - A_HKT_D.chan[16] |
| hkt_meb_1p5va_pce3_v<br>(Chunked Dataset) | FLOAT<br>(:) | 1P5VATLM-PCE3<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 1P5VATLM-PCE3 - A_HKT_D.chan[17] |
| hkt_meb_1p5vb_pce1_v<br>(Chunked Dataset) | FLOAT<br>(:) | 1P5VBTLM-PCE1<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 1P5VBTLM-PCE1 - A_HKT_D.chan[24] |
| hkt_meb_1p5vb_pce2_v<br>(Chunked Dataset) | FLOAT<br>(:) | 1P5VBTLM-PCE2<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 1P5VBTLM-PCE2 - A_HKT_D.chan[25] |
| hkt_meb_1p5vb_pce3_v<br>(Chunked Dataset) | FLOAT<br>(:) | 1P5VBTLM-PCE3<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 1P5VBTLM-PCE3 - A_HKT_D.chan[18] |
| hkt_meb_2p5v_pce1_v<br>(Chunked Dataset) | FLOAT<br>(:) | 2P5VTLM-PCE1<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 2P5VTLM-PCE1 - A_HKT_D.chan[19] |
| hkt_meb_2p5v_pce2_v<br>(Chunked Dataset) | FLOAT<br>(:) | 2P5VTLM-PCE2<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 2P5VTLM-PCE2 - A_HKT_D.chan[26] |
| hkt_meb_2p5v_pce3_v<br>(Chunked Dataset) | FLOAT<br>(:) | 2P5VTLM-PCE3<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 2P5VTLM-PCE3 - A_HKT_D.chan[27] |
| hkt_meb_3p3i_lvpc_i<br>(Chunked Dataset) | FLOAT<br>(:) | 3P3ITLM-LVPC<br>(not_set) | amps<br>ATL01/atlas/a_hkt_d_1062 converted | 3P3ITLM-LVPC - A_HKT_D.chan[12] |
| hkt_meb_3p3v_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | 3.3V Monitor<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 3.3V Monitor - A_HKT_D.chan[6] |
| hkt_meb_5p0i_lvpc_i<br>(Chunked Dataset) | FLOAT<br>(:) | 5P0ITLM-LVPC<br>(not_set) | amps<br>ATL01/atlas/a_hkt_d_1062 converted | 5P0ITLM-LVPC - A_HKT_D.chan[13] |
| hkt_meb_5p0i_sbc_i<br>(Chunked Dataset) | FLOAT<br>(:) | 5P0I_SBC_TLM<br>(not_set) | amps<br>ATL01/atlas/a_hkt_d_1062 converted | 5P0I_SBC_TLM - A_HKT_D.chan[28] |
| hkt_meb_5p0v_sbc_v<br>(Chunked Dataset) | FLOAT<br>(:) | 5P0V_SBC_TLM<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | 5P0V_SBC_TLM - A_HKT_D.chan[29] |
| hkt_meb_cal_n35p9_t<br>(Chunked Dataset) | FLOAT<br>(:) | CAL -35.9<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_d_1062 converted | CAL -35.9 - A_HKT_D.chan[3] |
| hkt_meb_cal_n62p5_t<br>(Chunked Dataset) | FLOAT<br>(:) | CAL -62.5<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_d_1062 converted | CAL -62.5 - A_HKT_D.chan[4] |
| hkt_meb_cal_n6p6_t<br>(Chunked Dataset) | FLOAT<br>(:) | CAL -6.6<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_d_1062 converted | CAL -6.6 - A_HKT_D.chan[2] |
| hkt_meb_cal_p25_t<br>(Chunked Dataset) | FLOAT<br>(:) | CAL +25<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_d_1062 converted | CAL +25 - A_HKT_D.chan[1] |
| hkt_meb_cal_p65p3_t<br>(Chunked Dataset) | FLOAT<br>(:) | CAL +65.3<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_d_1062 converted | CAL +65.3 - A_HKT_D.chan[0] |
| hkt_meb_i_uso_i<br>(Chunked Dataset) | FLOAT<br>(:) | ITLM-USO<br>(not_set) | amps<br>ATL01/atlas/a_hkt_d_1062 converted | ITLM-USO - A_HKT_D.chan[15] |
| hkt_meb_n15p0i_lvpc_i<br>(Chunked Dataset) | FLOAT<br>(:) | 15P0I_NEG_TLM-<br>LVPC<br>(not_set) | amps<br>ATL01/atlas/a_hkt_d_1062 converted | 15P0I_NEG_TLM-LVPC - A_HKT_D.chan[21] |
| hkt_meb_n15v_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | -15V Monitor<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | -15V Monitor - A_HKT_D.chan[10] |
| hkt_meb_n5a_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | HKT -5A Monitor<br>(not_set) | volts<br>ATL01/atlas/a_hkt_d_1062 converted | HKT -5A Monitor - A_HKT_D.chan[11] |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| hkt_meb_p15p0i_lvpc_i (Chunked Dataset) | FLOAT (:) | 15P0I_POS_TLM-LVPC (not_set) | amps ATL01/atlas/a_hkt_d_1062 converted | 15P0I_POS_TLM-LVPC - A_HKT_D.chan[20] |
| hkt_meb_p15v_mon_v (Chunked Dataset) | FLOAT (:) | +15V Monitor (not_set) | volts ATL01/atlas/a_hkt_d_1062 converted | +15V Monitor - A_HKT_D.chan[9] |
| hkt_meb_p5a_mon_v (Chunked Dataset) | FLOAT (:) | HKT +5A Monitor (not_set) | volts ATL01/atlas/a_hkt_d_1062 converted | HKT +5A Monitor - A_HKT_D.chan[8] |
| hkt_meb_p5d_mon_v (Chunked Dataset) | FLOAT (:) | +5D Monitor (not_set) | volts ATL01/atlas/a_hkt_d_1062 converted | +5D Monitor - A_HKT_D.chan[7] |
| hkt_meb_v_uso_v (Chunked Dataset) | FLOAT (:) | VTLM-USO (not_set) | volts ATL01/atlas/a_hkt_d_1062 converted | VTLM-USO - A_HKT_D.chan[14] |

**Group: /atlas/housekeeping/pdu**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | PDU Analog HK Telemetry. The PDU analog telemetry digitized by the HKT card and collected by the SBC Thermal Control Task. Packet Frequency is 1 in Hertz. Data is from the APID 1059 (Primary) or APID 1060 (Redundant) HK packets. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APID. (Nominally 1HZ). | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP GPS Epoch. This is computed based on the housekeeping design to sample a measurement every 0.003125 seconds from the internal ASC 1PPS . The time for this packet is set as the time of the lowest software channel number in this telemetry packet. If the specific time is needed add to it the difference of its actual ATLAS hardware channel number from the lowest software channel number times the 0.003125 seconds. 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. |
| hvpc_mod_1 (Chunked Dataset) | FLOAT (:) | HVPC Module 1 (not_set) | counts ATL01/atlas/a_hkt_a_1059 converted | HVPC Module 1 - A_HKT.chan[70] |
| hvpc_mod_2 (Chunked Dataset) | FLOAT (:) | HVPC Module 2 (not_set) | counts ATL01/atlas/a_hkt_a_1059 converted | HVPC Module 2 - A_HKT.chan[71] |
| hvpc_mod_3 (Chunked Dataset) | FLOAT (:) | HVPC Module 3 (not_set) | counts ATL01/atlas/a_hkt_a_1059 converted | HVPC Module 3 - A_HKT.chan[72] |
| hvpc_mod_4 (Chunked Dataset) | FLOAT (:) | HVPC Module 4 (not_set) | counts ATL01/atlas/a_hkt_a_1059 converted | HVPC Module 4 - A_HKT.chan[73] |
| hvpc_mod_5 (Chunked Dataset) | FLOAT (:) | HVPC Module 5 (not_set) | counts ATL01/atlas/a_hkt_a_1059 converted | HVPC Module 5 - A_HKT.chan[74] |
| hvpc_mod_6 (Chunked Dataset) | FLOAT (:) | HVPC Module 6 (not_set) | counts ATL01/atlas/a_hkt_a_1059 converted | HVPC Module 6 - A_HKT.chan[75] |
| hvpc_tlm_6 (Chunked Dataset) | FLOAT (:) | HVPC TLM 6 (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | HVPC TLM 6 - A_HKT.chan[76] |
| hvpc_tlm_7 (Chunked Dataset) | FLOAT (:) | HVPC TLM 7 (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | HVPC TLM 7 - A_HKT.chan[77] |
| pdu_daa_opts_htr_i (Chunked Dataset) | FLOAT (:) | PDU DAA OPTS HTR I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU DAA OPTS HTR I - A_HKT.chan[46] |
| pdu_det_i (Chunked Dataset) | FLOAT (:) | PDU DET I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU DET I - A_HKT.chan[23] |
| pdu_det_v (Chunked Dataset) | FLOAT (:) | PDU DET V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU DET V - A_HKT.chan[17] |
| pdu_hvpc_i (Chunked Dataset) | FLOAT (:) | PDU HVPC I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU HVPC I - A_HKT.chan[24] |
| pdu_laser_1_i (Chunked Dataset) | FLOAT (:) | PDU LASER 1 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU LASER 1 I - A_HKT.chan[21] |
| pdu_laser_1_v (Chunked Dataset) | FLOAT (:) | PDU LASER 1 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU LASER 1 V - A_HKT.chan[14] |
| pdu_laser_2_i (Chunked Dataset) | FLOAT (:) | PDU LASER 2 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU LASER 2 I - A_HKT.chan[22] |

| pdu_laser_2_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU LASER 2 V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU LASER 2 V - A_HKT.chan[15] |
|---|---|---|---|---|
| pdu_lhp1_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU LHP1 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU LHP1 I - A_HKT.chan[43] |
| pdu_lhp2_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU LHP2 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU LHP2 I - A_HKT.chan[44] |
| pdu_lhp_startup_htr_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU LHP STARTUP<br>HTR I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU LHP STARTUP HTR I - A_HKT.chan[42] |
| pdu_lrs_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU LRS I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU LRS I - A_HKT.chan[25] |
| pdu_lrs_opts_heater_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU LRS OPTS<br>HEATER I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU LRS OPTS HEATER I - A_HKT.chan[45] |
| pdu_meb_lvpc_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU MEB LVPC I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU MEB LVPC I - A_HKT.chan[26] |
| pdu_meb_lvpc_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU MEB LVPC V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU MEB LVPC V - A_HKT.chan[16] |
| pdu_n3v_dem1_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM1 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM1 I - A_HKT.chan[52] |
| pdu_n3v_dem1_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM1 V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM1 V - A_HKT.chan[2] |
| pdu_n3v_dem2_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM2 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM2 I - A_HKT.chan[63] |
| pdu_n3v_dem2_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM2 V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM2 V - A_HKT.chan[5] |
| pdu_n3v_dem3_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM3 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM3 I - A_HKT.chan[55] |
| pdu_n3v_dem3_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM3 V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM3 V - A_HKT.chan[8] |
| pdu_n3v_dem4_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM4 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM4 I - A_HKT.chan[66] |
| pdu_n3v_dem5_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM5 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM5 I - A_HKT.chan[58] |
| pdu_n3v_dem5_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM5 V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM5 V - A_HKT.chan[11] |
| pdu_n3v_dem6_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU N3V DEM6 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU N3V DEM6 I - A_HKT.chan[69] |
| pdu_ofa_n12v_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU OFA N12V V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU OFA N12V V - A_HKT.chan[13] |
| pdu_ofa_p12v_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU OFA P12V I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU OFA P12V I - A_HKT.chan[59] |
| pdu_ofa_p12v_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU OFA P12V V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU OFA P12V V - A_HKT.chan[12] |
| pdu_p3p3v_dem1_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU P3P3V DEM1 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM1 I - A_HKT.chan[51] |
| pdu_p3p3v_dem1_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU P3P3V DEM1 V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM1 V - A_HKT.chan[1] |
| pdu_p3p3v_dem2_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU P3P3V DEM2 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM2 I - A_HKT.chan[62] |
| pdu_p3p3v_dem2_v<br>(Chunked Dataset) | FLOAT<br>(:) | PDU P3P3V DEM2 V<br>(not_set) | volts<br>ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM2 V - A_HKT.chan[4] |
| pdu_p3p3v_dem3_i<br>(Chunked Dataset) | FLOAT<br>(:) | PDU P3P3V DEM3 I<br>(not_set) | amps<br>ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM3 I - A_HKT.chan[54] |

| pdu_p3p3v_dem3_v (Chunked Dataset) | FLOAT (:) | PDU P3P3V DEM3 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM3 V - A_HKT.chan[7] |
|---|---|---|---|---|
| pdu_p3p3v_dem4_i (Chunked Dataset) | FLOAT (:) | PDU P3P3V DEM4 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM4 I - A_HKT.chan[65] |
| pdu_p3p3v_dem5_i (Chunked Dataset) | FLOAT (:) | PDU P3P3V DEM5 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM5 I - A_HKT.chan[57] |
| pdu_p3p3v_dem5_v (Chunked Dataset) | FLOAT (:) | PDU P3P3V DEM5 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM5 V - A_HKT.chan[10] |
| pdu_p3p3v_dem6_i (Chunked Dataset) | FLOAT (:) | PDU P3P3V DEM6 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P3P3V DEM6 I - A_HKT.chan[68] |
| pdu_p5v_dem1_i (Chunked Dataset) | FLOAT (:) | PDU P5V DEM1 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM1 I - A_HKT.chan[50] |
| pdu_p5v_dem1_v (Chunked Dataset) | FLOAT (:) | PDU P5V DEM1 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM1 V - A_HKT.chan[0] |
| pdu_p5v_dem2_i (Chunked Dataset) | FLOAT (:) | PDU P5V DEM2 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM2 I - A_HKT.chan[61] |
| pdu_p5v_dem2_v (Chunked Dataset) | FLOAT (:) | PDU P5V DEM2 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM2 V - A_HKT.chan[3] |
| pdu_p5v_dem3_i (Chunked Dataset) | FLOAT (:) | PDU P5V DEM3 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM3 I - A_HKT.chan[53] |
| pdu_p5v_dem3_v (Chunked Dataset) | FLOAT (:) | PDU P5V DEM3 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM3 V - A_HKT.chan[6] |
| pdu_p5v_dem4_i (Chunked Dataset) | FLOAT (:) | PDU P5V DEM4 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM4 I - A_HKT.chan[64] |
| pdu_p5v_dem5_i (Chunked Dataset) | FLOAT (:) | PDU P5V DEM5 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM5 I - A_HKT.chan[56] |
| pdu_p5v_dem5_v (Chunked Dataset) | FLOAT (:) | PDU P5V DEM5 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM5 V - A_HKT.chan[9] |
| pdu_p5v_dem6_i (Chunked Dataset) | FLOAT (:) | PDU P5V DEM6 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU P5V DEM6 I - A_HKT.chan[67] |
| pdu_pwm_tlsp_pri_i (Chunked Dataset) | FLOAT (:) | PDU PWM TLSP PRI I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU PWM TLSP PRI I - A_HKT.chan[39] |
| pdu_pwm_tlsp_sec_i (Chunked Dataset) | FLOAT (:) | PDU PWM TLSP SEC I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU PWM TLSP SEC I - A_HKT.chan[40] |
| pdu_pwm_tlsp_tower_i (Chunked Dataset) | FLOAT (:) | PDU PWM TLSP TOWER I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU PWM TLSP TOWER I - A_HKT.chan[41] |
| pdu_spare_1_v (Chunked Dataset) | FLOAT (:) | PDU SPARE 1 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU SPARE 1 V - A_HKT.chan[27] |
| pdu_spare_2_v (Chunked Dataset) | FLOAT (:) | PDU SPARE 2 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU SPARE 2 V - A_HKT.chan[28] |
| pdu_spare_3_v (Chunked Dataset) | FLOAT (:) | PDU SPARE 3 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU SPARE 3 V - A_HKT.chan[29] |
| pdu_spare_4_v (Chunked Dataset) | FLOAT (:) | PDU SPARE 4 V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU SPARE 4 V - A_HKT.chan[30] |
| pdu_spare_5_v (Chunked Dataset) | FLOAT (:) | A PDU SPARE 5V (not_set) | counts ATL01/atlas/a_hkt_a_1059 converted | A_PDU_SPARE_5_V - HKT.chan[60] |
| pdu_spd_n5v_i (Chunked Dataset) | FLOAT (:) | PDU SPD N5V I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU SPD N5V I - A_HKT.chan[48] |
| pdu_spd_n5v_v (Chunked Dataset) | FLOAT (:) | PDU SPD N5V V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU SPD N5V V - A_HKT.chan[19] |
| pdu_spd_p3p3v_i (Chunked Dataset) | FLOAT (:) | PDU SPD P3P3V I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU SPD P3P3V I - A_HKT.chan[49] |
| pdu_spd_p3p3v_v | FLOAT | PDU SPD P3P3V V | volts | PDU SPD P3P3V V - A_HKT.chan[20] |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Chunked Dataset) | (:) | (not_set) | ATL01/atlas/a_hkt_a_1059 converted | |
| pdu_spd_p5v_i (Chunked Dataset) | FLOAT (:) | PDU SPD P5V I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU SPD P5V I - A_HKT.chan[47] |
| pdu_spd_p5v_v (Chunked Dataset) | FLOAT (:) | PDU SPD P5V V (not_set) | volts ATL01/atlas/a_hkt_a_1059 converted | PDU SPD P5V V - A_HKT.chan[18] |
| pdu_tams_i (Chunked Dataset) | FLOAT (:) | PDU TAMS I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TAMS I - A_HKT.chan[31] |
| pdu_tcs_ofa_htr1_i (Chunked Dataset) | FLOAT (:) | PDU TCS OFA HTR1 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TCS OFA HTR1 I - A_HKT.chan[32] |
| pdu_tcs_ofa_htr2_i (Chunked Dataset) | FLOAT (:) | PDU TCS OFA HTR2 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TCS OFA HTR2 I - A_HKT.chan[33] |
| pdu_tcs_ofa_htr3_i (Chunked Dataset) | FLOAT (:) | PDU TCS OFA HTR3 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TCS OFA HTR3 I - A_HKT.chan[34] |
| pdu_tcs_ofa_htr4_i (Chunked Dataset) | FLOAT (:) | PDU TCS OFA HTR4 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TCS OFA HTR4 I - A_HKT.chan[35] |
| pdu_tcs_ofa_htr5_i (Chunked Dataset) | FLOAT (:) | PDU TCS OFA HTR5 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TCS OFA HTR5 I - A_HKT.chan[36] |
| pdu_tcs_ofa_htr6_i (Chunked Dataset) | FLOAT (:) | PDU TCS OFA HTR6 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TCS OFA HTR6 I - A_HKT.chan[37] |
| pdu_tcs_ofa_htr7_i (Chunked Dataset) | FLOAT (:) | PDU TCS OFA HTR7 I (not_set) | amps ATL01/atlas/a_hkt_a_1059 converted | PDU TCS OFA HTR7 I - A_HKT.chan[38] |

| Group: /atlas/housekeeping/pointing | | |
|---|---|---|
| Description | (Attribute) | APID 1138 ATLAS Pointing Message- Spacecraft Attitude and Rates Packet - Relayed to SSR. Packet Frequency is by command. |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APIDs. (only downlinked on command). |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| q_sc_i2b_1 (Chunked Dataset) | DOUBLE (:) | q_sc_i2b_1 (not_set) | 1 ATL01/atlas/a_sc_pon_1138 | SC Inertial to ATLAS Body Frame quaternion 1 |
| q_sc_i2b_2 (Chunked Dataset) | DOUBLE (:) | q_sc_i2b_2 (not_set) | 1 ATL01/atlas/a_sc_pon_1138 | SC Inertial to ATLAS Body Frame quaternion 2 |
| q_sc_i2b_3 (Chunked Dataset) | DOUBLE (:) | q_sc_i2b_3 (not_set) | 1 ATL01/atlas/a_sc_pon_1138 | SC Inertial to ATLAS Body Frame quaternion 3 |
| q_sc_i2b_4 (Chunked Dataset) | DOUBLE (:) | q_sc_i2b_4 (not_set) | 1 ATL01/atlas/a_sc_pon_1138 | SC Inertial to ATLAS Body Frame quaternion 4 |
| sc_solution_sec (Chunked Dataset) | UINT_4_LE (:) | sc_solution_sec (not_set) | seconds since 2018-01-01 ATL01/atlas/a_sc_pon_1138 | Spacecraft recorded seconds at time of position/velocity solution 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. |
| sc_solution_subsec (Chunked Dataset) | UINT_4_LE (:) | sc_solution_subsec (not_set) | subseconds ATL01/atlas/a_sc_pon_1138 | Spacecraft recorded subseconds |
| x_sc_body_rate (Chunked Dataset) | DOUBLE (:) | x_sc_body_rate (not_set) | radians/second ATL01/atlas/a_sc_pon_1138 | SC body rate as measured about the X axis in the ATLAS frame |
| y_sc_body_rate (Chunked Dataset) | DOUBLE (:) | y_sc_body_rate (not_set) | radians/second ATL01/atlas/a_sc_pon_1138 | SC body rate as measured about the Y axis in the ATLAS frame |
| z_sc_body_rate (Chunked Dataset) | DOUBLE (:) | z_sc_body_rate (not_set) | radians/second ATL01/atlas/a_sc_pon_1138 | SC body rate as measured about the Z axis in the ATLAS frame |

| Group: /atlas/housekeeping/position_velocity | | |
|---|---|---|
| Description | (Attribute) | APID 1137 ATLAS Position Message-Spacecraft Position and Velocity Packet - Relayed to SSR. Packet Frequency is in Hertz. |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APIDs. (only downlinked on command). |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| sc_solution_sec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | sc_solution_sec<br>(not_set) | seconds since 2018-01-01<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft recorded seconds at time of position/velocity solution, 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. |
| sc_solution_subsec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | sc_solution_subsec<br>(not_set) | counts<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft recorded subseconds |
| x_sc_eci_pos<br>(Chunked Dataset) | DOUBLE<br>(:) | x_sc_eci_pos<br>(not_set) | meters<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft Earth-Centered-Inertial Position: X axis |
| x_sc_eci_vel<br>(Chunked Dataset) | DOUBLE<br>(:) | x_sc_eci_vel<br>(not_set) | meters/second<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft Earth-Centered-Inertial Velocity: X axis |
| y_sc_eci_pos<br>(Chunked Dataset) | DOUBLE<br>(:) | y_sc_eci_pos<br>(not_set) | meters<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft Earth-Centered-Inertial Position: Y axis |
| y_sc_eci_vel<br>(Chunked Dataset) | DOUBLE<br>(:) | y_sc_eci_vel<br>(not_set) | meters/second<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft Earth-Centered-Inertial Velocity: Y axis |
| z_sc_eci_pos<br>(Chunked Dataset) | DOUBLE<br>(:) | z_sc_eci_pos<br>(not_set) | meters<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft Earth-Centered-Inertial Position: Z axis |
| z_sc_eci_vel<br>(Chunked Dataset) | DOUBLE<br>(:) | z_sc_eci_vel<br>(not_set) | meters/second<br>ATL01/atlas/a_sc_pos_1137 | Spacecraft Earth-Centered-Inertial Velocity: Z axis |
| **Group: /atlas/housekeeping/radiometry** | | | | |
| Description | (Attribute) | The radiometry group contains background and receiver sensitivity | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of one hertz. | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| bg_sensitivity_pce1_s<br>(Chunked Dataset) | FLOAT<br>(:) | PCE1 Strong background sensitivity<br>(not_set) | events/s/Watt<br>ATBD Section 5.5.2 | PCE1, Strong spot - receiver response per watt of continuous illumination in the passband from a diffuse source larger than the field of view, in the absence of any dead time effects. |
| bg_sensitivity_pce1_w<br>(Chunked Dataset) | FLOAT<br>(:) | PCE1 Weak background sensitivity<br>(not_set) | events/s/Watt<br>ATBD Section 5.5.2 | PCE1, Weak spot - receiver response per watt of continuous illumination in the passband from a diffuse source larger than the field of view, in the absence of any dead time effects. |
| bg_sensitivity_pce2_s<br>(Chunked Dataset) | FLOAT<br>(:) | PCE2 Strong background sensitivity<br>(not_set) | events/s/Watt<br>ATBD Section 5.5.2 | PCE2, Strong spot - receiver response per watt of continuous illumination in the passband from a diffuse source larger than the field of view, in the absence of any dead time effects. |
| bg_sensitivity_pce2_w<br>(Chunked Dataset) | FLOAT<br>(:) | PCE2 Weak background sensitivity<br>(not_set) | events/s/Watt<br>ATBD Section 5.5.2 | PCE2, Weak spot - receiver response per watt of continuous illumination in the passband from a diffuse source larger than the field of view, in the absence of any dead time effects. |
| bg_sensitivity_pce3_s<br>(Chunked Dataset) | FLOAT<br>(:) | PCE3 Strong background sensitivity<br>(not_set) | events/s/Watt<br>ATBD Section 5.5.2 | PCE3, Strong spot - receiver response per watt of continuous illumination in the passband from a diffuse source larger than the field of view, in the absence of any dead time effects. |
| bg_sensitivity_pce3_w<br>(Chunked Dataset) | FLOAT<br>(:) | PCE3 Weak background sensitivity<br>(not_set) | events/s/Watt<br>ATBD Section 5.5.2 | PCE3, Weak spot - receiver response per watt of continuous illumination in the passband from a diffuse source larger than the field of view, in the absence of any dead time effects. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via L1B ATBD | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. The timestamp is computed based on the housekeeping design to sample laser near the asc 1pps internal pulse. (See the L1B ATBD section 5 Radiometric Corrections ) |
| ret_sensitivity_pce1_s<br>(Chunked Dataset) | FLOAT<br>(:) | PCE1 Strong return sensitivity<br>(not_set) | events/s/Watt<br>ATBD Section 5.5.3 | PCE1, Strong spot - receiver response per joule/return pulse in the field of view, in the absence of any deadtime effects. |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| ret_sensitivity_pce1_w (Chunked Dataset) | FLOAT (:) | PCE1 Weak return sensitivity (not_set) | events/s/Watt ATBD Section 5.5.3 | PCE1, Weak spot - receiver response per joule/return pulse in the field of view, in the absence of any deadtime effects. |
| ret_sensitivity_pce2_s (Chunked Dataset) | FLOAT (:) | PCE2 Strong return sensitivity (not_set) | events/s/Watt ATBD Section 5.5.3 | PCE2, Strong spot - receiver response per joule/return pulse in the field of view, in the absence of any deadtime effects. |
| ret_sensitivity_pce2_w (Chunked Dataset) | FLOAT (:) | PCE2 Weak return sensitivity (not_set) | events/s/Watt ATBD Section 5.5.3 | PCE2, Weak spot - receiver response per joule/return pulse in the field of view, in the absence of any deadtime effects. |
| ret_sensitivity_pce3_s (Chunked Dataset) | FLOAT (:) | PCE3 Strong return sensitivity (not_set) | events/s/Watt ATBD Section 5.5.3 | PCE3, Strong spot - receiver response per joule/return pulse in the field of view, in the absence of any deadtime effects. |
| ret_sensitivity_pce3_w (Chunked Dataset) | FLOAT (:) | PCE3 Weak return sensitivity (not_set) | events/s/Watt ATBD Section 5.5.3 | PCE3, Weak spot - receiver response per joule/return pulse in the field of view, in the absence of any deadtime effects. |

| Group: /atlas/housekeeping/status | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Flags parsed from HKT Status Registers Housekeeping Packet. Packet Frequency is 1 in Hertz. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APID. (Nominally 1HZ). | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| pdua_daa_opt (Chunked Dataset) | INTEGER_1 (:) | PDUA_DAA_OPT status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_DAA_OPT status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_det_ps (Chunked Dataset) | INTEGER_1 (:) | PDUA_DET_PS status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_DET_PS status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_hvpc (Chunked Dataset) | INTEGER_1 (:) | PDUA_HVPC status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_HVPC status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_laser_1 (Chunked Dataset) | INTEGER_1 (:) | PDUA_LASER_1 status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_LASER_1 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_laser_2 (Chunked Dataset) | INTEGER_1 (:) | PDUA_LASER_2 status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_LASER_2 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_lhp1 (Chunked Dataset) | INTEGER_1 (:) | PDUA_LHP1 status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_LHP1 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_lhp2 (Chunked Dataset) | INTEGER_1 (:) | PDUA_LHP2 status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_LHP2 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_lhp_startup (Chunked Dataset) | INTEGER_1 (:) | PDUA_LHP_STARTUP status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_LHP_STARTUP status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_lrs (Chunked Dataset) | INTEGER_1 (:) | PDUA_LRS status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_LRS status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_lrs_opt (Chunked Dataset) | INTEGER_1 (:) | PDUA_LRS_OPT status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_LRS_OPT status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_ofa1 (Chunked Dataset) | INTEGER_1 (:) | PDUA_OFA1 status flag (not_set) | counts ATL01/atlas/a_hkt_status_1065 converted | PDUA_OFA1 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdua_ofa2 | INTEGER_1 | PDUA_OFA2 status | counts | PDUA_OFA2 status flag. 0=ON, 1=OFF |

| | | flag<br>(not_set) | ATL01/atlas/a_hkt_status_1065 converted | flag_values: 0, 1<br>flag_meanings : on off |
|---|---|---|---|---|
| pdua_ofa3<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_OFA3 status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_OFA3 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_ofa4<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_OFA4 status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_OFA4 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_ofa5<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_OFA5 status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_OFA5 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_ofa6<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_OFA6 status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_OFA6 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_ofa7<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_OFA7 status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_OFA7 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_ofa_ps<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_OFA_PS status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_OFA_PS status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_pri_mir<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_PRI_MIR status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_PRI_MIR status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_sec_mir<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_SEC_MIR<br>status flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_SEC_MIR status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_spare_sig<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_SPARE_SIG<br>status flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_SPARE_SIG status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_spd_ps<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_SPD_PS status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_SPD_PS status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_tams_ls<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_TAMS_LS<br>status flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_TAMS_LS status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdua_tower<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUA_TOWER status<br>flag<br>(not_set) | counts<br>ATL01/atlas/a_hkt_status_1065 converted | PDUA_TOWER status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdub_daa_opt<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUB_DAA_OPT<br>status flag<br>(not_set) | 1<br>ATL01/atlas/a_hkt_status_1065 converted | PDUB_DAA_OPT status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdub_det_ps<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUB_DET_PS status<br>flag<br>(not_set) | 1<br>ATL01/atlas/a_hkt_status_1065 converted | PDUB_DET_PS status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdub_hvpc<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUB_HVPC status<br>flag<br>(not_set) | 1<br>ATL01/atlas/a_hkt_status_1065 converted | PDUB_HVPC status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdub_laser_1<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUB_LASER_1<br>status flag<br>(not_set) | 1<br>ATL01/atlas/a_hkt_status_1065 converted | PDUB_LASER_1 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdub_laser_2<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUB_LASER_2<br>status flag<br>(not_set) | 1<br>ATL01/atlas/a_hkt_status_1065 converted | PDUB_LASER_2 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdub_lhp1<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUB_LHP1 status<br>flag<br>(not_set) | 1<br>ATL01/atlas/a_hkt_status_1065 converted | PDUB_LHP1 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |
| pdub_lhp2<br>(Chunked Dataset) | INTEGER_1<br>(:) | PDUB_LHP2 status<br>flag<br>(not_set) | 1<br>ATL01/atlas/a_hkt_status_1065 converted | PDUB_LHP2 status flag. 0=ON, 1=OFF<br>flag_values: 0, 1<br>flag_meanings : on off |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| pdub_lhp_startup (Chunked Dataset) | INTEGER_1 (:) | PDUB_LHP_STARTUP status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_LHP_STARTUP status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_lrs (Chunked Dataset) | INTEGER_1 (:) | PDUB_LRS status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_LRS status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_lrs_opt (Chunked Dataset) | INTEGER_1 (:) | PDUB_LRS_OPT status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_LRS_OPT status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa1 (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA1 status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA1 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa2 (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA2 status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA2 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa3 (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA3 status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA3 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa4 (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA4 status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA4 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa5 (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA5 status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA5 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa6 (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA6 status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA6 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa7 (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA7 status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA7 status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_ofa_ps (Chunked Dataset) | INTEGER_1 (:) | PDUB_OFA_PS status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_OFA_PS status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_pri_mir (Chunked Dataset) | INTEGER_1 (:) | PDUB_PRI_MIR status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_PRI_MIR status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_sec_mir (Chunked Dataset) | INTEGER_1 (:) | PDUB_SEC_MIR status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_SEC_MIR status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_spare_sig (Chunked Dataset) | INTEGER_1 (:) | PDUB_SPARE_SIG status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_SPARE_SIG status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_spd_ps (Chunked Dataset) | INTEGER_1 (:) | PDUB_SPD_PS status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_SPD_PS status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_tams_ls (Chunked Dataset) | INTEGER_1 (:) | PDUB_TAMS_LS status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_TAMS_LS status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |
| pdub_tower (Chunked Dataset) | INTEGER_1 (:) | PDUB_TOWER status flag (not_set) | 1 ATL01/atlas/a_hkt_status_1065 converted | PDUB_TOWER status flag. 0=ON, 1=OFF flag_values: 0, 1 flag_meanings : on off |

**Group: /atlas/housekeeping/thermal**

| Description | (Attribute) | Thermal data from APID 1061 Analog HK Telemetry. Packet Frequency is 1 in Hertz. | | |
|---|---|---|---|---|
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APID. (Nominally 1HZ). | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time | DOUBLE | Elapsed GPS seconds | seconds since 2018-01-01 | Number of GPS seconds since the ATLAS SDP epoch. This is computed based on the housekeeping design to sample a |

| | | | | |
|---|---|---|---|---|
| (Chunked Dataset) | (:) | (time) | Derived via Time Tagging | measurement every 0.003125 seconds from the internal ASC 1PPS . The time for this packet is set as the time of the lowest channel number in this telemetry packet.. If the specific time is needed use the channel number from the lowest channel in packet. 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. |
| hkt_a_beam_px_t (Chunked Dataset) | FLOAT (:) | HKT_BEAMX_PX_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | A_HKT_BEAMX_PX_T A_HKT_C.chan[62] |
| hkt_beamx_t (Chunked Dataset) | FLOAT (:) | HKT BEAMX T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Beam Expander I/F mTTCS-21 or 30 A_HKT_C.chan[82] |
| hkt_bsm_t (Chunked Dataset) | FLOAT (:) | HKT BSM T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT BSM I/F T TCS-20 - A_HKT_C.chan[33] |
| hkt_cchp_adiab_t (Chunked Dataset) | FLOAT (:) | HKT CCHP ADIAB T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Laser CCHP Adiabatic Section T TCS-12 A_HKT_C.chan[55] |
| hkt_cchp_las1_t (Chunked Dataset) | FLOAT (:) | HKT CCHP LAS1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Laser 1 I/F T TCS-14 A_HKT_C.chan[59] |
| hkt_dem1_t1_eb_t (Chunked Dataset) | FLOAT (:) | HKT_DEM1_T1_EB_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 74 - DEM1_TH_B-MEB-37 External Bottom t A_HKT_C.chan[38] |
| hkt_dem1_t2_it_t (Chunked Dataset) | FLOAT (:) | HKT_DEM1_T2_IT_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 76 - DEM1_TH_D-MEB-39 Internal Top T A_HKT_C.chan[40] |
| hkt_dem1_t3_ib_t (Chunked Dataset) | FLOAT (:) | HKT_DEM1_T3_IB_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 75 - DEM1_TH_C-MEB-38 Internal Bottom T A_HKT_C.chan[39] |
| hkt_dem1_t4_et_t (Chunked Dataset) | FLOAT (:) | HKT_DEM1_T4_ET_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 73 - DEM1_TH_A-MEB-36 External Top T A_HKT_C.chan[37] |
| hkt_dem2_t (Chunked Dataset) | FLOAT (:) | HKT_DEM2_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 77 - DEM2_TH_A-MEB-40 External Bottom T A_HKT_C.chan[41] |
| hkt_dem3_t1_eb_t (Chunked Dataset) | FLOAT (:) | HKT_DEM3_T1_EB_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 79 - DEM3_TH_B-MEB-42 External Bottom T A_HKT_C.chan[43] |
| hkt_dem3_t2_it_t (Chunked Dataset) | FLOAT (:) | HKT_DEM3_T2_IT_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 81 - DEM3_TH_D-MEB-44 Internal Top T A_HKT_C.chan[45] |
| hkt_dem3_t3_ib_t (Chunked Dataset) | FLOAT (:) | HKT_DEM3_T3_IB_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 80 - DEM3_TH_C-MEB-43 Internal Bottom T A_HKT_C.chan[44] |
| hkt_dem3_t4_et_t (Chunked Dataset) | FLOAT (:) | HKT_DEM3_T4_ET_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 78 - DEM3_TH_A-MEB-41 External Top T A_HKT_C.chan[42] |
| hkt_dem4_t (Chunked Dataset) | FLOAT (:) | HKT_DEM4_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 82 - DEM4_TH_A-MEB-45 External Bottom T A_HKT_C.chan[46] |
| hkt_dem5_t1_eb_t (Chunked Dataset) | FLOAT (:) | HKT_DEM5_T1_EB_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 84 - DEM5_TH_B-MEB-47 External Bottom T A_HKT_C.chan[48] |
| hkt_dem5_t2_it_t (Chunked Dataset) | FLOAT (:) | HKT_DEM5_T2_IT_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 86 - DEM5_TH_D-MEB-49 Internal Top T A_HKT_C.chan[50] |
| hkt_dem5_t3_ib_t (Chunked Dataset) | FLOAT (:) | HKT_DEM5_T3_IB_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 85 - DEM5_TH_C-MEB-48 Internal Bottom T A_HKT_C.chan[49] |
| hkt_dem5_t4_et_t (Chunked Dataset) | FLOAT (:) | HKT_DEM5_T4_ET_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 83 - DEM5_TH_A-MEB-46 External Top T A_HKT_C.chan[47] |
| hkt_dem6_t (Chunked Dataset) | FLOAT (:) | HKT_DEM6_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT A/D Ch 87 - DEM6_TH_A-MEB-50 External Bottom T A_HKT_C.chan[51] |
| hkt_dom_rad1_t (Chunked Dataset) | FLOAT (:) | HKT DOM RAD1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT DAA DOM Radiator T (Pri) TCS-47 - A_HKT_C.chan[36] |
| hkt_dom_rad2_t (Chunked Dataset) | FLOAT (:) | HKT DOM RAD2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT DAA DOM Radiator T (Red) TCS-48 - A_HKT_C.chan[34] |
| hkt_foldm_t (Chunked Dataset) | FLOAT (:) | HKT FOLDM T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Fold Mirror I/F I TCS-22 A_HKT_C.chan[83] |
| hkt_imsc_myflex_t (Chunked Dataset) | FLOAT (:) | HKT IMSC MYFLEX T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | IMSC Flexure 1 T TCS-28 A_HKT_C.chan[88] |
| hkt_imsc_mzflex_t | FLOAT | HKT IMSC MZFLEX T | degreesC | IMSC Flexure 2 T TCS-29 A_HKT_C.chan[89] |

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|---|---|---|---|---|
| (Chunked Dataset) | (:) | (not_set) | ATL01/atlas/a_hkt_c_1061 converted | |
| hkt_lasrad_t (Chunked Dataset) | FLOAT (:) | HKT LASRAD T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Laser LHP Radiator T TCS_54 A_HKT_C.chan[61] |
| hkt_lhp_evap_t (Chunked Dataset) | FLOAT (:) | HKT LHP EVAP T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | LHP Evaporator T TCS-15 A_HKT_C.chan[54] |
| hkt_lhp_liqline_t (Chunked Dataset) | FLOAT (:) | HKT LHP LIQLINE T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | LHP Liqid Line T TCS-16 A_HKT_C.chan[60] |
| hkt_lhp_res1_t (Chunked Dataset) | FLOAT (:) | HKT LHP RES1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | LHP Compensation Chamber T (Pri) TCS-10 A_HKT_C.chan[52] |
| hkt_lhp_res2_t (Chunked Dataset) | FLOAT (:) | HKT LHP RES2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | LHP Compensation Chamber T (Red) TCS-11 A_HKT_C.chan[53] |
| hkt_lhp_vapline_t (Chunked Dataset) | FLOAT (:) | HKT LHP VAPLINE T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | A_HKT_LHP_VAPLINE_T TCS-17 A_HKT_C.chan[90] |
| hkt_lrs_orad1_t (Chunked Dataset) | FLOAT (:) | HKT LRS ORAD1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | LRS Optics RadiatorT (Pri) TCS-08 A_HKT_C.chan[56] |
| hkt_lrs_orad2_t (Chunked Dataset) | FLOAT (:) | HKT LRS ORAD2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | LRS Optics Radiator T (Red) TCS-09 A_HKT_C.chan[57] |
| hkt_lrs_ss_t (Chunked Dataset) | FLOAT (:) | HKT LRS SS T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | LRS Sunshade I/F T TCS-13 A_HKT_C.chan[58] |
| hkt_ltr_tams_t (Chunked Dataset) | FLOAT (:) | HKT LTR TAMS T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | TAMS LTR T TCS-18 A_HKT_C.chan[94] |
| hkt_ltr_trans_t (Chunked Dataset) | FLOAT (:) | HKT LTR TRANS T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Transmitter LTR T TCS_19 A_HKT_C.chan[102] |
| hkt_meb_asc1_t (Chunked Dataset) | FLOAT (:) | HKT MEB ASC1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB ASC1 T MEB-01F - A_HKT_C.chan[0] |
| hkt_meb_asc2_t (Chunked Dataset) | FLOAT (:) | HKT MEB ASC2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB ASC2 T MEB-02 - A_HKT_C.chan[1] |
| hkt_meb_hkt_t (Chunked Dataset) | FLOAT (:) | HKT MEB HKT T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB HKT T MEB-21 - A_HKT_C.chan[2] |
| hkt_meb_lvpc1_t (Chunked Dataset) | FLOAT (:) | HKT MEB LVPC1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB LVPC1 T MEB-03 - A_HKT_C.chan[3] |
| hkt_meb_lvpc2_t (Chunked Dataset) | FLOAT (:) | HKT MEB LVPC2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB LVPC2 T MEB-04 - A_HKT_C.chan[4] |
| hkt_meb_mce1_t (Chunked Dataset) | FLOAT (:) | HKT MEB MCE1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB MCE1 T MEB-07 - A_HKT_C.chan[5] |
| hkt_meb_mce2_t (Chunked Dataset) | FLOAT (:) | HKT MEB MCE2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB MCE2 T MEB-08 - A_HKT_C.chan[6] |
| hkt_meb_mce3_t (Chunked Dataset) | FLOAT (:) | HKT MEB MCE3 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB MCE3 T MEB-09 - A_HKT_C.chan[7] |
| hkt_meb_mce4_t (Chunked Dataset) | FLOAT (:) | HKT MEB MCE4 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB MCE4 T MEB-10 - A_HKT_C.chan[8] |
| hkt_meb_pce1_1_t (Chunked Dataset) | FLOAT (:) | HKT MEB PCE1 1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB PCE1 1 T MEB-11 - A_HKT_C.chan[9] |
| hkt_meb_pce1_2_t (Chunked Dataset) | FLOAT (:) | HKT MEB PCE1 2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB PCE1 2 T MEB-12 - A_HKT_C.chan[10] |
| hkt_meb_pce2_1_t (Chunked Dataset) | FLOAT (:) | HKT MEB PCE2 1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB PCE2 1 T MEB-13 - A_HKT_C.chan[11] |
| hkt_meb_pce2_2_t (Chunked Dataset) | FLOAT (:) | HKT MEB PCE2 2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB PCE2 2 T MEB-14 - A_HKT_C.chan[12] |
| hkt_meb_pce3_1_t (Chunked Dataset) | FLOAT (:) | HKT MEB PCE3 1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB PCE3 1 T MEB-15 - A_HKT_C.chan[13] |
| hkt_meb_pce3_2_t (Chunked Dataset) | FLOAT (:) | HKT MEB PCE3 2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT MEB PCE3 2 T MEB-16 - A_HKT_C.chan[14] |
| hkt_meb_sbc1_t | FLOAT | HKT MEB SBC1 T | degreesC | HKT MEB SBC1 T MEB-17 - A_HKT_C.chan[15] |

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|---|---|---|---|---|
| (Chunked Dataset) | (:) | (not_set) | ATL01/atlas/a_hkt_c_1061 converted | |
| hkt_meb_sbc2_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT MEB SBC2 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT MEB SBC2 T MEB-18 - A_HKT_C.chan[16] |
| hkt_meb_uso1_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT MEB USO1 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT MEB USO1 T MEB-19 - A_HKT_C.chan[17] |
| hkt_meb_uso2_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT MEB USO2 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT MEB USO2 T MEB-20 - A_HKT_C.chan[18] |
| hkt_ob_mz1_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OB MZ1 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | Optical Bench, -Z Side T TCS-23 A_HKT_C.chan[65] |
| hkt_ob_mz2_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OB MZ2 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | Optical Bench, -Z Side T TCS-24 A_HKT_C.chan[66] |
| hkt_ob_mz3_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OB MZ3 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | Optical Bench, -Z Side T TCS-25 A_HKT_C.chan[67] |
| hkt_ob_pz1_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OB PZ1 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | Optical Bench, +Z Side T TCS-26 A_HKT_C.chan[63] |
| hkt_ob_pz2_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OB PZ2 T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | Optical Bench, +Z Side T TCS-27 A_HKT_C.chan[64] |
| hkt_ob_pz3_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT_OB_PZ3_T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | Optical Bench +z3 T TCS_31 A_HKT_C.chan[103] |
| hkt_ob_pz4_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT_OB_PZ4_T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | Optical Bench +z4 T TCS_32 A_HKT_C.chan[105] |
| hkt_ofa1_et_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT_OFA1_ET_T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | OFA1 ETALON T TCS_58 A_HKT_C.chan[104] |
| hkt_ofa1_pri_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA1 PRI T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-33 OFA1 PRI T - A_HKT_C.chan[19] |
| hkt_ofa1_red_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA1 RED T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-34 OFA1 RED T - A_HKT_C.chan[26] |
| hkt_ofa2_pri_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA2 PRI T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-35 OFA2 PRI T - A_HKT_C.chan[20] |
| hkt_ofa2_red_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA2 RED T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-36 OFA2 RED T - A_HKT_C.chan[27] |
| hkt_ofa3_pri_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA3 PRI T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-37 OFA3 PRI T - A_HKT_C.chan[21] |
| hkt_ofa3_red_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA3 RED T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-38 OFA3 RED T - A_HKT_C.chan[28] |
| hkt_ofa4_pri_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA4 PRI T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-39 OFA4 PRI T - A_HKT_C.chan[22] |
| hkt_ofa4_red_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA4 RED T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-40 OFA4 RED T - A_HKT_C.chan[29] |
| hkt_ofa5_pri_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA5 PRI T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-41 OFA5 PRI T - A_HKT_C.chan[23] |
| hkt_ofa5_red_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA5 RED T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-42 OFA5 RED T - A_HKT_C.chan[30] |
| hkt_ofa6_pri_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA6 PRI T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-43 OFA6 PRI T - A_HKT_C.chan[24] |
| hkt_ofa6_red_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA6 RED T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-44 OFA6 RED T - A_HKT_C.chan[31] |
| hkt_ofa7_et_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT_OFA7_ET_T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | OFA7 ETALON T TCS_59 A_HKT_C.chan[106] |
| hkt_ofa7_pri_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA7 PRI T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-45 OFA7 PRI T - A_HKT_C.chan[25] |
| hkt_ofa7_red_t<br>(Chunked Dataset) | FLOAT<br>(:) | HKT OFA7 RED T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | HKT TCS-46 OFA7 RED T - A_HKT_C.chan[32] |
| hkt_scif_myflex_t | FLOAT | HKT SCIF MYFLEX T | degreesC | -Y S/C Flexure T A_HKT_C.chan[93] |

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|---|---|---|---|---|
| (Chunked Dataset) | (:) | (not_set) | ATL01/atlas/a_hkt_c_1061 converted | |
| hkt_scif_pxflex_t (Chunked Dataset) | FLOAT (:) | HKT SCIF PXFLEX T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | +X S/C Flexure T TCS-51 A_HKT_C.chan[87] |
| hkt_scif_pyflex_t (Chunked Dataset) | FLOAT (:) | HKT SCIF PYFLEX T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | -+Y S/C Flexure T TCS-53 A_HKT_C.chan[101] |
| hkt_spd_t (Chunked Dataset) | FLOAT (:) | HKT SPD T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | SPD I/F T TCS-50 A_HKT_C.chan[85] |
| hkt_struc_my_t (Chunked Dataset) | FLOAT (:) | HKT STRUC MY T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Structure Y Panel T TCS_55 A_HKT_C.chan[91] |
| hkt_struc_mz_t (Chunked Dataset) | FLOAT (:) | HKT STRUC MZ T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Structure Z Panel T TCS_57 A_HKT_C.chan[92] |
| hkt_sunshade_t (Chunked Dataset) | FLOAT (:) | HKT_SUNSHADE_T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Structure +Z Panel T A_HKT_C.chan[86] |
| hkt_tel_pri1_t (Chunked Dataset) | FLOAT (:) | HKT TEL PRI1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Telescope, Primary Mirror T (Pri) TCS-05 A_HKT_C.chan[95] |
| hkt_tel_pri2_t (Chunked Dataset) | FLOAT (:) | HKT TEL PRI2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Telescope, Primary Mirror T (Red) TCS-06 A_HKT_C.chan[96] |
| hkt_tel_pri3_t (Chunked Dataset) | FLOAT (:) | HKT TEL PRI3 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | HKT Telescope, Primary Mirror T TCS-07 - A_HKT_C.chan[35] |
| hkt_tel_sec1_t (Chunked Dataset) | FLOAT (:) | HKT TEL SEC1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Telescope, Secondary Mirror T (Pri) TCS-01 A_HKT_C.chan[97] |
| hkt_tel_sec2_t (Chunked Dataset) | FLOAT (:) | HKT TEL SEC2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Telescope, Secondary Mirror T (Red) TCS-02 A_HKT_C.chan[98] |
| hkt_tel_tow1_t (Chunked Dataset) | FLOAT (:) | HKT TEL TOW1 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Telescope, Tower T (Pri) TCS-03 A_HKT_C.chan[99] |
| hkt_tel_tow2_t (Chunked Dataset) | FLOAT (:) | HKT TEL TOW2 T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | Telescope, Tower T (Red) TCS-04 A_HKT_C.chan[100] |
| hkt_wtem_t (Chunked Dataset) | FLOAT (:) | HKT WTEM T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | OFA WTEM I/F T TCS-49 A_HKT_C.chan[84] |
| hvpca_therm_a_t (Chunked Dataset) | FLOAT (:) | HVPCTHERM T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PRIMARY HVPC THERMISTOR A MEB-30 A_HKT_C.chan[68] |
| hvpca_therm_b_t (Chunked Dataset) | FLOAT (:) | HVPCTHERM B T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PRIMARY HVPC THERMISTOR B MEB-32 A_HKT_C.chan[69] |
| hvpcb_therm_a_t (Chunked Dataset) | FLOAT (:) | HVPCB THERM T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | REDUNDANT HVPC THERMISTOR A MEB-31 A_HKT_C.chan[75] |
| hvpcb_therm_b_t (Chunked Dataset) | FLOAT (:) | HVPCB THERM B T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | REDUNDANT HVPC THERMISTOR B MEB-33 A_HKT_C.chan[76] |
| pdua_therm_ct_t (Chunked Dataset) | FLOAT (:) | PDUTHERM CT T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU CT BOARD A T-MEB-24 A_HKT_C.chan[70] |
| pdua_therm_dlv_a_t (Chunked Dataset) | FLOAT (:) | PDUTHERM DLV T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU LOW VOLTAGE 1A T-MEB-26 A_HKT_C.chan[71] |
| pdua_therm_dlv_b_t (Chunked Dataset) | FLOAT (:) | PDUTHERM DLV B T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU LOW VOLTAGE 2A T -MEB-28 A_HKT_C.chan[72] |
| pdua_therm_mi_t (Chunked Dataset) | FLOAT (:) | PDUTHERM MI T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU MAIN PWR BOARD A T-MEB_22 A_HKT_C.chan[73] |
| pdub_therm_ct_t (Chunked Dataset) | FLOAT (:) | PDUB THERM CT T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU CT BOARD B T -MEB-25 A_HKT_C.chan[77] |
| pdub_therm_dlv_a_t (Chunked Dataset) | FLOAT (:) | PDUB THERM DLV T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU LOW VOLTAGE 1B T -MEB-27 A_HKT_C.chan[78] |
| pdub_therm_dlv_b_t (Chunked Dataset) | FLOAT (:) | PDUB THERM DLV B T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU LOW VOLTAGE 2B T -MEB-29 A_HKT_C.chan[79] |
| pdub_therm_mi_t (Chunked Dataset) | FLOAT (:) | PDUB THERM MI T (not_set) | degreesC ATL01/atlas/a_hkt_c_1061 converted | PDU MAIN PWR BOARD B T -MEB_23 A_HKT_C.chan[80] |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| spda_therm_t<br>(Chunked Dataset) | FLOAT<br>(:) | SPDTHERM T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | PRIMARY SPD THERMISTOR MEB-34 A_HKT_C.chan[74] |
| spdb_therm_t<br>(Chunked Dataset) | FLOAT<br>(:) | SPDB THERM T<br>(not_set) | degreesC<br>ATL01/atlas/a_hkt_c_1061 converted | REDUNDANT SPD THERMISTOR MEB-35 A_HKT_C.chan[81] |

| **Group: /atlas/housekeeping/time_at_the_tone** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | APID 1136 Spacecraft Time at the Tone Packet - Relayed to SSR. Packet Frequency is by command. ATLAS Time-At-The-Tone-Was Message | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source APIDs. (only downlinked on command). | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| gps_1pps_sec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | gps 1pps<br>(not_set) | seconds since January 6, 1980<br>ATL01/APID 1136 Byte 0014-0017 | GPS reported seconds. |
| gps_1pps_subsec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | gps 1pps subsec<br>(not_set) | milliseconds<br>ATL01/APID 1136 Byte 0014-0017 | GPS reported subseconds |
| sc_time_1pps_sec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | SC time at 1 pps<br>(not_set) | seconds since January 6, 1980<br>ATL01/APID 1136 Byte 0014-0017 | SC time at the reception of the last 1PPS signal from the GPSR. |
| sc_time_1pps_subsec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | SC time at 1 pps<br>(subsec)<br>(not_set) | 100 nanoseconds<br>ATL01/APID 1136 Byte 0014-0017 | Subsecond portion of the SC time at the reception of the last 1PPS signal from the GPSR (seconds since SC epoch: 6-Jan-1980 00:00:00) |

| **Group: /atlas/pcex** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Group contains the Photon Counting Electronics x (PCEx) packet decommutated data | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source PCE Data Packets. (nominally fifty per second.) | | |

| **Group: /atlas/pcex/algorithm_science** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | The PCE PMF Algorithm Science data group. Contains outputs from the onboard receiver algorithm software. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source PCE Altimetric Data Packets. (nominally fifty per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| amet_time<br>(Chunked Dataset) | DOUBLE<br>(:) | AMET seconds at the Major Frame<br>(not_set) | seconds<br>ATL01/atlas/pcex/a_pmf_algorithm_science | AMET seconds at the Major Frame |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via L1B ATBD | The time of the first TX pulse in the major frame, relative to 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. |
| gps_time<br>(Chunked Dataset) | DOUBLE<br>(:) | GPS seconds at the Major Frame<br>(not_set) | seconds<br>ATL01/atlas/pcex/a_pmf_algorithm_science | GPS seconds at the Major Frame |
| pce_mframe_cnt<br>(Chunked Dataset) | UINT_4_LE<br>(:) | PCE Major frame counter<br>(not_set) | counts<br>ATL01/atlas/pcex/a_pmf_algorithm_science | Major Frame ID - The major frame ID is read from the DFC and starts counting at DFC POR. The counter is used to identify individual major frames across diag and science packets. This counter can go for about 2.7 years before rolling over. |
| useflag<br>(Chunked Dataset) | UINT_1_LE<br>(:) | Science Mode Flag<br>(not_set) | counts<br>ATL01/atlas/pcex/a_alt_sci/ | Science Mode Flag. Used by ATL03 to discard non-science mode data. 0=stby, 1=science_mode, 2=test, 3=manual, 4=radio, 5=unknown, > 10=amcs_not_normal<br>flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15<br>flag_meanings : stby science test manual radio unknown unused unused unused unused stby_alt_amcs science_alt_amcs test_alt_amcs unknown_alt_amcs |

| **Group: /atlas/pcex/algorithm_science/s_w** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | The PCE PMF Algorithm Science data group. Contains outputs from the onboard receiver algorithm software. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source PCE Altimetric Data Packets. (nominally fifty per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| | | | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| daynight_flag (Chunked Dataset) | UINT_1_LE (:) | Day/Night flag (not_set) | counts ATL01/atlas/pcex/a_pmf_algorithm_science | ATLAS flight software Day/Night Flag associated with the major frame. 0= day, 1 =night. Based on an algorithm determination of the background rate, not on the actual position of the sun. flag_values: 0, 1 flag_meanings : day night |
| decisionflags (Chunked Dataset) | UINT_1_LE (4, :) | Decision Flags (not_set) | counts ATL01/atlas/pcex/a_pmf_algorithm_science | ATLAS flight s/w Decision Flags associated with the major frame. indication if there was an error or if no science data is sent and why |
| ds_4bytes (Contiguous Dataset) | INTEGER_1 (4) | DS for 4 bytes (not_set) | 1 not_set | Dimension scale for an array of 4 bytes. |
| flywheel (Chunked Dataset) | UINT_1_LE (:) | Flywheel (not_set) | counts ATL01/atlas/pcex/a_pmf_algorithm_science | ATLAS flight software Flywheel associated with the major frame. |
| signalflags (Chunked Dataset) | UINT_1_LE (:) | Signal Found Flags (not_set) | counts ATL01/atlas/pcex/a_pmf_algorithm_science | ATLAS flight s/w signal event flags associated with the major frame. |

| Group: /atlas/pcex/altimetry | | | | |
|---|---|---|---|---|
| Description | (Attribute) | The PCE Altimetry Science Packet data common to both beams (PCEx_ALT_SCI_TLM_MID in APID 1254, 1264, 1274 sequence flag 01 (once per major frame). (see ICESat-2-MEB-SPEC-0875, section 5.12, Spacewire: Major Frame Packet Data Format | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source PCE Altimetric Data Packets. (nominally fifty per second.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| cal_fall_sm (Chunked Dataset) | FLOAT (:) | Altimetric Latest Calibration Falling (not_set) | seconds/cell Derived via L1B ATBD | The smoothed, calibrated value for the falling edge used to convert cell counts to units of time. time per cell count based on USO for each PCE. |
| cal_rise_sm (Chunked Dataset) | FLOAT (:) | Altimetric Latest Calibration Rising (not_set) | seconds/cell Derived via L1B ATBD | The smoothed, calibrated value for the rising edge used to convert cell counts to units of time. time per cell count based on USO for each PCE. |
| ch_mask_s (Chunked Dataset) | INTEGER_1 (16, :) | Channel Mask Strong (not_set) | counts ATL01/atlas/pcex/a_alt_science | Channel Mask for DLBOs. The 16 flags are a logical OR of the two band offset masks for strong beam |
| ch_mask_w (Chunked Dataset) | INTEGER_1 (4, :) | Channel Mask Weak (not_set) | counts ATL01/atlas/pcex/a_alt_science | Channel Mask for DLBOs. The 4 flags are a logical OR of the two band offset masks for weak beam |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via L1B ATBD | The time of the first TX pulse in the major frame, relative to 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. |
| ds_strong_channel_index (Contiguous Dataset) | INTEGER_1 (16) | DS for Strong Channels (not_set) | 1 not_set | Dimension scale for strong channels. |
| ds_weak_channel_index (Contiguous Dataset) | INTEGER_1 (4) | DS for Weak Channels (not_set) | 1 not_set | Dimension scale for weak channels. |
| n_bands (Chunked Dataset) | INTEGER_1 (:) | Number Downlink Bands (not_set) | counts ATL01/atlas/pcex/a_alt_science | Number of bands (in addition to the nominal 1 band) selected for downlink. |
| pce_mframe_cnt (Chunked Dataset) | UINT_4_LE (:) | PCE Major frame counter (not_set) | counts ATL02 | Major Frame ID - The ajor frame ID is read from the DFC and starts counting at DFC POR. T e counter is used to i dentify individual major frames across diag and science packets. This counter can go for about 2.7 years before rolling over. It is in the first time tag science packet. Used as part of the photon ID |
| useflag (Chunked Dataset) | UINT_1_LE (:) | Science Mode Flag (not_set) | counts ATL01/atlas/pcex/a_alt_sci/ | Science Mode Flag. Used by ATL03 to discard non-science mode data. 0=stby, 1=science_mode, 2=test, 3=manual, 4=radio, 5=unknown, > 10=amcs_not_normal flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 flag_meanings : stby science test manual radio unknown unused unused unused unused stby_alt_amcs science_alt_amcs test_alt_amcs manual_alt_amcs radio_alt_amcs unknown_alt_amcs |

| Group: /atlas/pcex/altimetry/s_w | | | | |
|---|---|---|---|---|
| Description | (Attribute) | The PCE Altimetry Science Packet specific to a beam (PCEx_ALT_SCI_TLM_MID in APID 1254, 1264, 1274 sequence flag 01 (once per major frame). (see ICESat-2-MEB-SPEC-0875, section 5.12, Spacewire: Major Frame Packet Data Format | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source PCE Altimetric Data Packets. (nominally fifty per second.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| alt_rw_start | FLOAT | Altimetric Range | seconds | The number of seconds between the transmit pulse and the start of the altimetric range window for the beam |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Chunked Dataset) | (:) | Window Start (not_set) | ATL01/atlas/pcex/a_pmf_algorithm_science and L1B ATBD conversion | |
| alt_rw_width (Chunked Dataset) | FLOAT (:) | Altimetric Range Window Width (not_set) | seconds ATL01/atlas/pcex/a_pmf_algorithm_science and L1B ATBD conversion | The number of seconds from the range window start and range window stop |
| band1_offset (Chunked Dataset) | FLOAT (:) | Band1 Offset (not_set) | seconds L1A ATBD | Downlink band offset (DLBO) for band1. |
| band1_width (Chunked Dataset) | FLOAT (:) | Band1 Width (not_set) | seconds L1A ATBD | Width of downlink band1. |
| band2_offset (Chunked Dataset) | FLOAT (:) | Band2 Offset (not_set) | seconds L1A ATBD | Downlink band offset (DLBO) for band2. |
| band2_width (Chunked Dataset) | FLOAT (:) | Band2 Width (not_set) | seconds L1A ATBD | Width of downlink band2. |
| n_mf_ph (Chunked Dataset) | INTEGER_4 (:) | Number of photons (not_set) | counts Derived | Number of photons within each major frame. |
| ph_ndx_beg (Chunked Dataset) | INTEGER_8 (:) | Photon Index Begin (not_set) | counts Derived | Index (1-based) within the photon-rate data of the first photon within each major frame. |

| Group: /atlas/pcex/altimetry/s_w/photons | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Group contains the PCE Altimetric received photon event (ph) decommutated data and its matching Transmit time tag data. Note the Transmit time tag data are repeated for each received photon event. Data is from Altimetry Science Packet (alt_sci_tlm) APID 1254, 1264, 1274 with Sequence Flag = 0 or 2. See ICESat-2-MEB-SPEC-0875, section 5.12, SPACEWIRE: TIME TAG SCIENCE DATA FORMAT | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source photon events. (varies by detection; nominal value is sixty thousand per second, derived from laser_rate * photons_per_shot * beams_per_pce; where laser_rate=10000, photons_per_shot=3, beams_per_pce=2.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via L1B ATBD | The Time of Day for the specific Transmit (TX) pulse associated with the Received (RX) event. (see L1B ATBD section 5 time of flight), relative to 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. |
| pce_mframe_cnt (Chunked Dataset) | UINT_4_LE (:) | PCE Major frame counter (not_set) | counts Retained from latest a_alt_science packet | Major Frame ID - The major frame ID is read from the DFC and starts counting at DFC POR. The counter is used to identify individual major frames across diag and science packets. This counter can go for about 2.7 years before rolling over. It is in the first time tag science packet. Used as part of the photon ID |
| ph_id_channel (Chunked Dataset) | UINT_1_LE (:) | Receive channel id (not_set) | 1 Derived as part of Photon ID | Channel number assigned for each received photon event. This is part of the photon ID. Values range from 1 to 120 to span all channels and rise/fall edges. Values 1 to 60 are for falling edge; PCE1 (1 to 20), PCE 2 (21 to 40) and PCE3 (41 to 60). Values 61 to 120 are for rising edge; PCE1 (61 to 80), PCE 2 (81 to 100) and PC3 (101 to 120). |
| ph_id_count (Chunked Dataset) | UINT_1_LE (:) | photon event counter (not_set) | counts Derived as part of Photon ID | photon event counter is part of photon ID and will count from 1 for each channel until reset by laser pulse counter. If ph_id_count is 0, then there was a transmit pulse without any received photons. In this case, the transmit portion of the alt_science packet is valid, but the receive portion is all 0s and should not be used. |
| ph_id_pulse (Chunked Dataset) | UINT_1_LE (:) | laser pulse counter (not_set) | counts Derived as part of Photon ID | laser pulse counter is part of photon ID and will count from 1 to 200 and reset for each new major frame (major_fram_id). If the corresponding ph_id_count is 0, then there was a transmit pulse without any received photons. |
| ph_tof (Chunked Dataset) | DOUBLE (:) | Time of Flight (not_set) | seconds ATL02 ATBD | Time of flight (TOF); the round trip time in seconds of the received photon relative to the beam's zero range point (ZRP). Computed from the Transmit (Tx) and Receive (Rx) Time-of-flight components and then calibrated to the centroid of the transmit pulse. |
| rx_band_id (Chunked Dataset) | INTEGER_1 (:) | rx downlink band id (not_set) | counts ATL01/atlas/pcex/a_alt_science_ph RX data | Flag to indicate downlink band id associated with the received rx_tof (received photon event). A value of 0 indicates the photon corresponds to band1; A value of 1 indicates the photon corresponds to band2. Corresponding parameters are band_width, band_offset and band_eventcount. flag_values: 0, 1 flag_meanings : band1 band2 |
| tof_flag (Chunked Dataset) | INTEGER_1 (:) | TOF Flag (not_set) | counts L1B ATBD Sect 2.5.4 | Time Of Flight center correction flag. Values indicate what components were used to adjust the TOF to the centroid of the Tx pulse, based on the alignment of Tx components across all 3 PCEs. 1=LL_LU_TU_TL; 2=LL_TU_TL; 3=LL_LU_TL; 4=LL_LU_TU; 5=LL_TL; 6=LL_TU; 7=LL_LU; 8=LL. Values greater than 10 indicate the same sequence of conditions indicated for a potential TEP photon. flag_values: 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18 flag_meanings : LL_LU_TU_TL LL_TU_TL LL_LU_TL LL_LU_TU LL_TL LL_TU LL_LU LL TEP_LL_LU_TU_TL TEP_LL_TU_TL TEP_LL_LU_TL TEP_LL_LU_TU TEP_LL_TL TEP_LL_TU TEP_LL_LU TEP_LL |
| tx_ll_tof (Chunked Dataset) | FLOAT (:) | Transmit LL time from T0 | seconds ATL01/atlas/pcex/a_alt_science_ph TX data | Transmit (Tx) Leading Lower (LL) time of flight (TOF); the round trip time in seconds from the detected lower leading edge of the transmit pulse relative to the ATLAS T0. Includes all calibrations of coarse and fine counts. |

| | | | L1B ATBD section tof | |
|---|---|---|---|---|
| tx_other_tof<br>(Chunked Dataset) | FLOAT<br>(:) | Other Transmit Time from LL<br>(not_set) | seconds<br>ATL01/atlas/pcex/a_alt_science_ph TX data<br>L1B ATBD section tof | Time of flight from the PCE-specific leading-lower (LL) threshold (tx_ll_tof) to the detected other transmit pulse edge. For PCE1, this is the time from the PCE1 LL to the Transmit Leading Upper edge (LU) threshold; for PCE2, this is the time from the PCE2 LL to the Transmit Trailing Upper edge (TU) threshold; and for PCE3, this is the time from the PCE3 LL to the Transmit Trailing Lower edge (TL) threshold. |

**Group: /atlas/pcex/atmosphere_sw**

| Description | (Attribute) | Contains parameters relating to the PCE Atmospheric Data Histograms. Normally 25 hz. (APID 1255, 1259, 1265, 1269, 1275, 1279). P1 S,P1 W, P2 S, P2 W, P3 S, P3 W. | | |
|---|---|---|---|---|
| data_rate | (Attribute) | Data in this group is stored at a 25hz (25 per second) rate. | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| atm_bins<br>(Chunked Dataset) | UINT_2_LE<br>(467, :) | Atmospheric Science Histogram<br>(not_set) | counts<br>ATL01/atlas/pcex/a_atm_hist_x | The histogram bins for the Atmospheric beam.Once every 400 shots ( laser pulses). Bin 1 (clouds) is nearest to spacecraft .Bin 467 is under ground. |
| atm_rw_start<br>(Chunked Dataset) | FLOAT<br>(:) | Atmospheric Range Window Start<br>(not_set) | seconds<br>ATL01/atlas/pcex/a_atm_hist_x and L1B ATBD section ATM | The number of seconds between the transmit pulse and the start of the Atmospheric range window |
| atm_rw_width<br>(Chunked Dataset) | FLOAT<br>(:) | Atmospheric Range Window Width<br>(not_set) | seconds<br>ATL01/atlas/pcex/a_atm_hist_x and L1B ATBD section ATM | The number of seconds from the Atmospheric range window start and range window stop. |
| atm_shift_amount<br>(Chunked Dataset) | INTEGER_2<br>(:) | Atmospheric Range Window Shift<br>(not_set) | counts<br>ATL01/atlas/pcex/a_atm_hist_x and L1B ATBD section ATM | The number of bins the range window start of one of the histograms was shifted to align them before they are added together. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via L1B ATBD | The time of the first TX pulse in major frame, relative to 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. |
| ds_hist_bin_index<br>(Contiguous Dataset) | INTEGER_2<br>(467) | DS for ATM histogram bins<br>(not_set) | 1<br>not_set | Dimension scale for atmosphere histogram bins. |
| pce_mframe_cnt<br>(Chunked Dataset) | UINT_4_LE<br>(:) | PCE Major frame counter<br>(not_set) | counts<br>ATL01/atlas/pcex/a_atm_hist_x | Major Frame Counter - The major frame counter is read from the DFC and starts counting at DFC POR. The counter is used to identify individual major frames across diag and science packets. This counter can go for about 2.7 years before rolling over. It is in the first time tag science packet. Used as part of the photon ID |
| useflag<br>(Chunked Dataset) | UINT_1_LE<br>(:) | Science Mode Flag<br>(not_set) | counts<br>ATL01/atlas/pcex/a_alt_sci/ | Science Mode Flag. Used by ATL03 to discard non-science mode data. 0=stby, 1=science_mode, 2=test, 3=manual, 4=radio, 5=unknown, > 10=amcs_not_normal<br>flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15<br>flag_meanings : stby science test manual radio unknown unused unused unused unused stby_alt_amcs science_alt_amcs test_alt_amcs unknown_alt_amcs |

**Group: /atlas/pcex/background**

| Description | (Attribute) | The background data is specific to each beam and reported at a 50-shot rate. | | |
|---|---|---|---|---|
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source PCE Altimetric Data Packets. (nominally fifty per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| bg_cnt_50shot_s<br>(Chunked Dataset) | UINT_2_LE<br>(:) | Strong background counts<br>(not_set) | counts<br>ATL01/atlas/pcex/a_pmf_algorithm_science | ATLAS flight s/w indicates for the beam the # of counted time tags (BackgroundCounts_50Shot) during the range windows associated with a set of 50 laser pulses of the major frame. |
| bg_cnt_50shot_w<br>(Chunked Dataset) | UINT_2_LE<br>(:) | Weak background counts<br>(not_set) | counts<br>ATL01/atlas/pcex/a_pmf_algorithm_science | ATLAS flight s/w indicates for the beam the # of counted time tags (BackgroundCounts_50Shot) during the range windows associated with a set of 50 laser pulses of the major frame. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via L1B ATBD | The time of the first TX pulse in the 50 laser pulses used for background, in seconds relative to 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. |
| pce_mframe_cnt<br>(Chunked Dataset) | UINT_4_LE<br>(:) | PCE Major frame counter<br>(not_set) | counts<br>Derived | Major Frame ID - The major frame ID is read from the DFC and starts counting at DFC POR. The counter is used to identify individual major frames across diag and science packets. This counter can go for about 2.7 years before rolling over. It is in the first time tag science packet. Used as part of the photon ID |
| useflag | UINT_1_LE | Science Mode Flag | counts | Science Mode Flag. Used by ATL03 to discard non-science mode data. 0=stby, 1=science_mode, 2=test, 3=manual, |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Chunked Dataset) | (:) | (not_set) | ATL01/atlas/pcex/a_alt_sci/ | 4=radio, 5=unknown, > 10=amcs_not_normal<br>flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15<br>flag_meanings : stby science test manual radio unknown unused unused unused unused stby_alt_amcs science_alt_amcs test_alt_amcs unknown_alt_amcs |

**Group: /atlas/pcex/tep**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Group contains the PCE TEP (transmit Echo Path) Data. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source photon events. (varies by detection; nominal value is sixty thousand per second, derived from laser_rate * photons_per_shot * beams_per_pce; where laser_rate=10000, photons_per_shot=3, beams_per_pce=2.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via L1B ATBD | The Time of Day associated with the Transmit (TX) pulse, relative to 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. |
| pce_mframe_cnt (Chunked Dataset) | UINT_4_LE (:) | PCE Major frame counter (not_set) | counts Retained from prior a_alt_science_ph packet | The major frame counter is read from the digital flow controller in a given PCE card. The counter identifies individual major frames across diag and science packets. Used as part of the photon ID. |
| ph_id_channel (Chunked Dataset) | UINT_1_LE (:) | Receive channel id (not_set) | 1 Derived as part of Photon ID | Channel number assigned for each received photon event. This is part of the photon ID. Values range from 1 to 120 to span all channels and rise/fall edges. Values 1 to 60 are for falling edge; PCE1 (1 to 20), PCE 2 (21 to 40) and PCE3 (41 to 60). Values 61 to 120 are for rising edge; PCE1 (61 to 80), PCE 2 (81 to 100) and PC3 (101 to 120). |
| ph_id_count (Chunked Dataset) | INTEGER_1 (:) | photon event counter (not_set) | counts Derived as part of Photon ID | The photon event counter is part of photon ID and counts from 1 for each channel until reset by laser pulse counter. |
| ph_id_pulse (Chunked Dataset) | UINT_1_LE (:) | laser pulse counter (not_set) | counts Derived as part of Photon ID | The laser pulse counter is part of photon ID and counts from 1 to 200 and is reset for each new major frame. |
| rx_band_id (Chunked Dataset) | UINT_1_LE (:) | rx downlink band id (not_set) | counts ATL01/atlas/pcex/a_alt_science_ph RX data | Flag to indicate downlink band id associated with the received time tag. Note that in order to reconstruct the event time tag, the 10-bit offset even coarse value must be added to the specified downlink band offset relating to that time tag. |
| rx_channel_id (Chunked Dataset) | UINT_1_LE (:) | receive PCE channel id (not_set) | counts ATL01/atlas/pcex/a_alt_science_ph RX data | channel number that Received photon event (as from Telemetry) |
| tep_pulse_num (Chunked Dataset) | UINT_1_LE (:) | TEP Pulse Number (not_set) | counts Derived as part of TEP Detection | The number of laser pulses from the TEP laser pulse to the laser pulse for which ATLAS is currently receiving non-TEP photons. |
| tof_tep (Chunked Dataset) | DOUBLE (:) | TEP Time of Flight (not_set) | seconds ATL01/atlas/pcex/a_alt_science_ph RX data L1B ATBD section tof | Transmit Echo Pulse (TEP) Time of flight (TOF); the round trip time in seconds of the TEP photon relative to the beam's zero range point (ZRP., Computed from the Transmit (Tx) pulse of the TEP and Receive (Rx) Time-of-flight components; then calibrated to the centroid of the transmit pulse. |
| tx_ll_tof_tep (Chunked Dataset) | FLOAT (:) | TEP Transmit time from T0 (not_set) | seconds ATL01/atlas/pcex/a_alt_science_ph TX data L1B ATBD section tof | Transmit Echo Pulse (TEP) Transmit (Tx) Leading Lower (LL) time of flight (TOF); the round trip time in seconds of the detected lower leading edge of the TEP transmit pulse relative to the ATLAS T0; includes all calibrations of coarse and fine counts. Associated with the pulse from which the TEP originates (offset identified by tep_pulse_num.) |
| tx_other_tof_tep (Chunked Dataset) | FLOAT (:) | Other TEP Transmit Time from LL (not_set) | seconds ATL01/atlas/pcex/a_alt_science_ph TX data L1B ATBD section tof | Transmit Echo Pulse (TEP) Time of flight from the PCE-specific leading-lower (LL) threshold (tep_ll_tof) to the detected TEP other transmit pulse edge. For PCE1, this is the time from the PCE1 (beam 5) LL to the Transmit Leading Upper edge (LU) threshold; for PCE2 (beam 3), this is the time from the PCE2 LL to the Transmit Trailing Upper edge (TU) threshold. Associated with the pulse from which the TEP originates (offset identified by tep_pulse_num.) |

**Group: /atlas/tx_pulse_width**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters to characterize the ATLAS pulse shape, derived from the Start Pulse Detector data. | | |
| data_rate | (Attribute) | Parameters in this group are stored at the ATLAS shot rate. | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Operations | Elapsed seconds since the ATLAS SDP GPS Epoch, associated with the transmit time where data from all 3 PCEs are present and aligned. 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. |
| tx_pulse_skew_est (Chunked Dataset) | FLOAT (:) | Transmit Pulse Skew Estimate (not_set) | seconds ATL02 ATBD, Section 7.2 | The difference between the averages of the lower and upper threshold crossing times. This is an estimate of the transmit pulse skew. |
| tx_pulse_width_lower (Chunked Dataset) | FLOAT (:) | Transmit Pulse Energy Lower Width (not_set) | seconds ATL03 ATBD | The distance between the lower threshold crossing times measured by the Start Pulse Detector. Only present when data from all 3 PCEs are available and aligned. |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| tx_pulse_width_upper (Chunked Dataset) | FLOAT (:) | Transmit Pulse Energy Upper Width (not_set) | seconds ATL03 ATBD | The distance between the upper threshold crossing times measured by the Start Pulse Detector. Only present when data from all 3 PCEs are available and aligned. |

**Group: /gpsr**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to the GPS Receiver. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source GPS Receiver Data Packets. (nominally one per second.) | | |

**Group: /gpsr/carrier_amplitude**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to Carrier Amplitude Data Record (CADR). | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| antenna_id (Chunked Dataset) | INTEGER_1 (16, :) | CADR Antenna Identifier (not_set) | 1 ATL01/sc3/gpsr/carrier_amplitude | Carrier Amplitude Data Record (CADR) - Antenna Identifier. 0 = First Antenna 1 = Second Antenna (invalid for present receiver) All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. flag_values: 0, 1 flag_meanings : first_antenna second_antenna |
| carrier_amp (Chunked Dataset) | FLOAT (16, :) | CADR Carrier Amplitude (not_set) | dB ATL01/sc3/gpsr/carrier_amplitude converted | Carrier Amplitude Data Record (CADR) - Carrier Amplitude - Multiple Frequency Processing. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| channel_num (Chunked Dataset) | INTEGER_1 (16, :) | CADR Channel Number (not_set) | counts ATL01/sc3/gpsr/carrier_amplitude | Carrier Amplitude Data Record (CADR) - Channel Number. 0 to 23; All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| constell_id (Chunked Dataset) | INTEGER_1 (16, :) | CADR Constellation ID (not_set) | counts ATL01/sc3/gpsr/carrier_amplitude | Carrier Amplitude Data Record (CADR) - Constellation ID - Single Frequency Channel 1-24 (0 = GPS Constellation; All other values invalid). Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| ds_16_slots (Contiguous Dataset) | INTEGER_1 (16) | DS for 16 slots (not_set) | 1 not_set | Dimension scale representing each of the 16 slots. |
| noise_ratio (Chunked Dataset) | FLOAT (16, :) | CADR Carrier to Noise Power Density Ratio (not_set) | dBHz ATL01/sc3/gpsr/carrier_amplitude converted | Carrier Amplitude Data Record (CADR) - Carrier to Noise Power Density Ratio. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| num_valid_slots (Chunked Dataset) | INTEGER_1 (:) | Number of slots filled (not_set) | counts STE_STOHx ?? | Number of the 16 available slots filled by telemetry. Data values after the number of valid slots are filled with 0. Note: Valid data records will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 16, then the remaining unused data fields within the arrays will be zero-filled. |
| signal_type (Chunked Dataset) | INTEGER_1 (16, :) | CADR GPS Signal Type (not_set) | 1 ATL01/sc3/gpsr/carrier_amplitude | Carrier Amplitude Data Record (CADR) - GPS Signal Type. 0 = GPS L1 C/A 1 = GPS L1 P 2 = GPS L2 C/A (N/A for present receiver) 3 = GPS L2 P 4 = GPS L2 CM 5 = GPS L2 CL (N/A for present receiver) 6 = No signal processing on this channel All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. flag_values: 0, 1, 2, 3, 4, 5, 6 flag_meanings : gps_l1a_ca gps_l1_p gps_l2_ca gps_l2_p gps_l2_cm gps_l2_cl no_signal_processing |
| sv_id (Chunked Dataset) | INTEGER_1 (16, :) | CADR Space Vehicle ID (not_set) | counts ATL01/sc3/gpsr/carrier_amplitude | Carrier Amplitude Data Record (CADR) - Space Vehicle ID. (0 = No signal acquisition or tracking; 1-32 = GPS SVs. All other values invalid). Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |

**Group: /gpsr/carrier_phase**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to the GPSR Carrier Phase Data Record (CrPDR). | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| antenna_id | INTEGER_1 | CRPDR Antenna | 1 | Carrier Phase Data Record (CrPDR) - Antenna Identifier. 0 = First Antenna 1 = Second Antenna (invalid for present |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Chunked Dataset) | (24, :) | Identifier (not_set) | ATL01/sc3/gpsr/carrier_phase | receiver) All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. flag_values: 0, 1 flag_meanings : first_antenna second_antenna |
| carrier_c_fract (Chunked Dataset) | FLOAT (24, :) | CRPDR Carrier Cycle Fraction (not_set) | degrees ATL01/sc3/gpsr/carrier_phase converted | Carrier Phase Data Record (CrPDR) - Carrier Cycle Fraction - Fraction corresponding to 360 degrees divided by 4096. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| carrier_c_int (Chunked Dataset) | INTEGER_8 (24, :) | CRPDR Integer Carrier Cycle Counter (not_set) | counts ATL01/sc3/gpsr/carrier_phase | Carrier Phase Data Record (CrPDR) - Integer Carrier Cycle Counter - Note: At the beginning of each track the integer carrier cycle count starts with 0. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| channel_num (Chunked Dataset) | INTEGER_1 (24, :) | CRPDR Channel Number (not_set) | counts ATL01/sc3/gpsr/carrier_phase | Carrier Phase Data Record (CrPDR) - Channel Number. 0 to 23; All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| constell_id (Chunked Dataset) | INTEGER_1 (24, :) | CRPDR Constellation ID (not_set) | counts ATL01/sc3/gpsr/carrier_phase | Carrier Phase Data Record (CrPDR) - Constellation ID - Single Frequency Channel 1-24 (0 = GPS Constellation; All other values invalid). Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| delta_range (Chunked Dataset) | DOUBLE (24, :) | CRPDR Delta Range (not_set) | meters/second ATL01/sc3/gpsr/carrier_phase converted | Carrier Phase Data Record (CrPDR) - Delta Range. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. 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. |
| deter_f (Chunked Dataset) | INTEGER_1 (24, :) | CRPDR Deterioration Flag (not_set) | 1 ATL01/sc3/gpsr/carrier_phase | Carrier Phase Data Record (CrPDR) - Deterioration Flag. 0= Carrier Loop Lock Steady 1 = Carrier Loop Lock Unsteady (Measurement data may be deteriorated). Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. flag_values: 0, 1 flag_meanings : steady unsteady |
| ds_24_slots (Contiguous Dataset) | INTEGER_1 (24) | DS for 24 slots (not_set) | 1 not_set | Dimension scale representing each of the 24 slots. |
| num_valid_slots (Chunked Dataset) | INTEGER_1 (:) | Number of slots filled (not_set) | counts STE_STOHx ?? | Number of the 24 available slots filled by telemetry. Data values after the number of valid slots are filled with 0. Note: Valid data records will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused data fields within the arrays will be zero-filled. |
| signal_type (Chunked Dataset) | INTEGER_1 (24, :) | CRPDR GPS Signal Type (not_set) | 1 ATL01/sc3/gpsr/carrier_phase | Carrier Phase Data Record (CrPDR) - GPS Signal Type. 0 = GPS L1 C/A 1 = GPS L1 P 2 = GPS L2 C/A (N/A for present receiver) 3 = GPS L2 P 4 = GPS L2 CM 5 = GPS L2 CL (N/A for present receiver) 6 = No signal processing on this channel All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. flag_values: 0, 1, 2, 3, 4, 5, 6 flag_meanings : gps_l1a_ca gps_l1_p gps_l2_ca gps_l2_p gps_l2_cm gps_l2_cl no_signal_processing |
| sv_id (Chunked Dataset) | INTEGER_1 (24, :) | CRPDR Space Vehicle ID (not_set) | counts ATL01/sc3/gpsr/carrier_phase | Carrier Phase Data Record (CrPDR) - Space Vehicle ID. (0 = No signal acquisition or tracking; 1-32 = GPS SVs. All other values invalid). Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |

**Group: /gpsr/channel_status**

| Description | (Attribute) | Contains parameters related to Channel Status record (CSR). | | |
|---|---|---|---|---|
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| antenna_id (Chunked Dataset) | INTEGER_1 (24, :) | CSR Antenna Identifier (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Antenna Identifier. 0 = First Antenna 1 = Second Antenna (invalid for present receiver) All other values invalid. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : first_antenna second_antenna |
| carrier_loop_bw | INTEGER_1 | CSR Carrier Loop | counts | Channel Status Record (CSR) - Index of actual carrier loop bandwidth setting - Single Frequency Channel 1-24 Value = 0; |

| | | | | |
|---|---|---|---|---|
| (Chunked Dataset) | (24, :) | Bandwidth (not_set) | ATL01/sc4/gpsr/channel_status | Multiple Settings are not applicable for this parameter type. All other values invalid. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. |
| carrier_loop_bw_ff (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Loop Bandwidth Final Flag (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Carrier Loop Bandwidth (CrLB) Final Flag (FF) - Single Frequency Channel 1-24. 0 = Carrier loop bandwidth not final, 1 = Final carrier bandwidth time applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : not_final applied |
| carrier_loop_disc_ff (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Loop Discriminator Final Flag (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Carrier Loop Discriminator (CrLD) Final Flag (FF) - Single Frequency Channel 1-24. 0 = Carrier loop discriminator not final, 1 = Final carrier loop discriminator applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : not_final applied |
| carrier_loop_int_t (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Loop Int Time (not_set) | counts ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Index of actual carrier loop integration time setting - Single Frequency Channel 1-24. Value = 0; Multiple Settings are not applicable for this parameter type. All other values invalid. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. |
| carrier_loop_int_t_ff (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Loop Int Time Final Flag (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Carrier Loop Int Time (CrLIT) Final Flag (FF) - Single Frequency Channel 1-24. 0 = Carrier loop integration time not final, 1 = Final carrier loop integration time applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : not_final applied |
| carrier_loop_lock (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Loop Lock (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Carrier Loop Lock (CrLL) - Single Frequency Channel 1-24. 0 = Not locked, 1 = Locked. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : not_locked locked |
| carrier_loop_mode (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Loop Mode (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Carrier Loop Mode) - Single Frequency Channel 1-24. 0 = No carrier loop activities; 1 = Carrier acquisition ongoing; 2 = Carrier tracking ongoing; 3 = Carrier acquisition error. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1, 2, 3 flag_meanings : no_activities acquisition tracking acq_error |
| carrier_loop_thres_ff (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Loop Threshold Final Flag (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Carrier Loop Threshold (CrLT) Final Flag (FF) - Single Frequency Channel 1-24. 0 = Carrier loop threshold not final, 1 = Final carrier loop threshold applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : not_final applied |
| carrier_ph_deter (Chunked Dataset) | INTEGER_1 (24, :) | CSR Carrier Phase Deterioration (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Carrier Phase Deterioration; 0 = No deterioration, 1 = Measurement quality deterioration. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : no_deterioration deterioration |
| channel_num (Chunked Dataset) | INTEGER_1 (24, :) | CSR Channel Number (not_set) | counts ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Channel Number. 0 to 23; All other values invalid. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. |
| code_loop_bw (Chunked Dataset) | INTEGER_1 (24, :) | CSR Code Loop Bandwidth (not_set) | counts ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Index of actual code loop bandwidth setting - Single Frequency Channel 1-24, Value = 0; Multiple Settings are not applicable for this parameter type. All other values invalid |
| code_loop_bw_ff (Chunked Dataset) | INTEGER_1 (24, :) | CSR Code Loop Bandwidth Final Flag (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Code Loop Bandwidth (CdLB) Final Flag (FF) - Single Frequency Channel 1-24. 0 = Code loop bandwidth not final, 1 = Final code bandwidth time applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : not_final applied |
| code_loop_corr_ff (Chunked Dataset) | INTEGER_1 (24, :) | CSR Code Loop Correlator Spacing Final Flag (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Code Loop Correlator Spacing (CdLCS) Final Flag (FF) - Single Frequency Channel 1-24. 0 = Code loop correlator not final, 1 = Final code loop correlator applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 flag_meanings : not_final applied |
| code_loop_int_t (Chunked Dataset) | INTEGER_1 (24, :) | CSR Code Loop Int Time (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Index of actual code loop integration time setting - Single Frequency Channel 1-24. Value = 0; Multiple Settings are not applicable for this parameter type. All other values invalid. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. |
| code_loop_int_t_ff (Chunked Dataset) | INTEGER_1 (24, :) | CSR Code Loop Int Time Final Flag (not_set) | 1 ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Code Loop Int Time Final (CdLIT) Flag (FF) - Single Frequency Channel 1-24. 0 = Code loop integration time not final, 1 = Final code loop integration time applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. flag_values: 0, 1 |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| | | | | flag_meanings : not_final applied |
| code_loop_lock<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR Code Loop Lock<br>(not_set) | 1<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Code Loop Lock (CdLL) - Single Frequency Channel 1-24. 0 = Not locked, 1 = Locked. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled.<br>flag_values: 0, 1<br>flag_meanings : not_locked locked |
| code_loop_mode<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR Code Loop Mode<br>(not_set) | 1<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Code Loop Mode - Single Frequency Channel 1-24. 0 = No code loop activities, 1 = Code acquisition ongoing, 2 = Code tracking ongoing, 3 = Code acquisition error. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled.<br>flag_values: 0, 1, 2, 3<br>flag_meanings : no_activities acquisition tracking acq_error |
| code_loop_thres_ff<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR Code Loop Threshold Final Flag<br>(not_set) | 1<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Code Loop Threshold (CdLT) Final Flag (FF) - Single Frequency Channel 1-24. 0 = Code loop threshold not final, 1 = Final code loop threshold applied. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled.<br>flag_values: 0, 1<br>flag_meanings : not_final applied |
| code_phase_deter<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR Code Phase Deterioration<br>(not_set) | 1<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Code Phase Deterioration (CdPD) - Single Frequency Channel 1-24. 0 = No deterioration, 1 = Measurement quality deterioration. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled.<br>flag_values: 0, 1<br>flag_meanings : no_deterioration deterioration |
| constell_id<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR Constellation ID<br>(not_set) | counts<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Constellation ID - Single Frequency Channel 1-24 (0 = GPS Constellation; All other values invalid). Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| ds_24_slots<br>(Contiguous Dataset) | INTEGER_1<br>(24) | DS for 24 slots<br>(not_set) | 1<br>not_set | Dimension scale representing each of the 24 slots. |
| logical_track_state<br>(Chunked Dataset) | UINT_1_LE<br>(24, :) | CSR Logical Tracking State<br>(not_set) | counts<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Logical Tracking State - Single Frequency Channel 1-24. See Appendix C within DN-ICESAT2-SYS-024 for enumerated values. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. |
| nav_d_sync<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR Navigation Data Sync Status<br>(not_set) | 1<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Navigation Data Sync Status - Single Frequency Channel 1-24. 0 = Nav Data Not Synchronized, 1 = Nav Data Synchronized, Data Stream Not Inverted, 3 = Nav Data Synchronized, Data Stream Inverted. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled.<br>flag_values: 0, 1, 3<br>flag_meanings : not_synced synced_not_inverted synced_inverted |
| num_valid_slots<br>(Chunked Dataset) | INTEGER_1<br>(:) | Number of slots filled<br>(not_set) | counts<br>STE_STOHx | Number of the 24 available slots filled by telemetry. Data values after the number of valid slots are filled with 0. Note: Valid data records will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused data fields within the arrays will be zero-filled. |
| signal_type<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR GPS Signal Type<br>(not_set) | 1<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - GPS Signal Type. 0 = GPS L1 C/A 1 = GPS L1 P 2 = GPS L2 C/A (N/A for present receiver) 3 = GPS L2 P 4 = GPS L2 CM 5 = GPS L2 CL (N/A for present receiver) 6 = No signal processing on this channel All other values invalid. Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled.<br>flag_values: 0, 1, 2, 3, 4, 5, 6<br>flag_meanings : gps_l1a_ca gps_l1_p gps_l2_ca gps_l2_p gps_l2_cm gps_l2_cl no_signal_processing |
| sv_id<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CSR Space Vehicle ID<br>(not_set) | counts<br>ATL01/sc4/gpsr/channel_status | Channel Status Record (CSR) - Space Vehicle ID. (0 = No signal acquisition or tracking; 1-32 = GPS SVs. All other values invalid). Note: num_valid_slots indicate the number of channel that actual valid to use. the remaining unused data fields are zero-filled. |
| **Group: /gpsr/code_phase** | | | | |
| Description | (Attribute) | Contains parameters related to Code Phase Data Record (CdPDR). | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| antenna_id<br>(Chunked Dataset) | INTEGER_1<br>(24, :) | CDPDR Antenna Identifier<br>(not_set) | 1<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - Antenna Identifier. 0 = First Antenna 1 = Second Antenna (invalid for present receiver) All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| | | | | packet will be zero-filled.<br>flag_values: 0, 1<br>flag_meanings : first_antenna second_antenna |
| channel_num (Chunked Dataset) | INTEGER_1 (24, :) | CDPDR Channel Number (not_set) | counts<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - Channel Number. 0 to 23; All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| code_chip_count (Chunked Dataset) | UINT_8_LE (24, :) | CDPDR Chip Count (not_set) | counts<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - Number of Code Chips Since Start of GPS Week. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| code_chip_fract (Chunked Dataset) | FLOAT (24, :) | CDPDR Fractional Chip Count (not_set) | counts<br>ATL01/sc3/gpsr/code_phase converted | Code Phase Data Record (CdPDR) - Fractional Portion of Number of Code Chips Since Start of GPS Week. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| constell_id (Chunked Dataset) | INTEGER_1 (24, :) | CDPDR Constellation ID (not_set) | counts<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - Constellation ID - Single Frequency Channel 1-24 (0 = GPS Constellation; All other values invalid). Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. 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. |
| deter_f (Chunked Dataset) | INTEGER_1 (24, :) | CDPDR Deterioration Flag (not_set) | 1<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - Deterioration Flag. 0= Carrier Loop Lock Steady 1 = Carrier Loop Lock Unsteady (Measurement data may be deteriorated). Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled.<br>flag_values: 0, 1<br>flag_meanings : steady unsteady |
| ds_24_slots (Contiguous Dataset) | INTEGER_1 (24) | DS for 24 slots (not_set) | 1<br>not_set | Dimension scale representing each of the 24 slots. |
| num_valid_slots (Chunked Dataset) | INTEGER_1 (:) | Number of slots filled (not_set) | counts<br>STE_STOHx ?? | Number of the 24 available slots filled by telemetry. Data values after the number of valid slots are filled with 0. Note: Valid data records will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused data fields within the arrays will be zero-filled. |
| signal_type (Chunked Dataset) | INTEGER_1 (24, :) | CDPDR GPS Signal Type (not_set) | 1<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - GPS Signal Type. 0 = GPS L1 C/A 1 = GPS L1 P 2 = GPS L2 C/A (N/A for present receiver) 3 = GPS L2 P 4 = GPS L2 CM 5 = GPS L2 CL (N/A for present receiver) 6 = No signal processing on this channel All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled.<br>flag_values: 0, 1, 2, 3, 4, 5, 6<br>flag_meanings : gps_l1a_ca gps_l1_p gps_l2_ca gps_l2_p gps_l2_cm gps_l2_cl no_signal_processing |
| smooth_flg (Chunked Dataset) | INTEGER_1 (24, :) | CDPDR Smoothing Flag (not_set) | 1<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - Smoothing Flag. 0 = Smoothing Not Applied 1 = Carrier phase-based smoothing applied for the reported code phase. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled.<br>flag_values: 0, 1<br>flag_meanings : not_applied applied |
| sv_id (Chunked Dataset) | INTEGER_1 (24, :) | CDPDR Space Vehicle ID (not_set) | counts<br>ATL01/sc3/gpsr/code_phase | Code Phase Data Record (CdPDR) - Space Vehicle ID. (0 = No signal acquisition or tracking; 1-32 = GPS SVs. All other values invalid. Note: Valid data records (num_valid_slots) will only be included for the amount of SFCs being tracked by the GPSR. If the tracked SFCs < 24, then the remaining unused CSR data fields within the ancillary packet will be zero-filled. |
| **Group: /gpsr/hk** | | | | |
| Description | (Attribute) | Contains parameters related to GPSR housekeeping. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| clock_source (Chunked Dataset) | INTEGER_1 (:) | HK Clock Source (not_set) | 1<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Clock Source<br>flag_values: 0, 1<br>flag_meanings : internal_clock value_invalid |
| cpu_processor_load (Chunked Dataset) | UINT_2_LE (:) | HK CPU Processor Load (not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - CPU Load of most recent PPS interval |

| dc_data_error<br>(Chunked Dataset) | UINT_1_LE<br>(:) | HK Data Cache Data<br>Error Counter<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Data Cache Data Error Counter |
|---|---|---|---|---|
| dc_tag_error<br>(Chunked Dataset) | UINT_1_LE<br>(:) | HK Data Cache Tag<br>Error Counter<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Data Cache Tag Error Counter |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. 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. |
| discarded_tc_packets<br>(Chunked Dataset) | UINT_1_LE<br>(:) | HK Discarded TC<br>Packet Counter<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Number of TC packets discarded since start of GPSR (wrapping counter). |
| discarded_tm_packets<br>(Chunked Dataset) | UINT_1_LE<br>(:) | HK Discarded TM<br>Packet Counter<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Number of TM packets discarded since start of GPSR (wrapping counter). |
| edac_double_bit_error<br>(Chunked Dataset) | INTEGER_1<br>(:) | HK MilBus I/F EDAC<br>Double Bit Error<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - MilBus I/F EDAC Double Bit Error |
| edac_single_bit_error<br>(Chunked Dataset) | UINT_1_LE<br>(:) | HK MilBus I/F EDAC<br>Single Bit Error<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - MilBus I/F EDAC Single Bit Error |
| front_end_t<br>(Chunked Dataset) | UINT_1_LE<br>(:) | DFH Front End<br>Temperature<br>(not_set) | counts<br>GPSR_DFH | GPSR Data Field Header - R/F Front End Temperature (raw counts; not EU-converted) |
| ic_data_error<br>(Chunked Dataset) | UINT_1_LE<br>(:) | HK Instr Cache Data<br>Error Counter<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Instr Cache Data Error Counter |
| ic_tag_error<br>(Chunked Dataset) | UINT_1_LE<br>(:) | HK Instr Cache Tag<br>Error Counter<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Instr Cache Tag Error Counter |
| memory_dump_status<br>(Chunked Dataset) | UINT_2_LE<br>(:) | HK Memory Dump<br>Status<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Number of TM packets to be generated until the current Memory Dump is finished |
| n_sv_w_all<br>(Chunked Dataset) | INTEGER_1<br>(:) | HK Number of Tracked<br>SVs w All Components<br>in Tracking State<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - GNSS satellites being tracked with all signal components in final tracking state at the most recent PPS |
| n_svs_acquired<br>(Chunked Dataset) | INTEGER_1<br>(:) | HK Number of SVs<br>Being Acquired<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - GNSS satellites being acquired at the most recent PPS, i.e. channels with Multi-Frequency Tracking state 2...4 |
| n_svs_used<br>(Chunked Dataset) | INTEGER_1<br>(:) | HK Number of SVs<br>Used for PVT<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - GNSS satellites being used for PVT at the PPS before the most recent PPS |
| n_svs_wo_all<br>(Chunked Dataset) | INTEGER_1<br>(:) | HK Number of Tracked<br>SVs w/o All<br>Components in<br>Tracking State<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - GNSS satellites being tracked with not all signal components in a final tracking state at the most recent PPS, i.e. channels with Multi-Frequency Tracking state 5...10 (L1 C/A & P(Y)) or Multi-Frequency Tracking state 5...7 (L1 C/A & L2 CM) |
| nsm<br>(Chunked Dataset) | INTEGER_1<br>(:) | GPSR Navigation<br>Solution Method (NSM)<br>(not_set) | 1<br>ATL01/sc4/gpsr/hk | GPSR - Navigation Solution Method. 1 = Propagated; 2 = Cold Start - First Nav Fix; 3 = Cold Start - Least Squares Method w/ no GDOP Optimization; 4 = Least Squares Method w/ all Visible SVs; 5 = Kalman Filter Method (Normal Operation); 7 = Invalid Navigation Solution. All other values are invalid.<br>flag_values: 0, 1, 2, 3, 4, 5, 7<br>flag_meanings : unknown propagated cold_first_nav cold_lsq_no_gdop lsqm_w_svs normal_kalman invalid_solution |
| prom_edac_status<br>(Chunked Dataset) | INTEGER_1<br>(:) | HK PROM EDAC<br>Status<br>(not_set) | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - PROM EDAC Single bit or uncorrectable error<br>flag_values: 0, 1<br>flag_meanings : no_error_detected error_detected |
| protocol_selection_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | HK MilBus Protocol<br>Selection Flag | counts<br>ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - MilBus Protocol Selection Flag |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| | | | (not_set) | |
| register_file_errors (Chunked Dataset) | INTEGER_1 (:) | HK Corrected Register File Errors (not_set) | 1 ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Corrected Register File Errors flag_values: 0, 1 flag_meanings : no_error_detected error_detected |
| sram_edac_status (Chunked Dataset) | INTEGER_1 (:) | HK SRAM EDAC Status (not_set) | 1 ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - SRAM EDAC Single bit error flag_values: 0, 1 flag_meanings : no_error_detected error_detected |
| transient_protocol_errors (Chunked Dataset) | UINT_2_LE (:) | HK MilBus Transient Protocol Error Count (not_set) | counts ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - MilBus Transient Protocol Error Count |
| transmit_buffer_occupancy (Chunked Dataset) | UINT_2_LE (:) | HK Transmit Buffer Occupancy (not_set) | counts ATL01/sc4/gpsr/hk | Housekeeping Parameter Report (HK) - Number of bytes buffered for transmission |
| **Group: /gpsr/navigation** | | | | |
| Description | (Attribute) | Contains parameters related to navigation solution. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| clock_freq_error (Chunked Dataset) | INTEGER_4 (:) | NAV Receiver Clock Frequency Error (not_set) | seconds ATL01/sc4/gpsr/navigation | Navigation Solution Data Record (NAV) - Receiver Clock Frequency Error |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. 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. |
| gdop (Chunked Dataset) | FLOAT (:) | NAV Geometric Dilution of Precision (not_set) | meters ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Geometric Dilution of Precision (Values greater than 655.34 m are saturated to 655.34 m.) |
| gnss_time_error (Chunked Dataset) | FLOAT (:) | NAV GNSS System Time Error (not_set) | seconds ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - GNSS System Time Error |
| gps_time_sec (Chunked Dataset) | UINT_4_LE (:) | TCDR GPS Time (Seconds) (not_set) | seconds ATL01/sc4/gpsr/navigation | Time Correlation Data Record (TCDR) - GPS Time (GPST) representation of the synchronization time stamp. Total seconds elapsed since GPS epoch (6-Jan-1980 00:00:00) starting with 0. (Same data that is provided to ATLAS in RT) |
| gps_time_subsec (Chunked Dataset) | UINT_4_LE (:) | TCDR GPS Time (Subseconds) (not_set) | 1/4294967296 seconds ATL01/sc4/gpsr/navigation | Time Correlation Data Record (TCDR) - Subseconds portion of the GPS Time (GPST) representation of the synchronization time stamp. Total seconds elapsed since GPS epoch (6-Jan-1980 00:00:00) starting with 0. (Same data that is provided to ATLAS in RT) |
| h_ell (Chunked Dataset) | DOUBLE (:) | NAV Height Above Reference Ellipsoid (WGS84) (not_set) | meters ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Height Above Reference Ellipsoid (WGS84) |
| latitude (Chunked Dataset) | DOUBLE (:) | NAV Latitude (WGS84) (not_set) | degrees_north ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Latitude (WGS84) |
| longitude (Chunked Dataset) | DOUBLE (:) | NAV Longitude (WGS84) (not_set) | degrees_east ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Longitude (WGS84) |
| max_curve_fit (Chunked Dataset) | INTEGER_1 (:) | NAV Maximum Curve Fit (not_set) | 1 ATL01/sc4/gpsr/navigation | Navigation Solution Data Record (NAV) - Maximum Curve Fit interval taken from all SVs used in current navigation solution flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 15 flag_meanings : 4h 6h 8h 14h 26h 50h 74h 98h 122h 146h no_curve_fit |
| max_ura (Chunked Dataset) | INTEGER_1 (:) | NAV Maximum User Range Accuracy (URA) (not_set) | counts ATL01/sc4/gpsr/navigation | Navigation Solution Data Record (NAV) - Maximum User Range Accuracy (-16 means that no URA is available) |
| n_svs (Chunked Dataset) | INTEGER_1 (:) | NAV Number of SVs in Solution (not_set) | counts ATL01/sc4/gpsr/navigation | Navigation Solution Data Record (NAV) - The number of SVs the receiver was able to use for the Navigation Solution computation, i.e. SVs for which code and carrier phase measurements and Ephemeris data were available |
| nsm | INTEGER_1 | GPSR Navigation | 1 | GPSR - Navigation Solution Method. 1 = Propagated 2 = Cold Start - First Nav Fix 3 = Cold Start - Least Squares Method |

| | | | | |
|---|---|---|---|---|
| (Chunked Dataset) | (:) | Solution Method (NSM)<br>(not_set) | ATL01/sc4/gpsr/navigation | w/ no GDOP Optimization 4 = Least Squares Method w/ all Visible SVs 5 = Kalman Filter Method (Normal Operation) 7 = Invalid Navigation Solution All other values invalid<br>flag_values: 1, 2, 3, 4, 5, 7<br>flag_meanings : propagated cold_lsq_no_gdop lsqm_w_svs normal_kalman invalid_solution |
| pdop<br>(Chunked Dataset) | FLOAT<br>(:) | NAV Position Dilution of Precision<br>(not_set) | counts<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Position Dilution of Precision. Values greater than 655.34 are saturated to 655.34; Value set to 655.35 when NSM = 1 or in the case NSM = 5 with fewer than 4 SVs available. |
| position_error_x<br>(Chunked Dataset) | FLOAT<br>(:) | NAV Position Error X<br>(not_set) | meters<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated X position error |
| position_error_y<br>(Chunked Dataset) | FLOAT<br>(:) | NAV Position Error Y<br>(not_set) | meters<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Y position error |
| position_error_z<br>(Chunked Dataset) | FLOAT<br>(:) | NAV Position Error Z<br>(not_set) | meters<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Z position error |
| position_qa<br>(Chunked Dataset) | INTEGER_2<br>(:) | NAV Time Quality Index<br>(not_set) | seconds<br>ATL01/sc4/gpsr/navigation | Navigation Solution Data Record (NAV) - Time Quality Index; Values greater than 4095 ns are saturated to 4095 ns. |
| position_x<br>(Chunked Dataset) | DOUBLE<br>(:) | NAV Position X (WGS84)<br>(not_set) | meters<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated X position of the platform reference point according to the Navigation Solution Method (NSM) at the point in time of GPST (WGS84) |
| position_y<br>(Chunked Dataset) | DOUBLE<br>(:) | NAV Position Y (WGS84)<br>(not_set) | meters<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Y position of the platform reference point according to the Navigation Solution Method (NSM) at the point in time of GPST (WGS84) |
| position_z<br>(Chunked Dataset) | DOUBLE<br>(:) | NAV Position Z (WGS84)<br>(not_set) | meters<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Z position of the platform reference point according to the Navigation Solution Method (NSM) at the point in time of GPST (WGS84) |
| tdop<br>(Chunked Dataset) | FLOAT<br>(:) | GPSR Time Dilution of Precision<br>(not_set) | meters<br>ATL01/sc4/gpsr/navigation converted | GPSR - Time Dilution of Precision. Values greater than 655.34 are saturated to 655.34; Value set to 655.35 when NSM = 1 or in the case NSM = 5 with fewer than 4 SVs available. |
| velocity_error_x<br>(Chunked Dataset) | FLOAT<br>(:) | NAV Velocity Error X<br>(not_set) | meters/second<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated X velocity error |
| velocity_error_y<br>(Chunked Dataset) | FLOAT<br>(:) | NAV Velocity Error Y<br>(not_set) | meters/second<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Y velocity error |
| velocity_error_z<br>(Chunked Dataset) | FLOAT<br>(:) | NAV Velocity Error Z<br>(not_set) | meters/second<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Z velocity error |
| velocity_x<br>(Chunked Dataset) | DOUBLE<br>(:) | NAV Velocity X (WGS84)<br>(not_set) | meters/second<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated X velocity of the platform reference point according to the Navigation Solution Method (NSM) at the point in time of GPST (WGS84) |
| velocity_y<br>(Chunked Dataset) | DOUBLE<br>(:) | NAV Velocity Y (WGS84)<br>(not_set) | meters/second<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Y velocity of the platform reference point according to the Navigation Solution Method (NSM) at the point in time of GPST (WGS84) |
| velocity_z<br>(Chunked Dataset) | DOUBLE<br>(:) | NAV Velocity Z (WGS84)<br>(not_set) | meters/second<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Estimated Z velocity of the platform reference point according to the Navigation Solution Method (NSM) at the point in time of GPST (WGS84) |
| vertical_speed<br>(Chunked Dataset) | DOUBLE<br>(:) | NAV Vertical Speed<br>(not_set) | meters/second<br>ATL01/sc4/gpsr/navigation converted | Navigation Solution Data Record (NAV) - Vertical Speed |
| **Group: /gpsr/noise_histogram** | | | | |
| Description | (Attribute) | Contains parameters related to the GPS Noise Histogram Data Record (NHDR). | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| chain_index<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | NHDR Chain Index - Chain 1-2<br>(not_set) | 1<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Chain Index - Down Conversion Chain Identifier 1-2<br>flag_values: 0, 1<br>flag_meanings : antenna1_l1carrier antenna1_l2carrier |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. 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 |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| | | | | delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| ds_chain<br>(Contiguous Dataset) | INTEGER_1<br>(2) | DS for each chain<br>(not_set) | 1<br>not_set | Dimension scale representing each of the 2 chains. |
| noise_power<br>(Chunked Dataset) | FLOAT<br>(2, :) | NHDR Noise Power -<br>Chain 1-2<br>(not_set) | dB<br>ATL01/sc3/gpsr/noise_histogram converted | Noise Histogram Data Record (NHDR) - Noise Power as seen at the input of the variable gain IF amplifier - Down Conversion Chain Identifier 1-2 |
| norm_neg_in_phase_m1<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Negative In-Phase<br>Counts M1 - Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the negative In-phase samples (M1) - Down Conversion Chain Identifier 1-2 |
| norm_neg_in_phase_m3<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Negative In-Phase<br>Counts M3 - Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the negative In-phase samples (M3) - Down Conversion Chain Identifier 1-2 |
| norm_neg_quad_phase_m1<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Negative Quadrature-<br>Phase Counts M1 -<br>Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the negative Quadrature-phase samples (M1) - Down Conversion Chain Identifier 1-2 |
| norm_neg_quad_phase_m3<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Negative Quadrature-<br>Phase Counts M3 -<br>Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the negative Quadrature-phase samples (M3) - Down Conversion Chain Identifier 1-2 |
| norm_pos_in_phase_p1<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Positive In-Phase<br>Counts P1 - Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the positive In-phase samples (P1) - Down Conversion Chain Identifier 1-2 |
| norm_pos_in_phase_p3<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Positive In-Phase<br>Counts P3 - Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the positive In-phase samples (P3) - Down Conversion Chain Identifier 1-2 |
| norm_pos_quad_phase_p1<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Positive Quadrature-<br>Phase Counts P1 -<br>Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the positive Quadrature-phase samples (P1) - Down Conversion Chain Identifier 1-2 |
| norm_pos_quad_phase_p3<br>(Chunked Dataset) | UINT_2_LE<br>(2, :) | NHDR Normalized<br>Positive Quadrature-<br>Phase Counts P3 -<br>Chain 1-2<br>(not_set) | counts<br>ATL01/sc3/gpsr/noise_histogram | Noise Histogram Data Record (NHDR) - Normalized signal level detector counts of the positive Quadrature-phase samples (P3) - Down Conversion Chain Identifier 1-2 |

**Group: /gpsr/time_correlation**

| Description | (Attribute) | Contains parameters related to GPSR time correlation data record (TCDR). | | |
|---|---|---|---|---|
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time, in seconds since the ATLAS SDP GPS Epoch, computed from raw_gps_time_sec and subseconds in the time correlation group. 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. |
| gps_time_sec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | TCDR GPS Time<br>(Seconds)<br>(not_set) | seconds<br>ATL01/sc4/gpsr/time_correlation | Time Correlation Data Record (TCDR) - GPS Time (GPST) representation of the synchronization time stamp. Total seconds elapsed since GPS epoch (6-Jan-1980 00:00:00) starting with 0. (Same data that is provided to ATLAS in RT) |
| gps_time_subsec<br>(Chunked Dataset) | UINT_4_LE<br>(:) | TCDR GPS Time<br>(Subseconds)<br>(not_set) | 1/4294967296 seconds<br>ATL01/sc4/gpsr/time_correlation | Time Correlation Data Record (TCDR) - Subseconds portion of the GPS Time (GPST) representation of the synchronization time stamp. Total seconds elapsed since GPS epoch (6-Jan-1980 00:00:00) starting with 0. (Same data that is provided to ATLAS in RT) |
| imt<br>(Chunked Dataset) | DOUBLE<br>(:) | TCDR Instrument<br>Measurement Time | seconds<br>ATL01/sc4/gpsr/time_correlation converted | Time Correlation Data Record (TCDR) - Time Correlation Data Record (TCDR) - Instrument Measurement Time (IMT) representation of the synchronization time stamp. IMT precisely describes how the GPSR clock oscillator behaves, and is |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| | | | (not_set) | for internal and maintenance use only. |
| nsm (Chunked Dataset) | INTEGER_1 (:) | GPSR Navigation Solution Method (NSM) (not_set) | 1 ATL01/sc4/gpsr/time_correlation | GPSR - Navigation Solution Method. 1 = Propagated 2 = Cold Start - First Nav Fix 3 = Cold Start - Least Squares Method w/ no GDOP Optimization 4 = Least Squares Method w/ all Visible SVs 5 = Kalman Filter Method (Normal Operation) 7 = Invalid Navigation Solution All other values invalid flag_values: 1, 2, 3, 4, 5, 7 flag_meanings : propagated cold_lsq_no_gdop lsqm_w_svs normal_kalman invalid_solution |
| tdop (Chunked Dataset) | FLOAT (:) | GPSR Time Dilution of Precision (not_set) | meters ATL01/sc4/gpsr/time_correlation converted | GPSR - Time Dilution of Precision. Values greater than 655.34 are saturated to 655.34; Value set to 655.35 when NSM = 1 or in the case NSM = 5 with fewer than 4 SVs available. |
| time_qa (Chunked Dataset) | INTEGER_2 (:) | TCDR Time Quality Index (not_set) | nanoseconds ATL01/sc4/gpsr/time_correlation | Time Correlation Data Record (TCDR) - Time Quality Index. Nanoseconds; Values greater than 4095 ns are saturated to 4095 ns. |
| utc_days (Chunked Dataset) | UINT_2_LE (:) | TCDR TCDR UTC Time - Days (not_set) | days ATL01/sc4/gpsr/time_correlation | Time Correlation Data Record (TCDR) - UTC time representation of the synchronization time stamp. Number of days since 1st January 2000, 00:00:00 starting with 0. |
| utc_msec (Chunked Dataset) | UINT_4_LE (:) | TCDR TCDR UTC Time - Milliseconds (not_set) | msec ATL01/sc4/gpsr/time_correlation | Time Correlation Data Record (TCDR) - UTC time representation of the synchronization time stamp. Number of milliseconds of current day. |
| utc_usec (Chunked Dataset) | UINT_2_LE (:) | TCDR TCDR UTC Time - Microseconds (not_set) | usec ATL01/sc4/gpsr/time_correlation | Time Correlation Data Record (TCDR) - UTC time representation of the synchronization time stamp. Number of microseconds of current day. |

**Group: /lrs**

| | | |
|---|---|---|
| Description | (Attribute) | Group contains the Laser Reference System (LRS) packet decommutated data |
| data_rate | (Attribute) | Data within this group are stored at the nominal rate of the corresponding LRS APIDs (varies per APID). |

**Group: /lrs/hk_1120**

| | | |
|---|---|---|
| Description | (Attribute) | Contains parameters relating to the Application Housekeeping Packet (LRStmHK)(APID 1120). The (Application Mode) Housekeeping Packet provides all LRS health and safety data. It is normally reported and stored at a 1 Hz rate. |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source LRS Housekeeping Data (nominally once per second). |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| chkstat_e_ad (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register - EEPROM Application Text Checksum (not_set) | 1 LRS_HK | EEPROM Application Data (AD) checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 flag_meanings : passed failed |
| chkstat_e_at (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register - EEPROM Application Text Checksum (not_set) | 1 LRS_HK | EEPROM Application Text (AT) checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 flag_meanings : passed failed |
| chkstat_e_bc (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register - EEPROM Boot Config Checksum (not_set) | 1 LRS_HK | EEPROM Boot Configuration (BC) checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 flag_meanings : passed failed |
| chkstat_e_ld_df (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register - EEPROM Laser Detector Dark Frame Checksum (not_set) | 1 LRS_HK | EEPROM Laser Detector (LD) Dark Frame data checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 flag_meanings : passed failed |
| chkstat_e_sd_df (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register - EEPROM Stellar Detector Dark Frame Checksum (not_set) | 1 LRS_HK | EEPROM Stellar Detector (SD) Dark Frame data checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 flag_meanings : passed failed |
| chkstat_s_at (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register -SRAM | 1 LRS_HK | SRAM Application Text (AT) checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 |

| | | Application Text Checksum (not_set) | | flag_meanings : passed failed |
|---|---|---|---|---|
| chkstat_s_ld_df (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register - SRAM Laser Detector Dark Frame Checksum (not_set) | 1 LRS_HK | SRAM Laser Detector (LD) Dark Frame data checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 flag_meanings : passed failed |
| chkstat_s_sd_df (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Checksum Status Register - SRAM Stellar Detector Dark Frame Checksum (not_set) | 1 LRS_HK | SRAM Stellar Detector (SD) Dark Frame data checksum (0=PASSED (normal operating condition) 1=FAILED (abnormal condition)) flag_values: 0, 1 flag_meanings : passed failed |
| cmdcnt (Chunked Dataset) | UINT_2_LE (:) | LRS_HK Valid User Command Counter (not_set) | counts LRS_HK | The Valid User Command Counter is a 16-bit counter that increments each time that the Failsafe Mode processes a valid command of the corresponding command type. A valid command is defined as a command that passes all verification tests. The counter starts at 0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. The counter is reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| cmderrcnt (Chunked Dataset) | UINT_2_LE (:) | LRS_HK User Command Error Counter (not_set) | counts LRS_HK | The 16-bit User Command Error Counter is incremented every time the Failsafe Mode has one or more command verification or processing errors with the corresponding command type (abnormal conditions). The counter starts at 0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. The counter increments only once per command when there is at least one verification/processing error for that command. CMDERRCODE will indicate the type of error. The counter is reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| cmderrcode (Chunked Dataset) | UINT_2_LE (:) | LRS_HK Unique Code for User Command Errors (not_set) | counts LRS_HK | The 16-bit Command Error Unique Code indicates the last type of command error that occurred in Failsafe Mode. This code will be reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). The error codes are defined in Table 19: Command Validation Error Codes in the LRS command and data ICD. |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| dmpmemcnt (Chunked Dataset) | UINT_4_LE (:) | LRS_HK Number of memory words dumped (not_set) | counts LRS_HK | This 32-bit counter records the total number of memory words dumped during Failsafe Mode processing of Failsafe Dump Memory Command (LRSfscmDPMEM). It starts at 0x00000000, and rolls over to 0x00000000 when it increments from 0xFFFFFFFF. This counter will be reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| dmppktleft (Chunked Dataset) | UINT_2_LE (:) | LRS_HK Remaining number of dump packets to go (not_set) | counts LRS_HK | This 16-bit counter indicates the remaining number of dump packets to send during Failsafe Mode processing of a Failsafe Dump Memory Command (LRSfscmDPMEM). It is 0x0000 whenever no dump command is active. |
| ground1_v (Chunked Dataset) | FLOAT (:) | LRS_HK Ground 1 Voltage (not_set) | volts LRS_HK | Voltage of Ground 1 - 0x0000 = 0.000 V (nominal value); 0xFFFF = +4.000 V : A_LRS_HK.ANALOGHK[0] |
| ground2_v (Chunked Dataset) | FLOAT (:) | LRS_HK Ground 2 Voltage (not_set) | volts LRS_HK | Voltage of Ground 2 - 0x0000 = 0.000 V (nominal value); 0xFFFF = +4.000 V : A_LRS_HK.ANALOGHK[1] |
| laser_barrel1_t (Chunked Dataset) | FLOAT (:) | LRS_HK Optics Thermistor #1 (Laser Side Barrel #1 Temperature) (not_set) | degreesC LRS_HK | Temperature of Optics Thermistor #1 (Laser Side Barrel #1) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| laser_barrel2_t (Chunked Dataset) | FLOAT (:) | LRS_HK Optics Thermistor #2 (Laser Side Barrel #2 Temperature) (not_set) | degreesC LRS_HK | Temperature of Optics Thermistor #2 (Laser Side Barrel #2) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| laser_barrel3_t (Chunked Dataset) | FLOAT (:) | LRS_HK Optics Thermistor #3 (Laser Side Barrel #3 Temperature) (not_set) | degreesC LRS_HK | Temperature of Optics Thermistor #3 (Laser Side Barrel #3) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| ldbackground (Chunked Dataset) | UINT_2_LE (:) | LRS_HK LD background (not_set) | counts LRS_HK | The 16-bit values are measures of the measured detector background for the laser side after subtracting the predicted dark frame. Each is a scaled average of the background levels from all tracking windows on that detector, for all measurements in the preceding one (1) second. Because the search and imaging windows move around, these values should be expected to fluctuate significantly; however, they are an indication of how well the predicted dark frame matches the |

| | | | | background (stray light) levels. If they are occasionally very large, there is probably a stray light problem. If they are consistently very large, there is probably error in the dark frame calibration. |
|---|---|---|---|---|
| ldc_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Laser Detector Card Temperature<br>(not_set) | degreesC<br>LRS_HK | Temperature of Laser Detector Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| ldmemcnt<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_HK Number of memory words loaded<br>(not_set) | counts<br>LRS_HK | This 32-bit counter records the total number of memory words loaded during Failsafe Mode processing of Failsafe Load Memory Command (LRSfscmLDMEM). It starts at 0x00000000, and rolls over to 0x00000000 when it increments from 0xFFFFFFFF. This counter will be reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT) |
| ldmemconflict<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK LD Memory Conflicts<br>(not_set) | counts<br>LRS_HK | This 16-bit counter is incremented each time the Application Mode is still accessing Laser-Side shared memory when a new LRS cycle starts. This conflict is an error, which indicates that shared memory access did not complete in the allocated time and may have caused stale or invalid laser centroids. This counter starts at 0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. This counter will be reset at Application Mode initialization and by an Application Reset Counters Command (LRScmRSTCNT). |
| ldoverrun<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK LD Processing Overruns<br>(not_set) | counts<br>LRS_HK | This 16-bit counter is incremented each time the Application Mode is still processing Laser-Side data when a new LRS cycle starts. This overrun condition is a warning, which indicates that some processor activity did not complete in the allocated time and may delay reporting of the next laser data packets. This counter starts at 0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. This counter will be reset at Application Mode initialization and by an Application Reset Counters Command (LRScmRSTCNT). |
| m12v_cmon_a<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK -12VDC Current Monitor<br>(not_set) | amps<br>LRS_HK | Amperage of -12VDC Current Monitor - 0x0000 = 0.000 A; 0xFFFF = +0.400 A : A_LRS_HK.ANALOGHK[6] |
| m12v_ldc_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK -12VDC LDC Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of -12VDC LDC Monitor - 0x0000 = 0.000 V; 0xBF9D = -12.000 V (nominal value); 0xFFFF = -16.000 V : A_LRS_HK.ANALOGHK[11] |
| m12v_sdc_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK -12VDC SDC Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of -12VDC SDC Monitor - 0x0000 = 0.000 V; 0xBF9D = -12.000 V (nominal value); 0xFFFF = -16.000 V : A_LRS_HK.ANALOGHK[10] |
| m12v_supp_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK -12VDC Supply Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of 112VDC Supply Monitor - 0x0000 = 0.000 V; 0xBF9D = -12.000 V (nominal value); 0xFFFF = -16.000 V : A_LRS_HK.ANALOGHK[14] |
| meter_bar1_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Optics Thermistor #4 (Metering Bars #1 Temperature)<br>(not_set) | degreesC<br>LRS_HK | Temperature of Optics Thermistor #4 (Metering Bars #1) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| meter_bar2_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Optics Thermistor #5 (Metering Bars #2 Temperature)<br>(not_set) | degreesC<br>LRS_HK | Temperature of Optics Thermistor #5 (Metering Bars #2) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| meter_bar3_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Optics Thermistor #6 (Metering Bars #3 Temperature)<br>(not_set) | degreesC<br>LRS_HK | Temperature of Optics Thermistor #6 (Metering Bars #3) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| p12v_ana_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +12VDC Analog Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of +12VDC Analog Monitor - 0x0000 = 0.000 V; 0xC000 = +12.000 V (nominal value); 0xFFFF = +16.000 V : A_LRS_HK.ANALOGHK[15] |
| p12v_cmon_a<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +12VDC Current Monitor<br>(not_set) | amps<br>LRS_HK | Amperage of +12VDC Current Monitor - 0x0000 = 0.000 A; 0xFFFF = +0.400 A : A_LRS_HK.ANALOGHK[7] |
| p1_5v_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +1.5VDC Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of +1.5VDC Monitor - 0x0000 = 0.000 V; 0x6000 = +1.500 V (nominal value); 0xFFFF = +4.000 V : A_LRS_HK.ANALOGHK[3] |
| p1_8v_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +1.8VDC Monitor Voltage<br>(not_set) | volts<br>LRS_HK | Volage of +1.8VDC Monitor - 0x0000 = 0.000 V; 0x7332 = 1.800 V (nominal); 0xFFFF = +4.000 V : A_LRS_HK.ANALOGHK[19] |
| p3_3v_cmon_a<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +3.3VDC Current Monitor<br>(not_set) | amps<br>LRS_HK | Amperage of +3.3VDC Current Monitor - 0x0000 = 0.000 A; 0xFFFF = +4.000 A : A_LRS_HK.ANALOGHK[9] |

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|---|---|---|---|---|
| p3_3v_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +3.3VDC<br>Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of +3.3VDC Monitor - 0x0000 = 0.000 V; 0xD333 = +3.300 V (nominal value); 0xFFFF = 4.000 V |
| p5v_ana_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +5VDC<br>Analog Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of +5VDC Analog Monitor - 0x0000 = 0.000 V; 0xA000 = +5.000 V (nominal value); 0xFFFF = +8.000 V :<br>A_LRS_HK.ANALOGHK[16] |
| p5v_cmon_a<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +5VDC<br>Current Monitor<br>(not_set) | amps<br>LRS_HK | Amperage of +5VDC Current Monitor - 0x0000 = 0.000 A; 0xFFFF = +0.400 A : A_LRS_HK.ANALOGHK[8] |
| p5v_ldc_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +5VDC LDC<br>Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of +5VDC LDC Monitor - 0x0000 = 0.000 V; 0xA000 = +5.000 V (nominal value); 0xFFFF = +8.000 V :<br>A_LRS_HK.ANALOGHK[12] |
| p5v_sdc_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +5VDC SDC<br>Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of +5VDC SDC Monitor - 0x0000 = 0.000 V; 0xA000 = +5.000 V (nominal value); 0xFFFF = +8.000 V :<br>A_LRS_HK.ANALOGHK[13] |
| p5v_supp_mon_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK +5VDC<br>Supply Monitor<br>(not_set) | volts<br>LRS_HK | Voltage of +5VDC Supply Monitor - 0x0000 = 0.000 V; 0xA000 = +5.000 V (nominal value); 0xFFFF = +8.000 V :<br>A_LRS_HK.ANALOGHK[16] |
| pc_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Processor<br>Card Thermistor<br>(not_set) | degreesC<br>LRS_HK | Temperature of Processor Card - 0x0000 = 0.000 V (nominal short;) 0xFFFF = +4.000 V (nominal open) [see thermistor<br>scaling section later for temperature scaling] |
| pcc_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Power<br>Converter Card<br>Temperature<br>(not_set) | degreesC<br>LRS_HK | Temperature of Power Converter Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see<br>thermistor scaling section later for temperature scaling] |
| ppscount<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_HK 1PPS sync<br>counter<br>(not_set) | counts<br>LRS_HK | A 32-bit count of sync pulses registered by the LRS FPGA. The value of the pulse counter starts at 0x00000000, and rolls<br>over to 0x00000000 when it increments from 0xFFFFFFFF. |
| ppsoffset_ms<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_HK Oscillator<br>Offset<br>(not_set) | ms<br>LRS_HK | Oscillator Offset (milliseconds) for TOD (time of day) correction. |
| ppsoffset_ticks<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_HK Oscillator<br>Offset Ticks<br>(not_set) | counts<br>LRS_HK | Oscillator Offset (ticks) for TOD (time of day) correction. |
| ppsoscval<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_HK Latched<br>oscillator value at<br>1PPS sync<br>(not_set) | counts<br>LRS_HK | The 32-bit count of internal 27 MHz oscillator ticks at the time when the last 1 PPS sync pulse was registered by the LRS<br>FPGA. |
| reference_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Reference<br>Voltage<br>(not_set) | volts<br>LRS_HK | Reference Voltage - 0x0000 = 0.000 V; 0x8000 = +2.000 V (nominal value); 0xFFFF = +4.000 V :<br>A_LRS_HK.ANALOGHK[2] |
| sdbackground<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK SD<br>background<br>(not_set) | counts<br>LRS_HK | The 16-bit values are measures of the measured detector background of the stellar side after subtracting the predicted<br>dark frame. Each is a scaled average of the background levels from all tracking windows on that detector, for all<br>measurements in the preceding one (1) second. Because the search and imaging windows move around, these values<br>should be expected to fluctuate significantly; however, they are an indication of how well the predicted dark frame matches<br>the background (stray light) levels. If they are occasionally very large, there is probably a stray light problem. If they are<br>consistently very large, there is probably error in the dark frame calibration. |
| sdc_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Stellar<br>Detector Card<br>Temperature<br>(not_set) | counts<br>LRS_HK | Temperature of Stellar Detector Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see<br>thermistor scaling section later for temperature scaling] |
| sdmemconflict<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK SD Memory<br>Conflicts<br>(not_set) | counts<br>LRS_HK | This 16-bit counter is incremented each time the Application Mode is still accessing Stellar-Side shared memory when a<br>new LRS cycle starts that includes new Stellar-Side data collection. This conflict is an error, which indicates that shared<br>memory access did not complete in the allocated time and may have caused stale or invalid stellar centroids. This counter<br>starts at 0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. This counter will be reset at Application Mode<br>initialization and by an Application Reset Counters Command (LRScmRSTCNT). |
| sdoverrun<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK SD<br>Processing Overruns<br>(not_set) | counts<br>LRS_HK | This 16-bit counter is incremented each time the Application Mode is still processing Stellar-Side data when a new LRS<br>cycle starts that should include new Stellar-Side data collection. This overrun condition is a warning, which indicates that<br>some processor activity did not complete in the allocated time and may delay reporting of the next stellar data packets.<br>This counter starts at 0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. This counter will be reset at<br>Application Mode initialization and by an Application Reset Counters Command (LRScmRSTCNT). |

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|---|---|---|---|---|
| spwdiscardbkup (Chunked Dataset) | UINT_4_LE (:) | LRS_HK Spacewire tlm packets dropped due to buffer not being empty (not_set) | counts LRS_HK | This 32-bit counter is incremented every time a spacewire telemetry packet is dropped by Failsafe Mode while waiting for the transmission buffer to empty (an abnormal condition). It starts at 0x00000000, and rolls over to 0x00000000 when it increments from 0xFFFFFFFF. This counter will be reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| spwdiscardcmd (Chunked Dataset) | UINT_4_LE (:) | LRS_HK Spacewire words dropped due to timeout waiting for full CCSDS packet (not_set) | counts LRS_HK | This 32-bit counter is incremented each time a spacewire command word is dropped by Failsafe Mode due to a timeout while waiting for a full CCSDS packet (an abnormal condition). It starts at 0x00000000, and rolls over to 0x00000000 when it increments from 0xFFFFFFFF. This counter will be reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| spwdiscardlink (Chunked Dataset) | UINT_4_LE (:) | LRS_HK Spacewire tlm packets dropped due to link not available (not_set) | counts LRS_HK | This 32-bit counter is incremented every time a spacewire telemetry packet is dropped by Failsafe Mode while waiting for a valid spacewire link between the LRS and MEB (an abnormal condition). It starts at 0x00000000, and rolls over to 0x00000000 when it increments from 0xFFFFFFFF. This counter will be reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| spwoutofsync (Chunked Dataset) | UINT_4_LE (:) | LRS_HK Spacewire words skipped to find sync (not_set) | counts LRS_HK | This 32-bit counter is incremented each time a spacewire command word is skipped by Failsafe Mode to reach a valid packet sync (an abnormal condition). It starts at 0x00000000, and rolls over to 0x00000000 when it increments from 0xFFFFFFFF. This counter will be reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| spwstat_ll_err (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Spacewire Status Register - Last Link Error (not_set) | 1 LRS_HK | This is the Last Link Error Code portion of the LRS spacewire interface register. flag_values: 0, 1, 2, 3 flag_meanings : disconnected parity_err esc_rec credit_err |
| spwstat_lp_err (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Spacewire Status Register - Last Packet Error (not_set) | 1 LRS_HK | This is the Last Packet Error Code portion of the LRS spacewire interface register. flag_values: 0, 1, 2, 3 flag_meanings : no_error eep_rec incomplete_sw invalid |
| spwstat_pec (Chunked Dataset) | UINT_1_LE (:) | LRS_HK Spacewire Status Register _ Packet Error Counter (not_set) | counts LRS_HK | This is the 6-bit Packet Error Counter portion of the LRS spacewire interface status register |
| spwstat_st_f (Chunked Dataset) | INTEGER_1 (:) | LRS_HK Spacewire Status Register - Status (not_set) | 1 LRS_HK | This is the status flag portion of the LRS spacewire interface status register. flag_values: 0, 1 flag_meanings : not_running running |
| srate_x (Chunked Dataset) | FLOAT (:) | LRS_HK Stellar Pattern Rate X (not_set) | pixels/sec LRS_HK | X component (tip/tilt) of the stellar rate pattern estimate. |
| srate_y (Chunked Dataset) | FLOAT (:) | LRS_HK Stellar Pattern Rate Y (not_set) | pixels/second LRS_HK | Y component (tip/tilt) of the stellar rate pattern estimate |
| srate_z (Chunked Dataset) | FLOAT (:) | LRS_HK Stellar Pattern Rate Z (not_set) | radians/second LRS_HK | Z (rotation) component of the stellar rate pattern estimate |
| stellar_barrel1_t (Chunked Dataset) | FLOAT (:) | LRS_HK Optics Thermistor #7 (Stellar Side Barrel #1 Temperature) (not_set) | degreesC LRS_HK | Temperature of Optics Thermistor #7 (Stellar Side Barrel #1) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| stellar_barrel2_t (Chunked Dataset) | FLOAT (:) | LRS_HK Optics Thermistor #8 (Stellar Side Barrel #2 Temperature) (not_set) | degreesC LRS_HK | Temperature of Optics Thermistor #8 (Stellar Side Barrel #2) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| stellar_barrel3_t (Chunked Dataset) | FLOAT (:) | LRS_HK Optics Thermistor #9 (Stellar Side Barrel #3 Temperature) (not_set) | degreesC LRS_HK | Temperature of Optics Thermistor #9 (Stellar Side Barrel #3) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| stellar_shroud_t (Chunked Dataset) | FLOAT (:) | LRS_HK Optics Thermistor #10 (Stellar Side Shroud Temperature) | degreesC LRS_HK | Temperature of Optics Thermistor #10 (Stellar Side Shroud) - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |

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|---|---|---|---|---|
| | | | (not_set) | |
| sysstat_ac_en (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - Analog Converter Status (not_set) | 1 LRS_HK | The current status of the LRS FPGA Analog Converter. (0 =DISABLED (abnormal condition); 1 = ENABLED (normal operating condition)) flag_values: 0, 1 flag_meanings : disabled enabled |
| sysstat_hk (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register HK Working (not_set) | 1 LRS_HK | The current status of the Housekeeping working (0 = Finished Execution; 1 = Executing ). Note: The FPGA toggles these values based on what logic is executing, so they may show up as 0 or 1 based on when the packet is generated flag_values: 0, 1 flag_meanings : finished executing |
| sysstat_j1 (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - Jumper 1 (not_set) | 1 LRS_HK | Jumper 1 status (no planned use on ATLAS). 0 = Jumper is DISCONNECTED (normal operating condition flag_values: 0, 1 flag_meanings : disconnected connected |
| sysstat_j2 (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - Jumper 2 (not_set) | 1 LRS_HK | Jumper 2 status (no planned use on ATLAS). 0 = Jumper is DISCONNECTED (normal operating condition) flag_values: 0, 1 flag_meanings : disconnected connected |
| sysstat_ldc (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - LDC Status (not_set) | 1 LRS_HK | The current status of the Laser Detector Card (LDC) working (0 = Finished Execution; 1 = Executing). Note: The FPGA toggles these values based on what logic is executing, so they may show up as 0 or 1 based on when the packet is generated flag_values: 0, 1 flag_meanings : finished executing |
| sysstat_ldc_en (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - LDC Power and Signals Enable Status (not_set) | 1 LRS_HK | The current status of the LRS FPGA LDC (Laser Detector Card) Power and Signals. (0 = DISABLED (abnormal condition); 1 = ENABLED (normal operating condition)) flag_values: 0, 1 flag_meanings : disabled enabled |
| sysstat_ldca_cable (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - LDC Analog Cable Status (not_set) | 1 LRS_HK | The current status of the LRS FPGA LDCA (Laser Detector Card Analog) Cable. (0 = DISCONNECTED (abnormal condition); 1 = CONNECTED (normal operating condition)) flag_values: 0, 1 flag_meanings : disconnected connected |
| sysstat_ldcd_cable (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - LDC Digital Cable Status (not_set) | 1 LRS_HK | The current status of the LRS FPGA LDCD (Laser Detector Card Digital Cable. (0 = DISCONNECTED (abnormal condition); 1 = CONNECTED (normal operating condition)) flag_values: 0, 1 flag_meanings : disconnected connected |
| sysstat_lsync (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - Laser Sync validity Status (not_set) | 1 LRS_HK | The current validity of the Laser Sync (0 = INVALID (abnormal condition); 1 = VALID (normal operating condition)) flag_values: 0, 1 flag_meanings : invalid valid |
| sysstat_sdc (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - SDC Status (not_set) | 1 LRS_HK | The current status of the Stellar Detector Card (SDC) working (0 = Finished Execution; 1 = Executing). Note: The FPGA toggles these values based on what logic is executing, so they may show up as 0 or 1 based on when the packet is generated flag_values: 0, 1 flag_meanings : finished executing |
| sysstat_sdc_en (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - SDC Power and Signals Enable Status (not_set) | 1 LRS_HK | The current status of the LRS FPGA SDC (Stellar Detector Card) Power and Signals. (0 = DISABLED (abnormal condition); 1 = ENABLED (normal operating condition)) flag_values: 0, 1 flag_meanings : disabled enabled |
| sysstat_sdca_cable (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - SDC Analog Cable Status (not_set) | 1 LRS_HK | The current status of the LRS FPGA SDCD (Stellar Detector Card Digital Cable. (0 = DISCONNECTED (abnormal condition); 1 = CONNECTED (normal operating condition)) flag_values: 0, 1 flag_meanings : disconnected connected |
| sysstat_sdcd_cable (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - SDC Digital Cable Status (not_set) | 1 LRS_HK | The current status of the LRS FPGA SDCD (Stellar Detector Card Digital Cable. (0 = DISCONNECTED (abnormal condition); 1 = CONNECTED (normal operating condition)) flag_values: 0, 1 flag_meanings : disconnected connected |
| sysstat_sw (Chunked Dataset) | INTEGER_1 (:) | LRS_HK System Status Register - Spacewire Module Status | 1 LRS_HK | The current status of the Spacewire Module (0 = NOT RUNNING (abnormal condition); 1 = RUNNING (normal operating condition)) flag_values: 0, 1 flag_meanings : not_running running |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| | | | (not_set) | |
| therm_gnd_ref_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Thermistor<br>Reference (ground)<br>(not_set) | volts<br>LRS_HK | Voltage of Thermistor Reference (ground) - 0x0000 = 0.000 V (nominal value); 0xFFFF = +4.000 V :<br>A_LRS_HK.ANALOGHK[20] |
| therm_open_ref_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Thermistor<br>Reference (open)<br>(not_set) | volts<br>LRS_HK | Voltage of Thermistor Reference (open) - 0x0000 = 0.000 V; 0xFFFF = +4.000 V (nominal value) :<br>A_LRS_HK.ANALOGHK[21] |
| timecnt<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK Valid Time<br>Sync Command<br>Counter<br>(not_set) | counts<br>LRS_HK | The Valid Time Sync Command Counter is a 16-bit counter that increments each time that the Failsafe Mode processes a<br>valid command of the corresponding command type. A valid command is defined as a command that passes all verification<br>tests. The counter starts at 0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. The counter is reset at<br>power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| timeerrcnt<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK Time Sync<br>Command Error<br>Counter<br>(not_set) | counts<br>LRS_HK | The 16-bit Time Sync Command error Counter is incremented every time the Failsafe Mode has one or more command<br>verification or processing errors with the corresponding command type (abnormal conditions). The counter starts at<br>0x0000, and rolls over to 0x0000 when it increments from 0xFFFF. The counter increments only once per command when<br>there is at least one verification/processing error for that command. TIMEERRCODE will indicate the type of error. The<br>counter is reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). |
| timeerrcode<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_HK Time Sync<br>Command Error Code<br>(not_set) | counts<br>LRS_HK | The 16-bit Time Sync Error Code indicates the last type of time sync error that occurred in Failsafe Mode. This code will be<br>reset at power on and by a Failsafe Reset Counters Command (LRSfscmRSTCNT). The error codes are defined in Table<br>19: Command Validation Error Codes. |
| **Group: /lrs/laser_centroid** | | | | |
| Description | (Attribute) | | Contains parameters relating to the Application Laser Centroid (LCENT) Data. The (Application Mode) Laser Centroid Data Packet contains reported Laser-Side Centroids, which are part of the core LRS data output. This packet normally will contain 10 valid centroids, reported and stored at a nominally 50 Hz rate and is available through all data channels (SSR, real time telemetry, and onboard to the spacecraft ACS). | |
| data_rate | (Attribute) | | Data within this group are stored at the data rate of the source LRS Application Laser Centroid Data (nominally fifty per second). | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| cent_h<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_LCENT centroid<br>H<br>(not_set) | pixels<br>LRS_LCENT | The centroid H value. The centroids are the Transmit Laser Centroids and TAMS Centroids. |
| cent_mag<br>(Chunked Dataset) | INTEGER_2<br>(:) | LRS_LCENT centroid<br>magitude<br>(not_set) | counts<br>LRS_LCENT | The 12-bit centroid magnitude. The centroids are the Transmit Laser Centroids and TAMS Centroids. |
| cent_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_LCENT centroid<br>V<br>(not_set) | pixels<br>LRS_LCENT | The centroid V value. The centroids are the Transmit Laser Centroids and TAMS Centroids. |
| centofintbase<br>(Chunked Dataset) | UINT_4_LE<br>(:) | Center of integration<br>base<br>(not_set) | counts<br>LRS | Base age of centroids relative to secondary header timestamp. This 32-bit value indicates how many 843.75 kHz time ticks<br>of offset should be applied between the secondary header timestamp and the center_of_integration for the laser centroids<br>reported. This time offset assumes that the secondary header timestamp represents an exact milli-second (that is, is<br>accurate beyond the precision expressed in the timestamp). The offset is based on the LRS internal 27 MHz oscillator<br>(divided by 32), and it can express offset from zero to more than 84 minutes with about 1.185 micro second resolution.<br>Under normal operating conditions, the offset should never exceed 20 milli seconds (about 16875 counts). Centroid<br>timetags offset with this value alone should be adequate for coarse geo-location, but not precision geo-location knowledge<br>as expected for science (individual centroid offsets are required for that purpose). |
| coi_offset<br>(Chunked Dataset) | INTEGER_2<br>(:) | Center of integration<br>offset<br>(not_set) | counts<br>LRS | The signed 16-bit center of integration offset for this specific centroid. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time values retrieved from the CCSDS header timestamps, relative to the ATLAS SDP GPS Epoch. The ATLAS Standard<br>Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds<br>between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset<br>contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can<br>be computed. |
| quality_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | LRS_LCENT Centroid<br>quality<br>(not_set) | 1<br>LRS_LCENT | Flag indicates centroids pass basic validity checks in the LRS software. 0 = valid centroids; 1 = the corresponding centroid<br>is considered questionable (that is, the corresponding centroid should not be expected to report a valid target with full<br>accuracy). The win parameter within this group correlates the flags to tams/laser windows. However, the correlation of the<br>windows to the actual tams/laser spots is not guaranteed.<br>flag_values: 0, 1<br>flag_meanings : valid questionable |
| trackstat_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | LRS_LCENT Tracking<br>status<br>(not_set) | 1<br>LRS_LCENT | Flag indicates tracking status for centroid; 1 = valid tracking of that centroid window; 0 = the corresponding window is in a<br>searching or acquiring state (that is, the corresponding centroid should not be considered to report a valid target). The win<br>parameter within this group correlates the flags to tams/laser windows. However, the correlation of the windows to the |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| | | | | actual tams/laser spots is not guaranteed.<br>flag_values: 0, 1<br>flag_meanings : acq_state track_state |
| win (Chunked Dataset) | INTEGER_1 (:) | Window (not_set) | 1<br>LRS_LCENT | Indicates the window corresponding to each component of the centmagtime and corresponding flags. Values of 1-4 correspond to TAMS windows; values of 5-10 correspond to laser windows. Assignment of a window to a particular spot is not guaranteed.<br>flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10<br>flag_meanings : none tams0 tams1 tams2 tams3 laser1 laser2 laser3 laser4 laser5 laser6 |

**Group: /lrs/laser_image**

| | | | |
|---|---|---|---|
| Description | (Attribute) | | The (Application Mode) Laser Image Data Packet contains measured pixel data from a Laser-Side image dump. This SSR packet is only reported when requested by command, and is normally used only for diagnostic purposes. |
| data_rate | (Attribute) | | Data within this group are stored at the data rate of the source LRS Laser Image Data Packet. (This packet is dumped only when commanded.) |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| centofintbase (Chunked Dataset) | UINT_4_LE (:) | Center of integration base (not_set) | counts<br>LRS | Base age of centroids relative to secondary header timestamp. This 32-bit value indicates how many 843.75 kHz time ticks of offset should be applied between the secondary header timestamp and the center_of_integration for the laser centroids reported. This time offset assumes that the secondary header timestamp represents an exact milli-second (that is, is accurate beyond the precision expressed in the timestamp). The offset is based on the LRS internal 27 MHz oscillator (divided by 32), and it can express offset from zero to more than 84 minutes with about 1.185 micro second resolution. Under normal operating conditions, the offset should never exceed 20 milli seconds (about 16875 counts). Centroid timetags offset with this value alone should be adequate for coarse geo-location, but not precision geo-location knowledge as expected for science (individual centroid offsets are required for that purpose). |
| datatype (Chunked Dataset) | UINT_2_LE (:) | LRS_xIMG Type of pixel data (not_set) | 1<br>LRS_SIMG | This 16-bit value contains a code indicating the type of pixel data being reported in the packet. The valid codes are defined as follows (other codes are invalid): 0 Raw Pixel Data (no compensation), 4369 Dark Frame Corrected Data, 8738 Data Corrected for both Dark Frame and Local Dark<br>flag_values: 0, 4369, 8738<br>flag_meanings : raw dark adj |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01<br>Derived via Time Tagging | The base age of the centroids in GPS seconds relative to 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. |
| ldc_t (Chunked Dataset) | FLOAT (:) | LRS_HK Laser Detector Card Temperature (not_set) | degrees<br>LRS_HK | Temperature of Laser Detector Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| nread (Chunked Dataset) | UINT_2_LE (:) | LRSxLIMG Window read count (not_set) | counts<br>LRS_xIMG | This 16-bit value is the number of reads performed on the window. This value will count up to the requested number of reads on successive packets. The detector has a settling behavior when read on successive cycles, so it may be necessary to perform multiple back-to-back reads to mimic the behavior that will occur when windows are tracked. |

**Group: /lrs/laser_image/window_nn**

| | | | |
|---|---|---|---|
| Description | (Attribute) | | This group contains five of the laser image windows reported within the LRStmLIMG packet. This SSR packet is only reported when requested by command, and is normally used only for diagnostic purposes. |
| data_rate | (Attribute) | | Data within this group are stored at the data rate of the source LRS Laser Image Data Packet. This packet is dumped only when commanded.) |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| ds_pixel_64_index (Contiguous Dataset) | INTEGER_1 (64) | Pixel Index for 64 pixel arrays (not_set) | 1<br>not_set | Dimension scale for 64-pixel arrays. |
| hloc (Chunked Dataset) | UINT_2_LE (:) | LRS_LIMG Horizontal location of window (not_set) | pixels<br>LRS_LIMG | Horizontal location of window. The 16-bit values for the coordinates of the minimum column contained within the window. The TAMS window uses 8 x 8 pixels, so the coordinates of the center will be 3.5 pixels greater in each axis. |
| pixeldata (Chunked Dataset) | UINT_2_LE (64, :) | LRS_LIMG pixel data (not_set) | counts<br>LRS_LIMG | Pixel data for window- The arrays contains the 64 pixels of a TAMS window. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], then [HLOC+7, VLOC], then [HLOC, VLOC+1], and ending with [HLOC+7, VLOC+7] ). |
| vloc (Chunked Dataset) | UINT_2_LE (:) | LRS_LIMG Vertical location of window (not_set) | pixels<br>LRS_LIMG | Vertical location of window. The 16-bit values for the coordinates of the minimum row contained within the window. The TAMS window uses 8 x 8 pixels, so the coordinates of the center will be 3.5 pixels greater in each axis. |

**Group: /lrs/laser_window**

| | | | | |
|---|---|---|---|---|
| | | | | |

| Description | (Attribute) | The (Application Mode) Transmit Laser Window Data Packet (LRStmLWIN) contains measured pixel data from a Transmit Laser (Laser-Side) centroid window. This SSR packet is only reported when requested by command, and is normally used only for diagnostic purposes. | | |
|---|---|---|---|---|
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source LRS Transmit Laser Window Data Packet. (This packet is dumped only when commanded.) | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| adjdata (Chunked Dataset) | UINT_2_LE (25, :) | LRS_LWIN Adjusted Pixel data for window (not_set) | counts LRS_LWIN | Adjusted Pixel data for window - The array contains the 25 pixels of the window containing the pixel readings after they are corrected for both the predicted dark frame and the LOCALDARK bias. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| cent_h (Chunked Dataset) | FLOAT (:) | LRS_LCENT centroid H (not_set) | pixels LRS_LCENT | The centroid H value (in 256ths of a pixel) |
| cent_mag (Chunked Dataset) | INTEGER_2 (:) | LRS_LCENT centroid magitude (not_set) | counts LRS_LCENT | The 12-bit centroid magnitude. From Word 2, bits 15 (MSB) to 4 |
| cent_v (Chunked Dataset) | FLOAT (:) | LRS_LCENT centroid V (not_set) | pixels LRS_LCENT | The centroid V value (in 256ths of a pixel). |
| centofintbase (Chunked Dataset) | UINT_4_LE (:) | Center of integration base (not_set) | counts LRS | Base age of centroids relative to secondary header timestamp. This 32-bit value indicates how many 843.75 kHz time ticks of offset should be applied between the secondary header timestamp and the center_of_integration for the laser centroids reported. This time offset assumes that the secondary header timestamp represents an exact milli-second (that is, is accurate beyond the precision expressed in the timestamp). The offset is based on the LRS internal 27 MHz oscillator (divided by 32), and it can express offset from zero to more than 84 minutes with about 1.185 micro second resolution. Under normal operating conditions, the offset should never exceed 20 milli seconds (about 16875 counts). Centroid timetags offset with this value alone should be adequate for coarse geo-location, but not precision geo-location knowledge as expected for science (individual centroid offsets are required for that purpose). |
| coi_offset (Chunked Dataset) | INTEGER_2 (:) | Center of integration offset (not_set) | counts LRS | The signed 16-bit center of integration offset for this specific centroid. |
| darkdata (Chunked Dataset) | UINT_2_LE (25, :) | LRS_LWIN Dark pixel data for window (not_set) | counts LRS_LWIN | Dark pixel data for window- The array contains the 25 pixels of the window contain the pixel readings after they are corrected for the predicted dark frame. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| darkfactor (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Dark Factor (not_set) | counts LRS_TWIN | Dark Factor - This 16-bit value is the scale factor applied when correcting the window reading for dark frame. |
| darkoff_next (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Next Frame Dark Offset (not_set) | counts LRS_TWIN | This 16-bit value contains the dark offset value that will be used for processing this window in the next frame. |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Time of the centroids 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. |
| ds_pixel_25_index (Contiguous Dataset) | INTEGER_1 (25) | Pixel Index for 25 pixel arrays (not_set) | 1 not_set | Dimension scale for 25-pixel arrays. |
| hdot_avg (Chunked Dataset) | FLOAT (:) | LRS_xWIN Average Horizontal Velocity (not_set) | pixels/second LRS_xWIN | This 32-bit value contains the average horizontal velocity for the target in pixels per frame, 1:23:8 fixed point format. |
| hloc (Chunked Dataset) | UINT_2_LE (:) | LRS_LWIN Horizontal location of window (not_set) | pixels LRS_LWIN | Horizontal location of window. The 16-bit values for the coordinates of the minimum column contained within the window. The Transmit Laser window uses 5 x 5 pixels, so the coordinates of the center will be 2.5 pixels greater in each axis. |
| ldc_t (Chunked Dataset) | FLOAT (:) | LRS_HK Laser Detector Card Temperature (not_set) | Degrees LRS_HK | Temperature of Laser Detector Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |
| localdark (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Local Dark (not_set) | counts LRS_xWIN | Local Dark - This 16-bit value is the local dark correction applied when correcting the window reading for stray light and/or residual dark frame bias. |
| max_mag (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Maximum Magnitude (not_set) | counts LRS_xWIN | This 16-bit value contains the maximum magnitude value for the target. |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| min_mag (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Minimum Magnitude (not_set) | counts LRS_xWIN | This 16-bit value contains the minimum magnitude value for the target. |
| quality_f (Chunked Dataset) | INTEGER_1 (:) | LRS_LCENT Centroid quality (not_set) | 1 LRS_LCENT | This 16-bit value contains a single bit for the quality of this image only. flag_values: 0, 1 flag_meanings : valid questionable |
| rawdata (Chunked Dataset) | UINT_2_LE (25, :) | LRS_LWIN Raw pixel data for window (not_set) | counts LRS_LWIN | Raw pixel data for window- The array contains the 25 pixels of the window contain the ADC readings for the pixels without onboard corrections. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| status_f (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Target status (not_set) | 1 LRS_xWIN | Target status-This 16-bit value contains a code indicating the target status applicable to the window reported in this packet. The valid codes are defined as follows (other codes are invalid): 65531 Dimmest Spot (not currently used), 65532 Invalid Rate, 65533 Collided with Another Window, 65534 Violated Minimum Area Limit, 65535 Violated Image Bound, 0 Empty, 1 Acquire1, 2 Acquire2, 3 Tracking flag_values: 0, 1, 2, 3, 65532, 65534, 65535 flag_meanings : empty acq1 acq2 track not_allowed collided violated |
| tickattime (Chunked Dataset) | UINT_4_LE (:) | LRS_xWIN Oscillator Tick Value (not_set) | counts LRS_xWIN | Oscillator tick value at last time pulse. This 32-bit value is the reading from the internal 27 MHz oscillator at the last 1 PPS time tick. |
| tickfirst (Chunked Dataset) | UINT_4_LE (:) | LRS_xWIN Oscillator ticks when first pixel is read (not_set) | counts LRS_xWIN | Oscillator ticks when first pixel is read. The 32-bit value reading from the internal 27 MHz oscillator when the first pixel of the window was read. They can be used to confirm the calculation of the center of integration offsets. |
| ticklast (Chunked Dataset) | UINT_4_LE (:) | LRS_xWIN Oscillator ticks when last pixel is read (not_set) | counts LRS_xWIN | Oscillator ticks when last pixel is read. The 32-bit value reading from the internal 27 MHz oscillator when the last pixel of the window was read. They can be used to confirm the calculation of the center of integration offsets. |
| use_f (Chunked Dataset) | INTEGER_1 (:) | LRS_xWIN Window Use Flag (not_set) | 1 LRS_xWIN | Window Use - This 16-bit value reports the way that the window is currently being used by the search and tracking algorithms. The valid codes are defined as follows (other codes are invalid): 0 = Inactive, 1= Image Generation, 2 = Searching, 3 = Tracking flag_values: 0, 1, 2, 3 flag_meanings : inactive image_gen search track |
| vdot_avg (Chunked Dataset) | FLOAT (:) | LRS_LWIN Average Vertical Velocity (not_set) | pixels/second LRS_LWIN | This 32-bit value contains the average vertical velocity for the target in pixels per frame, 1:23:8 fixed point format. |
| vloc (Chunked Dataset) | UINT_2_LE (:) | LRS_LWIN Vertical location of window (not_set) | pixels LRS_LWIN | Vertical location of window. The 16-bit values for the coordinates of the minimum row contained within the window. The Transmit Laser window uses 5 x 5 pixels, so the coordinates of the center will be 2.5 pixels greater in each axis. |
| windex (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Window Index (not_set) | counts LRSxTWIN | Window Index- The 16-bit value contains the window index reported in this packet. |
| **Group: /lrs/stellar_centroid** | | | | |
| Description | (Attribute) | The (Application Mode) Stellar Centroid Data Packet contains reported Stellar-Side Centroids, which are part of the core LRS data output. This packet is normally reported and stored at a nominally 10 Hz rate with a variable number of stars reported and is available through all data channels (SSR, real time telemetry, and onboard to the spacecraft ACS). | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source LRS Stellar Centroid Data Packet. (nominally 10 per second.) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| cent_h (Chunked Dataset) | FLOAT (:) | LRS_LCENT centroid H (not_set) | pixels LRS_LCENT | The centroid H value. |
| cent_mag (Chunked Dataset) | INTEGER_2 (:) | LRS_LCENT centroid magitude (not_set) | counts LRS_LCENT | The 12-bit centroid magnitude. From Word 2, bits 15 (MSB) to 4 |
| cent_v (Chunked Dataset) | FLOAT (:) | LRS_LCENT centroid V (not_set) | pixels LRS_LCENT | The centroid V value. |
| centofintbase (Chunked Dataset) | UINT_4_LE (:) | Center of integration base (not_set) | counts LRS | Base age of centroids relative to secondary header timestamp. This 32-bit value indicates how many 843.75 kHz time ticks of offset should be applied between the secondary header timestamp and the center_of_integration for the laser centroids reported. This time offset assumes that the secondary header timestamp represents an exact milli-second (that is, is |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| | | | | accurate beyond the precision expressed in the timestamp). The offset is based on the LRS internal 27 MHz oscillator (divided by 32), and it can express offset from zero to more than 84 minutes with about 1.185 micro second resolution. Under normal operating conditions, the offset should never exceed 20 milli seconds (about 16875 counts). Centroid timetags offset with this value alone should be adequate for coarse geo-location, but not precision geo-location knowledge as expected for science (individual centroid offsets are required for that purpose). |
| coi_offset (Chunked Dataset) | INTEGER_2 (:) | Center of integration offset (not_set) | counts LRS | The signed 16-bit center of integration offset for this specific centroid. |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Retrieved times from the CCSDS header timestamps, in seconds relative to 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. |
| quality_f (Chunked Dataset) | INTEGER_1 (:) | LRS_LCENT Centroid quality (not_set) | 1 LRS_LCENT | Flag indicates centroids pass basic validity checks in the LRS software. 0 indicate valid centroids; 1 indicate the corresponding centroid is considered questionable (that is, the corresponding centroid should not be expected to report a valid target with full accuracy). flag_values: 0, 1 flag_meanings : valid questionable |
| trackstat_f (Chunked Dataset) | INTEGER_1 (:) | LRS_LCENT Tracking status (not_set) | 1 LRS_LCENT | Flag indicates tracking status for centroid. 1 indicate valid tracking of that centroid window; 0 indicate the corresponding window is in a searching or acquiring state (that is, the corresponding centroid should not be considered to report a valid target). flag_values: 0, 1 flag_meanings : acq_state track_state |

| Group: /lrs/stellar_image | | | | |
|---|---|---|---|---|
| Description | (Attribute) | | The (Application Mode) Laser Image Data Packet contains measured pixel data from a Laser-Side image dump. This SSR packet is only reported when requested by command, and is normally used only for diagnostic purposes. Packets contain pixel data in the form of 6 8x8 windows. Each 'pixeldata' array contains 64 pixels of an image. All 6 images are put together to make a 1024 by 1024 image. During the image dump, no spots are tracked (the LCENT packets are not telemetered to ground while dumping the image). | |
| data_rate | (Attribute) | | Data within this group are stored at the data rate of the source LRS Laser Image Data Packet. (This packet is dumped only when commanded.) | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| centofintbase (Chunked Dataset) | UINT_4_LE (:) | Center of integration base (not_set) | counts LRS | Base age of centroids relative to secondary header timestamp. This 32-bit value indicates how many 843.75 kHz time ticks of offset should be applied between the secondary header timestamp and the center_of_integration for the laser centroids reported. This time offset assumes that the secondary header timestamp represents an exact milli-second (that is, is accurate beyond the precision expressed in the timestamp). The offset is based on the LRS internal 27 MHz oscillator (divided by 32), and it can express offset from zero to more than 84 minutes with about 1.185 micro second resolution. Under normal operating conditions, the offset should never exceed 20 milli seconds (about 16875 counts). Centroid timetags offset with this value alone should be adequate for coarse geo-location, but not precision geo-location knowledge as expected for science (individual centroid offsets are required for that purpose). |
| cycle (Chunked Dataset) | UINT_2_LE (:) | cycle (LRS_SIMG Cycle) | counts LRS_SIMG | This 16-bit value is the number (0 to 4 are valid) of the cycle within the 100 millisecond integration period on which this packet was generated. The actual window used for the pixel data will be window (6*CYCLE + n). |
| datatype (Chunked Dataset) | UINT_2_LE (:) | LRS_xIMG Type of pixel data (not_set) | 1 LRS_SIMG | This 16-bit value contains a code indicating the type of pixel data being reported in the packet. The valid codes are defined as follows (other codes are invalid): 0 Raw Pixel Data (no compensation), 4369 Dark Frame Corrected Data, 8738 Data Corrected for both Dark Frame and Local Dark flag_values: 0, 4369, 8738 flag_meanings : raw dark adj |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Time computed from the base age of the centroids, 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. |
| nread (Chunked Dataset) | UINT_2_LE (:) | LRSxLIMG Window read count (not_set) | counts LRS_xIMG | This 16-bit value is the number of reads performed on the window. This value will count up to the requested number of reads on successive packets. The detector has a settling behavior when read on successive cycles, so it may be necessary to perform multiple back-to-back reads to mimic the behavior that will occur when windows are tracked. |
| sdc_t (Chunked Dataset) | FLOAT (:) | LRS_HK Stellar Detector Card Temperature (not_set) | Degrees LRS_HK | Temperature of Stellar Detector Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |

| Group: /lrs/stellar_image/window_nn | | | | |
|---|---|---|---|---|
| Description | (Attribute) | | This group contains five of the laser image windows reported within the LRStmLIMG packet. This SSR packet is only reported when requested by command, and is normally used only for diagnostic purposes. Window 0 is a vertical slice of 8 pixels starting at 1, windows step 48 verticals, the next image starts at vertical 49, Window 1 is a vertical slice of 8 pixels starting at 9, windows step 48 verticals, the next image starts at vertical 57, | |

| data_rate | (Attribute) | Data within this group are stored at the data rate of the source LRS Stellar Image Data Packet. This packet is dumped only when commanded.) | | |
|---|---|---|---|---|
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| ds_pixel_64_index<br>(Contiguous Dataset) | INTEGER_1<br>(64) | Pixel Index for 64 pixel arrays<br>(not_set) | 1<br>not_set | Dimension scale for 64-pixel arrays. |
| hloc<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_LIMG Horizontal location of window<br>(not_set) | pixels<br>LRS_LIMG | Horizontal location of window. The 16-bit values for the coordinates of the minimum column contained within the window. All windows are 8 x 8 pixels ( same size as TAMS), so the coordinates of the center will be 3.5 pixels greater in each axis. |
| pixeldata<br>(Chunked Dataset) | UINT_2_LE<br>(64, :) | LRS_LIMG pixel data<br>(not_set) | counts<br>LRS_LIMG | Pixel data for window- The arrays contains the 64 pixels of a TAMS window. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], then [HLOC+7, VLOC], then [HLOC, VLOC+1], and ending with [HLOC+7, VLOC+7] ). |
| vloc<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_LIMG Vertical location of window<br>(not_set) | pixels<br>LRS_LIMG | Vertical location of window. The 16-bit values for the coordinates of the minimum row contained within the window. All windows are 8 x 8 pixels ( same size as TAMS), so the coordinates of the center will be 3.5 pixels greater in each axis. |
| **Group: /lrs/stellar_window** | | | | |
| Description | (Attribute) | The (Application Mode) Stellar Window Data Packet contains measured pixel data from a Stellar-Side centroid window. This SSR packet is only reported when requested by command, and is normally used only for diagnostic purposes. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source LRS Stellar Window Data Packet. (This packet is dumped only when commanded.) | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| adjdata<br>(Chunked Dataset) | UINT_2_LE<br>(64, :) | LRS_SWIN Adjusted Pixel data for window<br>(not_set) | counts<br>LRS_SWIN | Adjusted Pixel data for window - The array contains the 64 pixels of the window containing the pixel readings after they are corrected for both the predicted dark frame and the LOCALDARK bias. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| cent_h<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_SWIN centroid H<br>(not_set) | pixels<br>LRS_SWIN | The centroid H value (in 256ths of a pixel). |
| cent_mag<br>(Chunked Dataset) | INTEGER_2<br>(:) | LRS_SWIN centroid magitude<br>(not_set) | counts<br>LRS_SWIN | The 12-bit centroid magnitude. From Word 2, bits 15 (MSB) to 4. This is a copy of the word that should be reported in the (Application mode) Stellar Centroid Data Packet for the window reported here. |
| cent_v<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_SWIN centroid V<br>(not_set) | pixels<br>LRS_SWIN | The centroid V value (in 256ths of a pixel). |
| centofintbase<br>(Chunked Dataset) | UINT_4_LE<br>(:) | Center of integration base<br>(not_set) | counts<br>LRS | Base age of centroids relative to secondary header timestamp. This 32-bit value indicates how many 843.75 kHz time ticks of offset should be applied between the secondary header timestamp and the center_of_integration for the laser centroids reported. This time offset assumes that the secondary header timestamp represents an exact milli-second (that is, is accurate beyond the precision expressed in the timestamp). The offset is based on the LRS internal 27 MHz oscillator (divided by 32), and it can express offset from zero to more than 84 minutes with about 1.185 micro second resolution. Under normal operating conditions, the offset should never exceed 20 milli seconds (about 16875 counts). Centroid timetags offset with this value alone should be adequate for coarse geo-location, but not precision geo-location knowledge as expected for science (individual centroid offsets are required for that purpose). |
| coi_offset<br>(Chunked Dataset) | INTEGER_2<br>(:) | Center of integration offset<br>(not_set) | counts<br>LRS | The signed 16-bit center of integration offset for this specific centroid. |
| darkdata<br>(Chunked Dataset) | UINT_2_LE<br>(64, :) | LRS_SWIN Dark pixel data for window<br>(not_set) | counts<br>LRS_SWIN | Dark pixel data for window- The array contains the 64 pixels of the window contain the pixel readings after they are corrected for the predicted dark frame. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| darkfactor<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Dark Factor<br>(not_set) | counts<br>LRS_TWIN | Dark Factor - This 16-bit value is the scale factor applied when correcting the window reading for dark frame. |
| darkoff_next<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Next Frame Dark Offset<br>(not_set) | counts<br>LRS_TWIN | This 16-bit value contains the dark offset value that will be used for processing this window in the next frame. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time of the centroid, 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. |
| ds_pixel_64_index<br>(Contiguous Dataset) | INTEGER_1<br>(64) | Pixel Index for 64 pixel arrays | 1<br>not_set | Dimension scale for 64-pixel arrays. |

| | | | | |
|---|---|---|---|---|
| | | | (not_set) | |
| hdot_avg<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_xWIN Average<br>Horizontal Velocity<br>(not_set) | pixels/second<br>LRS_xWIN | This 32-bit value contains the average horizontal velocity for the target in pixels per frame, 1:23:8 fixed point format. |
| hloc<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_SWIN Horizontal<br>location of window<br>(not_set) | pixels<br>LRS_SWIN | Horizontal location of window. The 16-bit values for the coordinates of the minimum column contained within the window.<br>The Stellar window uses 8 x 8 pixels, so the coordinates of the center will be 3.5 pixels greater in each axis. |
| localdark<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Local Dark<br>(not_set) | counts<br>LRS_xWIN | Local Dark - This 16-bit value is the local dark correction applied when correcting the window reading for stray light and/or<br>residual dark frame bias. |
| max_mag<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Maximum<br>Magnitude<br>(not_set) | counts<br>LRS_xWIN | This 16-bit value contains the maximum magnitude value for the target. |
| min_mag<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Minimum<br>Magnitude<br>(not_set) | counts<br>LRS_xWIN | This 16-bit value contains the minimum magnitude value for the target. |
| quality_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | LRS_SWIN Centroid<br>quality flag<br>(not_set) | 1<br>LRS_SWIN | Flag indicates centroids pass basic validity checks in the LRS software. 0 indicate valid centroids; 1 indicate the<br>corresponding centroid is considered questionable (that is, the corresponding centroid should not be expected to report a<br>valid target with full accuracy).<br>flag_values: 0, 1<br>flag_meanings : valid questionable |
| rawdata<br>(Chunked Dataset) | UINT_2_LE<br>(64, :) | LRS_SWIN Raw pixel<br>data for window<br>(not_set) | counts<br>LRS_SWIN | Raw pixel data for window- The array contains the 64 pixels of the window contain the ADC readings for the pixels without<br>onboard corrections. The values are transmitted in raster scan order, starting with the minimum row and column values<br>(that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then<br>[HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| sdc_t<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_HK Stellar<br>Detector Card<br>Temperature<br>(not_set) | degrees<br>LRS_HK | Temperature of Stellar Detector Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see<br>thermistor scaling section later for temperature scaling] |
| status_f<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Target<br>status<br>(not_set) | 1<br>LRS_xWIN | Target status-This 16-bit value contains a code indicating the target status applicable to the window reported in this packet.<br>The valid codes are defined as follows (other codes are invalid): 65531 Dimmest Spot (not currently used), 65532 Invalid<br>Rate, 65533 Collided with Another Window, 65534 Violated Minimum Area Limit, 65535 Violated Image Bound, 0 Empty, 1<br>Acquire1, 2 Acquire2, 3 Tracking<br>flag_values: 0, 1, 2, 3, 65532, 65534, 65535<br>flag_meanings : empty acq1 acq2 track not_allowed collided violated |
| tickattime<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_xWIN Oscillator<br>Tick Value<br>(not_set) | counts<br>LRS_xWIN | Oscillator tick value at last time pulse. This 32-bit value is the reading from the internal 27 MHz oscillator at the last 1 PPS<br>time tick. |
| tickfirst<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_xWIN Oscillator<br>ticks when first pixel is<br>read<br>(not_set) | counts<br>LRS_xWIN | Oscillator ticks when first pixel is read. The 32-bit value reading from the internal 27 MHz oscillator when the first pixel of<br>the window was read. They can be used to confirm the calculation of the center of integration offsets. |
| ticklast<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_xWIN Oscillator<br>ticks when last pixel is<br>read<br>(not_set) | counts<br>LRS_xWIN | Oscillator ticks when last pixel is read. The 32-bit value reading from the internal 27 MHz oscillator when the last pixel of<br>the window was read. They can be used to confirm the calculation of the center of integration offsets. |
| tickoverlap<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_SWIN Oscillator<br>ticks when last pixel is<br>read<br>(not_set) | counts<br>LRS_SWIN | Oscillator ticks at the start or end of a pixel row overlap. The 32-bit value reading from the internal 27 MHz oscillator when<br>the overlap started/ended. They can be used to confirm the calculation of the center of integration offsets. |
| use_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | LRS_xWIN Window<br>Use Flag<br>(not_set) | 1<br>LRS_xWIN | Window Use - This 16-bit value reports the way that the window is currently being used by the search and tracking<br>algorithms. The valid codes are defined as follows (other codes are invalid): 0 = Inactive, 1= Image Generation, 2 =<br>Searching, 3 = Tracking<br>flag_values: 0, 1, 2, 3<br>flag_meanings : inactive image_gen search track |
| vdot_avg<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_LWIN Average<br>Vertical Velocity<br>(not_set) | pixels/second<br>LRS_LWIN | This 32-bit value contains the average vertical velocity for the target in pixels per frame, 1:23:8 fixed point format. |
| vloc<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_SWIN Vertical<br>location of window<br>(not_set) | pixels<br>LRS_SWIN | Vertical location of window. The 16-bit values for the coordinates of the minimum row contained within the window. The<br>Stellar window uses 8 x 8 pixels, so the coordinates of the center will be 3.5 pixels greater in each axis. |
| | | | | |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| windex (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Window Index (not_set) | counts LRSxTWIN | Window Index- The 16-bit value contains the window index reported in this packet. |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| adjdata (Chunked Dataset) | UINT_2_LE (64, :) | LRS_TWIN Adjusted Pixel data for window (not_set) | counts LRS_TWIN | Adjusted Pixel data for window - The array contains the 64 pixels of the window containing the pixel readings after they are corrected for both the predicted dark frame and the LOCALDARK bias. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| cent_h (Chunked Dataset) | FLOAT (:) | LRS_LCENT centroid H (not_set) | pixels LRS_LCENT | The centroid H value (in 256ths of a pixel). |
| cent_mag (Chunked Dataset) | INTEGER_2 (:) | LRS_LCENT centroid magitude (not_set) | counts LRS_LCENT | The 12-bit centroid magnitude. From Word 2, bits 15 (MSB) to 4 |
| cent_v (Chunked Dataset) | FLOAT (:) | LRS_LCENT centroid V (not_set) | pixels LRS_LCENT | The centroid V value (in 256ths of a pixel). |
| centofintbase (Chunked Dataset) | UINT_4_LE (:) | Center of integration base (not_set) | counts LRS | Base age of centroids relative to secondary header timestamp. This 32-bit value indicates how many 843.75 kHz time ticks of offset should be applied between the secondary header timestamp and the center_of_integration for the laser centroids reported. This time offset assumes that the secondary header timestamp represents an exact milli-second (that is, is accurate beyond the precision expressed in the timestamp). The offset is based on the LRS internal 27 MHz oscillator (divided by 32), and it can express offset from zero to more than 84 minutes with about 1.185 micro second resolution. Under normal operating conditions, the offset should never exceed 20 milli seconds (about 16875 counts). Centroid timetags offset with this value alone should be adequate for coarse geo-location, but not precision geo-location knowledge as expected for science (individual centroid offsets are required for that purpose). |
| coi_offset (Chunked Dataset) | INTEGER_2 (:) | Center of integration offset (not_set) | counts LRS | The signed 16-bit center of integration offset for this specific centroid. |
| darkdata (Chunked Dataset) | UINT_2_LE (64, :) | LRS_TWIN Dark pixel data for window (not_set) | counts LRS_TWIN | Dark pixel data for window- The array contains the 64 pixels of the window contain the pixel readings after they are corrected for the predicted dark frame. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| darkfactor (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Dark Factor (not_set) | counts LRS_TWIN | Dark Factor - This 16-bit value is the scale factor applied when correcting the window reading for dark frame. |
| darkoff_next (Chunked Dataset) | UINT_2_LE (:) | LRS_xWIN Next Frame Dark Offset (not_set) | counts LRS_TWIN | This 16-bit value contains the dark offset value that will be used for processing this window in the next frame. |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Time of the centroid, 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. |
| ds_pixel_64_index (Contiguous Dataset) | INTEGER_1 (64) | Pixel Index for 64 pixel arrays (not_set) | 1 not_set | Dimension scale for 64-pixel arrays. |
| hdot_avg (Chunked Dataset) | FLOAT (:) | LRS_xWIN Average Horizontal Velocity (not_set) | pixels/second LRS_xWIN | This 32-bit value contains the average horizontal velocity for the target in pixels per frame, 1:23:8 fixed point format. |
| hloc (Chunked Dataset) | UINT_2_LE (:) | LRS_TWIN Horizontal location of window (not_set) | pixels LRS_TWIN | Horizontal location of window. The 16-bit values for the coordinates of the minimum column contained within the window. The TAMS window uses 8 x 8 pixels, so the coordinates of the center will be 3.5 pixels greater in each axis. |
| ldc_t (Chunked Dataset) | FLOAT (:) | LRS_HK Laser Detector Card Temperature (not_set) | Degrees LRS_HK | Temperature of Laser Detector Card - 0x0000 = 0.000 V (nominal short); 0xFFFF = +4.000 V (nominal open) [see thermistor scaling section later for temperature scaling] |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| localdark<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Local Dark<br>(not_set) | counts<br>LRS_xWIN | Local Dark - This 16-bit value is the local dark correction applied when correcting the window reading for stray light and/or residual dark frame bias. |
| max_mag<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Maximum Magnitude<br>(not_set) | counts<br>LRS_xWIN | This 16-bit value contains the maximum magnitude value for the target. |
| min_mag<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Minimum Magnitude<br>(not_set) | counts<br>LRS_xWIN | This 16-bit value contains the minimum magnitude value for the target. |
| quality_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | LRS_LCENT Centroid quality<br>(not_set) | 1<br>LRS_LCENT | This 16-bit value contains a single bit for the quality of this image only.<br>flag_values: 0, 1<br>flag_meanings : valid questionable |
| rawdata<br>(Chunked Dataset) | UINT_2_LE<br>(64, :) | LRS_TWIN Raw pixel data for window<br>(not_set) | counts<br>LRS_TWIN | Raw pixel data for window- The array contains the 64 pixels of the window contain the ADC readings for the pixels without onboard corrections. The values are transmitted in raster scan order, starting with the minimum row and column values (that is, the first transmitted 16-bit word will be from [HLOC, VLOC], then [HLOC+1, VLOC], , then [HLOC+7, VLOC], then [HLOC, VLOC+1], , and ending with [HLOC+7, VLOC+7] ). |
| status_f<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Target status<br>(not_set) | 1<br>LRS_xWIN | Target status-This 16-bit value contains a code indicating the target status applicable to the window reported in this packet. The valid codes are defined as follows (other codes are invalid): 65531 Dimmest Spot (not currently used), 65532 Invalid Rate, 65533 Collided with Another Window, 65534 Violated Minimum Area Limit, 65535 Violated Image Bound, 0 Empty, 1 Acquire1, 2 Acquire2, 3 Tracking<br>flag_values: 0, 1, 2, 3, 65532, 65534, 65535<br>flag_meanings : empty acq1 acq2 track not_allowed collided violated |
| tickattime<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_xWIN Oscillator Tick Value<br>(not_set) | counts<br>LRS_xWIN | Oscillator tick value at last time pulse. This 32-bit value is the reading from the internal 27 MHz oscillator at the last 1 PPS time tick. |
| tickfirst<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_xWIN Oscillator ticks when first pixel is read<br>(not_set) | counts<br>LRS_xWIN | Oscillator ticks when first pixel is read. The 32-bit value reading from the internal 27 MHz oscillator when the first pixel of the window was read. They can be used to confirm the calculation of the center of integration offsets. |
| ticklast<br>(Chunked Dataset) | UINT_4_LE<br>(:) | LRS_xWIN Oscillator ticks when last pixel is read<br>(not_set) | counts<br>LRS_xWIN | Oscillator ticks when last pixel is read. The 32-bit value reading from the internal 27 MHz oscillator when the last pixel of the window was read. They can be used to confirm the calculation of the center of integration offsets. |
| use_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | LRS_xWIN Window Use Flag<br>(not_set) | 1<br>LRS_xWIN | Window Use - This 16-bit value reports the way that the window is currently being used by the search and tracking algorithms. The valid codes are defined as follows (other codes are invalid): 0 = Inactive, 1= Image Generation, 2 = Searching, 3 = Tracking<br>flag_values: 0, 1, 2, 3<br>flag_meanings : inactive image_gen search track |
| vdot_avg<br>(Chunked Dataset) | FLOAT<br>(:) | LRS_LWIN Average Vertical Velocity<br>(not_set) | pixels/second<br>LRS_LWIN | This 32-bit value contains the average vertical velocity for the target in pixels per frame, 1:23:8 fixed point format. |
| vloc<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_TWIN Vertical location of window<br>(not_set) | pixels<br>LRS_TWIN | Vertical location of window. The 16-bit values for the coordinates of the minimum row contained within the window. The TAMS window uses 8 x 8 pixels, so the coordinates of the center will be 3.5 pixels greater in each axis. |
| windex<br>(Chunked Dataset) | UINT_2_LE<br>(:) | LRS_xWIN Window Index<br>(not_set) | counts<br>LRSxTWIN | Window Index- The 16-bit value contains the window index reported in this packet. |
| **Group: /orbit_info** | | | | |
| Description | (Attribute) | Contains orbit information. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source PCE Altimetric Data Packets. (nominally fifty per second.) | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| cycle_number<br>(Chunked Dataset) | INTEGER_1<br>(:) | Cycle Number<br>(not_set) | 1<br>Operations | A count of the number of exact repeats of this reference orbit. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Granule Start Time<br>(time) | seconds since 2018-01-01<br>Operations | Number of GPS seconds since the ATLAS SDP epoch at the start of the granule. At the time of ATL02 creation, the equator crossing time is not precisely known.. 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. |
| orbit_number | UINT_2_LE | Orbit Number | 1 | Unique identifying number for each planned ICESat-2 orbit. |

| | | | (not_set) | Operations |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| rgt (Chunked Dataset) | INTEGER_2 (:) | Reference Ground track (not_set) | 1 Operations | 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. |

**Group: /quality_assessment**

| Description | (Attribute) | Contains quality assessment data. This may include QA counters, QA along-track data and/or QA summary data. | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| ds_statistics (Contiguous Dataset) | INTEGER_1 (5) | Dimension scale for QA statistics (not_set) | 1 Derived (QA) | QA statistics array index flag_values: 1, 2, 3, 4, 5 flag_meanings : number_of_points minimum maximum average standard_deviation |
| qa_granule_fail_reason (Compact Dataset) | INTEGER_4 (1) | Granule Failure Reason (not_set) | 1 Operations | Flag indicating granule failure reason. 0=no failure; 1=processing error; 2=Insufficient output data was generated; 3=TBD Failure; 4=TBD_Failure; 5=other failure. flag_values: 0, 1, 2, 3, 4, 5 flag_meanings : no_failure PROCESS_ERROR INSUFFICIENT_OUTPUT failure_3 failure_4 OTHER_FAILURE |
| qa_granule_pass_fail (Compact Dataset) | INTEGER_4 (1) | Granule Pass Flag (not_set) | 1 Operations | Flag indicating granule quality. 0=granule passes automatic QA. 1=granule fails automatic QA. flag_values: 0, 1 flag_meanings : PASS FAIL |

**Group: /quality_assessment/along_track**

| Description | (Attribute) | Along-track statistics | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| delta_time_end (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of seconds since the ATLAS SDP epoch at the end of the QA interval. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| delta_time_start (Chunked Dataset) | DOUBLE (:) | Elapsed UTC seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of seconds since the ATLAS SDP epoch at the start of the QA interval. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |

**Group: /quality_assessment/along_track/pcex**

| Description | (Attribute) | Along-track statistics | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| qa_at_n_dupe (Chunked Dataset) | INTEGER_4 (:) | Number of duplicates (not_set) | counts Derived (QA) | The number of duplicate Rx events detected in the along-track interval. |
| qa_at_n_rx_s (Chunked Dataset) | INTEGER_4 (:) | Number of Strong Rx Events (not_set) | counts Derived (QA) | The number of Strong Rx events in the along-track interval. |
| qa_at_n_rx_w (Chunked Dataset) | INTEGER_4 (:) | Number of Weak Rx Events (not_set) | counts Derived (QA) | The number of Weak Rx events in the along-track interval. |
| qa_at_n_tep (Chunked Dataset) | INTEGER_4 (:) | Number of TEPs (not_set) | counts Derived (QA) | The number of TEP events detected in the along-track interval. |
| qa_at_n_tx (Chunked Dataset) | INTEGER_4 (:) | Number of Tx Pulses (not_set) | counts Derived (QA) | The number of Tx Pulses in the along-track interval. |
| qa_at_tx_ll_stat (Chunked Dataset) | DOUBLE (5, :) | QA Tx LL Stat (not_set) | counts Derived (QA) | Along-track statistic of Transmit Leading Lower time of flight. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_at_tx_other_stat (Chunked Dataset) | DOUBLE (5, :) | QA Tx Other Stat (not_set) | counts Derived (QA) | Along-track statistic of the Other Transmit time of flight measurement. For PCE1, this is Transmit Leading Upper edge (LU) time; for PCE2 this is Transmit Trailing Upper edge (TU) time; and for PCE3 this is Transmit Trailing Lower edge (TL) time. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |

**Group: /quality_assessment/record_counts**

| Description | (Attribute) | Packet count statistics | | |
|---|---|---|---|---|
| Label | Datatype | long_name | units | description |

| (Layout) | (Dimensions) | (standard_name) | source | |
|---|---|---|---|---|
| delta_time_end<br>(Compact Dataset) | DOUBLE<br>(1) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Number of seconds since the ATLAS SDP epoch at the end of the interval. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| delta_time_start<br>(Compact Dataset) | DOUBLE<br>(1) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Number of seconds since the ATLAS SDP epoch at the start of the QA interval. 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. |
| qa_n_a_hkt_a<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_HKT_A inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_HKT_A inputs processed. |
| qa_n_a_hkt_b<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_HKT_B inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_HKT_B inputs processed. |
| qa_n_a_hkt_c<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_HKT_C inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_HKT_C inputs processed. |
| qa_n_a_hkt_d<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_HKT_D inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_HKT_D inputs processed. |
| qa_n_a_hkt_e<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_HKT_E inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_HKT_E inputs processed. |
| qa_n_a_hkt_status<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_HKT_STATUS inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_HKT_STATUS inputs processed. |
| qa_n_a_mce_pos<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_MCE_POS inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_MCE_POS inputs processed. |
| qa_n_a_sc_pon<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_SC_PON inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_SC_PON inputs processed. |
| qa_n_a_sc_pos<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_SC_POS inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_SC_POS inputs processed. |
| qa_n_a_sc_tat<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_SC_TAT inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_SC_TAT inputs processed. |
| qa_n_a_sla_hk<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of A_SLA_HK inputs.<br>(not_set) | counts<br>Derived (QA) | The number of A_SLA_HK inputs processed. |
| qa_n_lrs_hk<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of LRS HK inputs.<br>(not_set) | counts<br>Derived (QA) | The number of LRS HK inputs processed. |
| qa_n_lrs_laser_cent<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of LRS Laser Centroid inputs.<br>(not_set) | counts<br>Derived (QA) | The number of LRS Laser Centroid inputs processed. |
| qa_n_lrs_laser_image<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of LRS Laser Image inputs.<br>(not_set) | counts<br>Derived (QA) | The number of LRS Laser Image inputs processed. |
| qa_n_lrs_laser_window<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of LRS Laser Window inputs.<br>(not_set) | counts<br>Derived (QA) | The number of LRS Laser Window inputs processed. |
| qa_n_lrs_stellar_cent<br>(Compact Dataset) | INTEGER_4<br>(1) | Number of LRS Stellar Centroid inputs.<br>(not_set) | counts<br>Derived (QA) | The number of LRS Stellar Centroid inputs processed. |
| qa_n_lrs_stellar_image | INTEGER_4 | Number of LRS Stellar | counts | The number of LRS Stellar Image inputs processed. |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Compact Dataset) | (1) | Image inputs. (not_set) | Derived (QA) | |
| qa_n_lrs_stellar_window (Compact Dataset) | INTEGER_4 (1) | Number of LRS Stellar Window inputs. (not_set) | counts Derived (QA) | The number of LRS Stellar Window inputs processed. |
| qa_n_lrs_tams_window (Compact Dataset) | INTEGER_4 (1) | Number of LRS TAMS Window inputs. (not_set) | counts Derived (QA) | The number of LRS TAMS Window inputs processed. |
| qa_n_sc1 (Compact Dataset) | INTEGER_4 (1) | Number of SC1 inputs. (not_set) | counts Derived (QA) | The number of SC1 inputs processed. |
| qa_n_sc2 (Compact Dataset) | INTEGER_4 (1) | Number of SC2 inputs. (not_set) | counts Derived (QA) | The number of SC2 inputs processed. |
| qa_n_sc3 (Compact Dataset) | INTEGER_4 (1) | Number of SC3 inputs. (not_set) | counts Derived (QA) | The number of SC3 inputs processed. |
| qa_n_sc4 (Compact Dataset) | INTEGER_4 (1) | Number of SC4 inputs. (not_set) | counts Derived (QA) | The number of SC4 inputs processed. |
| qa_n_sim_hk (Compact Dataset) | INTEGER_4 (1) | Number of SIM_HK inputs. (not_set) | counts Derived (QA) | The number of SIM_HK inputs processed. |

**Group: /quality_assessment/record_counts/pcex**

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| qa_n_a_dfc_hk (Compact Dataset) | INTEGER_4 (1) | Number of DFC HK Inputs (not_set) | counts Derived (QA) | The number of A_DFC_HK inputs processed. |
| qa_n_alt_mframe (Compact Dataset) | INTEGER_4 (1) | Number of major frame inputs. (not_set) | counts Derived (QA) | The number of major frame inputs processed. |
| qa_n_atm_hist_s (Compact Dataset) | INTEGER_4 (1) | Number of ATM Strong inputs. (not_set) | counts Derived (QA) | The number of ATM strong inputs processed. |
| qa_n_atm_hist_w (Compact Dataset) | INTEGER_4 (1) | Number of ATM weak inputs. (not_set) | counts Derived (QA) | The number of ATM weak inputs processed. |
| qa_n_pmf_algorithm_science (Compact Dataset) | INTEGER_4 (1) | Number of PMF Algorithm Science inputs. (not_set) | counts Derived (QA) | The number of PMF Algorithm Science inputs processed. |
| qa_n_pmf_timekeeping (Compact Dataset) | INTEGER_4 (1) | Number of PMF Timekeeping inputs. (not_set) | counts Derived (QA) | The number of PMF TImekeeping inputs processed. |

**Group: /quality_assessment/summary**

| Description | (Attribute) | Summary statistics | | |
|---|---|---|---|---|
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| delta_time_end (Compact Dataset) | DOUBLE (1) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of seconds since the ATLAS SDP epoch at the end of the QA interval. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| delta_time_start (Compact Dataset) | DOUBLE (1) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| qa_amet_r1 (Compact Dataset) | INTEGER_4 (1) | AMET Increment OOB (not_set) | counts Derived (QA) | Number of instances where the difference between external AMET counter and the GPS 1PPS exceeds the limit of 1.0. |
| qa_amet_r2 (Compact Dataset) | INTEGER_4 (1) | AMET Increment OOB (not_set) | counts Derived (QA) | Number of instances where the difference between internal AMET at 1PPS and GPS 1PPS exceed the limit of 100.e6. |

| | | | | |
|---|---|---|---|---|
| qa_bias_offset_x<br>(Compact Dataset) | INTEGER_4<br>(1) | Num Bias Offset X<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the bias offset X value is outside the limit of -70 to 70 microradians. |
| qa_bias_offset_y<br>(Compact Dataset) | INTEGER_4<br>(1) | Num Bias Offset Y<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the bias offset Y value is outside the limit of -70 to 70 microradians. |
| qa_cal47_temp<br>(Compact Dataset) | INTEGER_4<br>(1) | CAL47 temperature<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the CAL-47 temperature is outside the limit of -20 to 50 degC. |
| qa_fw_flag<br>(Compact Dataset) | INTEGER_4<br>(1) | Freewheel Indicated<br>(not_set) | counts<br>Derived (QA) | Number of instances where the freewheel flag is non-zero. |
| qa_hvpc_mod_1<br>(Compact Dataset) | INTEGER_4<br>(1) | Num HVPC Bias Mod 1<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the HVPC Bias Mod1 value is outside the limit of -2000 to 0 counts. |
| qa_hvpc_mod_2<br>(Compact Dataset) | INTEGER_4<br>(1) | Num HVPC Bias Mod 2<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the HVPC Bias Mod2 value is outside the limit of -2000 to 0 counts. |
| qa_hvpc_mod_3<br>(Compact Dataset) | INTEGER_4<br>(1) | Num HVPC Bias Mod 3<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the HVPC Bias Mod3 value is outside the limit of -2000 to 0 counts. |
| qa_hvpc_mod_4<br>(Compact Dataset) | INTEGER_4<br>(1) | Num HVPC Bias Mod 4<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the HVPC Bias Mod4 value is outside the limit of -2000 to 0 counts. |
| qa_hvpc_mod_5<br>(Compact Dataset) | INTEGER_4<br>(1) | Num HVPC Bias Mod 5<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the HVPC Bias Mod5 value is outside the limit of -2000 to 0 counts. |
| qa_hvpc_mod_6<br>(Compact Dataset) | INTEGER_4<br>(1) | Num HVPC Bias Mod 6<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the HVPC Bias Mod6 value is outside the limit of -2000 to 0 counts. |
| qa_int_e_tx<br>(Compact Dataset) | INTEGER_4<br>(1) | Num Internal Energy<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the computed total internal laser energy is outside the limit of 130 to 2700 microjoules. |
| qa_internal_energy<br>(Compact Dataset) | INTEGER_4<br>(1) | Num Internal Energy<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where input internal laser energy values exceed the limit of 0 to 200 counts. |
| qa_internal_temp<br>(Compact Dataset) | INTEGER_4<br>(1) | Num Internal Temp<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where input laser temperature values exceed the limit of 20 to 40 degC. |
| qa_lrs_e_tx<br>(Compact Dataset) | INTEGER_4<br>(1) | Num LRS Energy OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the computed total LRS laser energy is outside the limit of 130 to 2700 microjoules. |
| qa_lrs_inv_mag<br>(Compact Dataset) | INTEGER_4<br>(6,1) | Num LRS Mag Invalid<br>(not_set) | counts<br>Derived (QA) | Number of instances where an LRS laser magnitude is outside the limit of 0-500. |
| qa_lrs_inv_spot<br>(Compact Dataset) | INTEGER_4<br>(1) | Num LRS Spots<br>Missing<br>(not_set) | counts<br>Derived (QA) | Number of instances where not all 6 laser spots are valid when computing LRS laser energy. |
| qa_lrs_inv_sum<br>(Compact Dataset) | INTEGER_4<br>(1) | Num LRS Sums Invalid<br>(not_set) | counts<br>Derived (QA) | Number of instances where the sum of the 6 LRS laser spots is outside the limit of 0 to 2000. |
| qa_lrs_temp<br>(Compact Dataset) | INTEGER_4<br>(1) | Num LRS Temp OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the LRS temperature is outside the limit of -20 to 50 degC. |
| qa_s_tod_a_sla_hk<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for a_sla_hk TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive A_SLA_HK time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_gpsr<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for gpsr TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /gpsr time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_hk_laser_energy<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for<br>hk_laser_energy TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/housekeeping/laser_energy time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_hk_meb | DOUBLE | QA for hk_pdu TOD | counts | Summary statistics on the differences between successive /atlas/housekeeping/meb time of day values. Values are in the |

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|---|---|---|---|---|
| (Compact Dataset) | (5,1) | (not_set) | Derived via L1B ATBD | order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_hk_pdu<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for hk_pdu TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/housekeeping/pdu time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_hk_pointing<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for hk_pointing<br>TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/housekeeping/pointing time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_hk_pos_vel<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for hk_pos_vel<br>TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/housekeeping/position_velocity time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_hk_tat<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for hk_tat TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/housekeeping/time_at_the_tone time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_hk_thermal<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for hk_therm TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/housekeeping/hk_thermal time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_mce_position<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for mce_position<br>TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/housekeeping/mce_position time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_sc_acs<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for acs TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /sc/attitude_control_system time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_sc_ephemeris<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for sc_ephemeris<br>TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /sc/ephemeris time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_sc_hk<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for sc_hk TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /sc/hk time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_sc_imu<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for sc_imu TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /sc/intertial_measurement_unit time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_sc_st<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for sc_star_tracker<br>TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /sc/star_tracker time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_sc_stoh1<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for<br>sc_star_tracker_oh1<br>TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /sc/star_tracker/optical_head1 time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_sc_stoh2<br>(Compact Dataset) | DOUBLE<br>(5,1) | QA for<br>sc_star_tracker_oh2<br>TOD<br>(not_set) | counts<br>Derived via L1B ATBD | Summary statistics on the differences between successive /sc/star_tracker/optical_head2 time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_spd_e_tx<br>(Compact Dataset) | INTEGER_4<br>(1) | Num SPD Energy OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the computed total SPD laser energy is outside the limit of 130 to 2700 microjoules. |
| qa_spd_energy<br>(Compact Dataset) | INTEGER_4<br>(1) | Num SPD Energy OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where input SPD laser energy values exceed the limit of -30000 to 0 counts. |
| qa_spd_temp<br>(Compact Dataset) | INTEGER_4<br>(1) | Num SPD Temp OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where SPD temperature values exceed the limit of -20 to 50 degC. |
| qa_time_corr<br>(Compact Dataset) | INTEGER_4<br>(1) | Shot Time correlation<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the ratio of unaligned shots/aligned shots exceeds the limit of 0.9. |

**Group: /quality_assessment/summary/pcex**

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| qa_bg_sens_s<br>(Compact Dataset) | INTEGER_4<br>(1) | Num Strong Bg<br>Sensitivity OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the computed strong background sensitivity value is outside the limit of 5e16 to 2e18. |
| qa_bg_sens_w<br>(Compact Dataset) | INTEGER_4<br>(1) | Num Weak Bg<br>Sensitivity OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the computed weak background sensitivity value is outside the limit of 5e16 to 2e18. |
| qa_dupe_percent<br>(Compact Dataset) | INTEGER_4<br>(20,1) | Channel Dupe Percent<br>OOB<br>(not_set) | counts<br>Derived (QA) | Number of instances where the per-channel number of duplicates is greater than 10% of the total number of per-channel events. |

| qa_ph_tx_ll (Compact Dataset) | INTEGER_4 (1) | Tx LL OOB (not_set) | counts Derived (QA) | Number of instances where the Tx leading lower exceeds the limit of 33.33ns. |
|---|---|---|---|---|
| qa_ret_sens_s (Compact Dataset) | INTEGER_4 (1) | Num Strong Return Sensitivity OOB (not_set) | counts Derived (QA) | Number of instances where the computed strong return sensitivity value is outside the limit of 0 to 2e18. |
| qa_ret_sens_w (Compact Dataset) | INTEGER_4 (1) | Num Weak Return Sensitivity OOB (not_set) | counts Derived (QA) | Number of instances where the computed weak return sensitivity value is outside the limit of 0 to 2e18. |
| qa_rx_channel_id (Compact Dataset) | INTEGER_4 (1) | Rx Channel ID OOB (not_set) | counts Derived (QA) | Number of instances where the Rx channel ID contains an unexpected value. |
| qa_rx_coarse_count (Compact Dataset) | INTEGER_4 (1) | Rx Coarse Count OOB (not_set) | counts Derived (QA) | Number of instances where the Rx coarse count value exceeds the limit of 10000 counts. |
| qa_rx_fine_count (Compact Dataset) | INTEGER_4 (1) | Rx Fine Count OOB (not_set) | counts Derived (QA) | Number of instances where the Rx fine count value exceeds the limit of 75 counts. |
| qa_s_alt_cal_fall (Compact Dataset) | DOUBLE (5,1) | QA alt_cal_fall (not_set) | counts Derived (QA) | Summary statistic of the full-rate (before interpolation) alt_cal_fall computation. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_alt_cal_rise (Compact Dataset) | DOUBLE (5,1) | QA alt_cal_rise (not_set) | counts Derived (QA) | Summary statistic of the full-rate (before interpolation) alt_cal_rise computation. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_n_1pps_skip (Compact Dataset) | INTEGER_4 (1) | QA 1PPS missed (not_set) | counts Derived via L1B ATBD | Number of times 1 pps was not consecutive. |
| qa_s_n_dupe (Compact Dataset) | INTEGER_4 (1) | Number of duplicates (not_set) | counts Derived (QA) | The number of duplicate Rx events detected in the granule. |
| qa_s_n_mf_skip (Compact Dataset) | INTEGER_4 (1) | QA 1P MF missed (not_set) | counts Derived via L1B ATBD | The number of times major frame counter was not consecutive. |
| qa_s_n_rx_s (Compact Dataset) | INTEGER_8 (1) | Number of Strong Rx Events (not_set) | counts Derived (QA) | The number of Strong Rx events in the granule. |
| qa_s_n_rx_w (Compact Dataset) | INTEGER_8 (1) | Number of Weak Rx Events (not_set) | counts Derived (QA) | The number of Weak Rx events in the granule. |
| qa_s_n_tep (Compact Dataset) | INTEGER_4 (1) | Number of TEPs (not_set) | counts Derived (QA) | The number of TEP events detected in the granule. |
| qa_s_n_tx (Compact Dataset) | INTEGER_8 (1) | Number of Tx Pulses (not_set) | counts Derived (QA) | The number of Tx Pulses in the granule. |
| qa_s_n_tx_oob (Compact Dataset) | INTEGER_4 (1) | QA number of instances TX out of bounds (not_set) | counts Derived via L1B ATBD | The number of times the Tx count is out of bounds (oob); i.e.: 199 to 201 TX pulses were not reported in a major frame. |
| qa_s_tod_alt (Compact Dataset) | DOUBLE (5,1) | QA for pcex_alt TOD (not_set) | counts Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/pcex/altimetry time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_atm_hist_s (Compact Dataset) | DOUBLE (5,1) | QA for atm_his_st TOD (not_set) | counts Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/pcex/atmosphere_strong time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_atm_hist_w (Compact Dataset) | DOUBLE (5,1) | QA for atm_hist_w TOD (not_set) | counts Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/pcex/atmosphere_weak time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_background (Compact Dataset) | DOUBLE (5,1) | QA for pcex_background TOD (not_set) | counts Derived via L1B ATBD | Summary statistics on the differences between successive /atlas/pcex/background time of day values. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tod_method (Compact Dataset) | DOUBLE (5,1) | QA from TOD Methods (not_set) | counts Derived via L1B ATBD | Summary statistics on the differences between Time_T0_Method1 and Time _T0_Method2. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tx_ll_stat (Compact Dataset) | DOUBLE (5,1) | QA Tx LL Stat (not_set) | counts Derived (QA) | Summary statistic of Transmit Leading Lower time of flight. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_s_tx_other_stat (Compact Dataset) | DOUBLE (5,1) | QA Tx Other Stat (not_set) | counts Derived (QA) | Summary statistic of the Other Transmit time of flight measurement. For PCE1, this is Transmit Leading Upper edge (LU) time; for PCE2 this is Transmit Trailing Upper edge (TU) time; and for PCE3 this is Transmit Trailing Lower edge (TL) time. Values are in the order number_of_points, minimum, maximum, average, standard_deviation. |
| qa_tep_tof | INTEGER_4 | Num TEP OOB | counts | Number of instances where TEP TOF values exceed the limit of 0 to 100ns. |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Compact Dataset) | (1) | (not_set) | Derived (QA) | |
| qa_tx_coarse_count (Compact Dataset) | INTEGER_4 (1) | Tx Coarse Count OOB (not_set) | counts Derived (QA) | Number of instances where the Tx coarse count value exceeds the limit of 10000 counts. |
| qa_tx_leading_fine (Compact Dataset) | INTEGER_4 (1) | Tx Leading Fine Count OOB (not_set) | counts Derived (QA) | Number of instances where the Tx leading fine count value exceeds the limit of 75 counts. |
| qa_tx_trailing_fine (Compact Dataset) | INTEGER_4 (1) | Tx Trailing Fine Count OOB (not_set) | counts Derived (QA) | Number of instances where the Tx trailing fine count value exceeds the limit of 75 counts. |

| Group: /sc | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Group contains the Spacecraft (SC) Ancillary Science packet #1 decommutated data | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| acs_time_sec (Chunked Dataset) | UINT_4_LE (:) | ACS time (sec) (not_set) | seconds ATL01/sc | SC time at the initiation of the ACS task (seconds since SC epoch: 6-Jan-1980 00:00:00) (Same time provided within the Attitude/Rate message to ATLAS in RT at 1Hz) |
| acs_time_subsec (Chunked Dataset) | UINT_4_LE (:) | ACS time (subsec) (not_set) | 100 nanoseconds ATL01/sc | Subsecond portion of the SC time at the initiation of the ACS task (seconds since SC epoch: 6-Jan-1980 00:00:00) (Same time provided within the Attitude/Rate message to ATLAS in RT at 1Hz) |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Number of GPS seconds since the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch 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 Standard Data Product (SDP) epoch. By adding atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch time can be computed. |
| sc_time_1pps_sec (Chunked Dataset) | UINT_4_LE (:) | SC time at 1 pps (sec) (not_set) | seconds ATL01/sc | SC time at the reception of the last 1PPS signal from the GPSR (seconds since SC epoch: 6-Jan-1980 00:00:00) |
| sc_time_1pps_subsec (Chunked Dataset) | UINT_4_LE (:) | SC time at 1 pps (subsec) (not_set) | 100 nanoseconds ATL01/sc | Subsecond portion of the SC time at the reception of the last 1PPS signal from the GPSR (seconds since SC epoch: 6-Jan-1980 00:00:00) |

| Group: /sc/attitude_control_system | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to spacecraft ACS (attitude control system) software. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| acs_mode (Chunked Dataset) | UINT_1_LE (:) | ACS Software Mode (not_set) | counts ATL01/sc1/attitude_control_system | ACS Active ACS Software Mode 0 = Idle 1 = Rate Capture 2 = Sun Acquisition 3 = (Reserved - N/A for ICESat-2) 4 = Slew 5 = Inertial Sun Point 6 = Earth Pointing 7 = ACS Calibration 8 = Inertial Pointing 9 = Reference Ground Track (RGT) 10 = Roll Off-Point (ROP) 11 = Instrument Calibration (ICAL) 12 = DV Wheel Standby 13 = DV Thruster Standby 14 = DV Burn flag_values: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 flag_meanings : idle rate_capture sun_acquisition reserved slew inertial_sun_point earth_pointing acs_calibration inertial_pointing reference_ground_track roll_off_point instrument_ca |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | The time tag of the data computed from raw_acs_time_sec and subseconds in the L1A Attitude_control_ group, relative to the ATLAS SDP epoch. The ATLAS Standard Data Products (SDP) epoch offset is defined within /ancillary_data/atlas_sdp_gps_epoch as the number of GPS seconds between the GPS epoch (1980-01-06T00:00:00.000000Z UTC) and the ATLAS SDP epoch. By adding the offset contained within atlas_sdp_gps_epoch to delta time parameters, the time in gps_seconds relative to the GPS epoch can be computed. |
| sc_body_rate_x (Chunked Dataset) | DOUBLE (:) | SC Body Rate (X) (not_set) | radians/second ATL01/sc1/attitude_control_system and L1B ATBD conversion | ACS Fine Rate Estimate - SC Body X axis. (Same data provided to ATLAS in RT at 1Hz) |
| sc_body_rate_y (Chunked Dataset) | DOUBLE (:) | SC Body Rate (Y) (not_set) | radians/second ATL01/sc1/attitude_control_system and L1B ATBD conversion | ACS Fine Rate Estimate - SC Body Y axis. (Same data provided to ATLAS in RT at 1Hz) |
| sc_body_rate_z (Chunked Dataset) | DOUBLE (:) | SC Body Rate (Z) (not_set) | radians/second ATL01/sc1/attitude_control_system and L1B ATBD conversion | ACS Fine Rate Estimate - SC Body Z axis. (Same data provided to ATLAS in RT at 1Hz) |
| sc_to_lrs_quat_1 (Chunked Dataset) | DOUBLE (:) | SC Inertial to LRS Frame Quaternions 1 (not_set) | counts ATL01/sc1/attitude_control_system and L1B ATBD conversion | ACS Spacecraft Inertial frame to Laser Reference System (LRS) reference frame quaternion1. (Same data provided to ATLAS in RT at 1Hz). |
| sc_to_lrs_quat_2 | DOUBLE | SC Inertial to LRS | counts | ACS Spacecraft Inertial frame to Laser Reference System (LRS) reference frame quaternion 2. (Same data provided to |

| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
|---|---|---|---|---|
| (Chunked Dataset) | (:) | Frame Quaternions 2 (not_set) | ATL01/sc1/attitude_control_system and L1B ATBD conversion | ATLAS in RT at 1Hz). |
| sc_to_lrs_quat_3 (Chunked Dataset) | DOUBLE (:) | SC Inertial to LRS Frame Quaternions 3 (not_set) | counts ATL01/sc1/attitude_control_system and L1B ATBD conversion | ACS Spacecraft Inertial frame to Laser Reference System (LRS) reference frame quaternion 3. (Same data provided to ATLAS in RT at 1Hz). |
| sc_to_lrs_quat_4 (Chunked Dataset) | DOUBLE (:) | SC Inertial to LRS Frame Quaternions 4 (not_set) | counts ATL01/sc1/attitude_control_system and L1B ATBD conversion | ACS Spacecraft Inertial frame to Laser Reference System (LRS) reference frame quaternion4. (Same data provided to ATLAS in RT at 1Hz). |

| Group: /sc/ephemeris | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to spacecraft Ephemeris Propagator. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | The time tag of the data by using raw_prop_time_sec and subsecs in the L1A ephemeris group, relative to the ATLAS SDP GSP epoch. The ATLAS Standard Data Products (SDP) GPS 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. |
| eci_position_res_x (Chunked Dataset) | FLOAT (:) | SC ECI Position residual X (not_set) | meters ATL01/sc1/ephemeris | ACS Orbit Determination Filter position of X frame residual. |
| eci_position_res_y (Chunked Dataset) | FLOAT (:) | SC ECI Position residualY (not_set) | meters ATL01/sc1/ephemeris | ACS Orbit Determination Filter position of Y frame residual. |
| eci_position_res_z (Chunked Dataset) | FLOAT (:) | SC ECI Position residual Z (not_set) | meters ATL01/sc1/ephemeris | ACS Orbit Determination Filter position of Z frame residual. |
| eci_position_x (Chunked Dataset) | DOUBLE (:) | SC ECI Position X (not_set) | meters ATL01/sc1/ephemeris converted | ACS SC X position in the ECI coordinate frame. (Same data that is provided to ATLAS in RT) |
| eci_position_y (Chunked Dataset) | DOUBLE (:) | SC ECI Position Y (not_set) | meters ATL01/sc1/ephemeris converted | ACS SC Y position in the ECI coordinate frame. (Same data that is provided to ATLAS in RT) |
| eci_position_z (Chunked Dataset) | DOUBLE (:) | SC ECI Position Z (not_set) | meters ATL01/sc1/ephemeris converted | ACS SC Z position in the ECI coordinate frame. (Same data that is provided to ATLAS in RT) |
| eci_velocity_res_x (Chunked Dataset) | FLOAT (:) | SC ECI velocity residual X (not_set) | meters/second ATL01/sc1/ephemeris | ACS Orbit Determination Filter velocity of X frame residual. |
| eci_velocity_res_y (Chunked Dataset) | FLOAT (:) | SC ECI velocity residual Y (not_set) | meters/second ATL01/sc1/ephemeris | ACS Orbit Determination Filter velocity of Y frame residual. |
| eci_velocity_res_z (Chunked Dataset) | FLOAT (:) | SC ECI velocity residual Z (not_set) | meters/second ATL01/sc1/ephemeris | ACS Orbit Determination Filter velocity of Z frame residual. |
| eci_velocity_x (Chunked Dataset) | DOUBLE (:) | SC ECI Velocity X (not_set) | meters/second ATL01/sc1/ephemeris converted | ACS SC X velocity in the ECI coordinate frame. (Same data that is provided to ATLAS in RT) |
| eci_velocity_y (Chunked Dataset) | DOUBLE (:) | SC ECI Velocity Y (not_set) | meters/second ATL01/sc1/ephemeris converted | ACS SCY velocity in the ECI coordinate frame. (Same data that is provided to ATLAS in RT) |
| eci_velocity_z (Chunked Dataset) | DOUBLE (:) | SC ECI Velocity Z (not_set) | meters/second ATL01/sc1/ephemeris converted | ACS SC Z velocity in the ECI coordinate frame. (Same data that is provided to ATLAS in RT) |

| Group: /sc/hk | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to spacecraft housekeeping data. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |
| Label (Layout) | Datatype (Dimensions) | long_name (standard_name) | units source | description |
| at_det_p (Chunked Dataset) | FLOAT (2, :) | ATLAS Currents - Detector Power (Sides A, B) | amps ATL01/sc1/hk converted | ATLAS Detector power feed current measured by the SC PDU (7.5A; Sides A, B) |

| | | | (not_set) | |
|---|---|---|---|---|
| at_det_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>Detector (Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS Detector power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_heater_1_c<br>(Chunked Dataset) | FLOAT<br>(2, :) | ATLAS Currents -<br>Survival Heater 1<br>(Sides A, B)<br>(not_set) | amps<br>ATL01/sc1/hk converted | ATLAS Survival Heater 1 power feed current measured by the SC PDU (10A; Sides A, B) |
| at_heater_1_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>Survival Heater 1<br>(Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS Survival Heater 1 power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_heater_2_c<br>(Chunked Dataset) | FLOAT<br>(2, :) | ATLAS Currents -<br>Survival Heater 2<br>(Sides A, B)<br>(not_set) | amps<br>ATL01/sc1/hk converted | ATLAS Survival Heater 2 power feed current measured by the SC PDU (10A; Sides A, B) |
| at_heater_2_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>Survival Heater 2<br>(Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS Survival Heater 2 power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_heater_3_c<br>(Chunked Dataset) | FLOAT<br>(2, :) | ATLAS Currents -<br>Survival Heater 3<br>(Sides A, B)<br>(not_set) | amps<br>ATL01/sc1/hk converted | ATLAS Survival Heater 3 power feed current measured by the SC PDU (10A; Sides A, B) |
| at_heater_3_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>Survival Heater 3<br>(Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS Survival Heater 3 power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_heater_4_c<br>(Chunked Dataset) | FLOAT<br>(2, :) | ATLAS Currents -<br>Survival Heater 4<br>(Sides A, B)<br>(not_set) | amps<br>ATL01/sc1/hk converted | ATLAS Survival Heater 4 power feed current measured by the SC PDU (10A; Sides A, B) |
| at_heater_4_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>Survival Heater 4<br>(Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS Survival Heater 4 power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_laser_a_c<br>(Chunked Dataset) | FLOAT<br>(:) | ATLAS Currents -<br>Laser A<br>(not_set) | amps<br>ATL01/sc1/hk converted | ATLAS Laser A power feed current measured by the SC PDU (20A) |
| at_laser_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>Laser (Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS Laser power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_lhp_sdhtr_c<br>(Chunked Dataset) | FLOAT<br>(2, :) | ATLAS Currents - LHP<br>Shutdown HTR (Sides<br>A, B)<br>(not_set) | amps<br>ATL01/sc1/hk converted | ATLAS Loop Heat Pipe Shutdown power feed current measured by the SC PDU (7.5A; Sides A, B) |
| at_lhp_sdhtr_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>LHP Shutdown HTR<br>(Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS LHP Shutdown Heater power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_main_c<br>(Chunked Dataset) | FLOAT<br>(2, :) | ATLAS Currents -<br>ATLAS Main (Sides A,<br>B)<br>(not_set) | amps<br>ATL01/sc1/hk converted | ATLAS Main power feed current measured by the SC PDU (20A; Sides A, B) |
| at_main_sw<br>(Chunked Dataset) | INTEGER_1<br>(2, :) | ATLAS Switch Status -<br>Main (Sides A, B)<br>(not_set) | 1<br>ATL01/sc1/hk | ATLAS Main power feed status measured by the SC PDU (Sides A, B)<br>flag_values: 0, 1<br>flag_meanings : on off |
| at_t<br>(Chunked Dataset) | FLOAT<br>(15, :) | ATLAS Temperatures<br>(1-15)<br>(not_set) | degreesC<br>ATL01/sc1/hk converted | SC Monitored ATLAS Temperatures (1 to 15) |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | The derived time tag of the data, relative to 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. |
| ds_ab_index<br>(Contiguous Dataset) | INTEGER_1<br>(2) | Dimension scale for<br>Side A or B<br>(not_set) | 1<br>not_set | Dimension scale for Side A or B<br>flag_values: 1, 2<br>flag_meanings : side_a side_b |
| ds_flexure_index<br>(Contiguous Dataset) | INTEGER_1<br>(3) | Dimension scale for<br>flexure thermistors<br>(not_set) | 1<br>not_set | Dimension scale for flexure thermistor temperatures. |
| ds_temp_index<br>(Contiguous Dataset) | INTEGER_1<br>(15) | Dimension scale for<br>ATLAS Temperatures<br>(not_set) | 1<br>not_set | Dimension scale for ATLAS temperatures. |
| sa_1_in_bk_t<br>(Chunked Dataset) | FLOAT<br>(:) | Solar Array Panel 1<br>(Inboard) Back-Side<br>Temperature<br>(not_set) | degreesC<br>ATL01/sc1/hk converted | SC Monitored Temperature of the Back-Side of Solar Panel 1 (Inboard Panel) |
| sa_1_in_cell_t<br>(Chunked Dataset) | FLOAT<br>(:) | Solar Array Panel 1<br>(Inboard) Cell-Side<br>Temp<br>(not_set) | degreesC<br>ATL01/sc1/hk converted | SC Monitored Temperature of the Cell-Side of Solar Panel 1 (Inboard Panel) |
| sa_4_ot_bk_t<br>(Chunked Dataset) | FLOAT<br>(:) | Solar Array Panel 4<br>(Outboard) Back- Side<br>Temperature<br>(not_set) | degreesC<br>ATL01/sc1/hk converted | SC Monitored Temperature of the Back-Side of Solar Panel 4 (Outboard Panel) |
| sa_4_ot_cell_t<br>(Chunked Dataset) | FLOAT<br>(:) | Solar Array Panel 4<br>(Outboard) Cell- Side<br>Temperature<br>(not_set) | degreesC<br>ATL01/sc1/hk converted | SC Monitored Temperature of the Cell-Side of Solar Panel 4 (Outboard Panel) |
| sc_at_flex_t<br>(Chunked Dataset) | FLOAT<br>(3, :) | SC-to-ATLAS Flexure<br>Temperature<br>(not_set) | degreesC<br>ATL01/sc1/hk converted | SC Monitored Temperature of Mechanical I/F Flexure 1, 2 and 3 |
| sc_e_bus_v<br>(Chunked Dataset) | FLOAT<br>(2, :) | SC Essential Bus<br>Voltage (Sides A, B)<br>(not_set) | volts<br>ATL01/sc1/hk converted | SC Essential Bus Voltage measured by the SC PDU. (Sides A, B) |

**Group: /sc/inertial_measurement_unit**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to spacecraft IMU (Inertial Measurement Unit). | | |
| data_rate | (Attribute) | Data within this main group are stored at the data rate of the source IMU within the Spacecraft Ancillary Science Data Packet. (nominally fifty per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | IMU delta time tag at the end of the IDL frame over which the integrated gyro angle data was collected, relative to 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. |
| sync_event_ttag<br>(Chunked Dataset) | DOUBLE<br>(:) | IMU Sync Event Time<br>Tag<br>(not_set) | seconds<br>ATL01/sc1/inertial_measurement_unit/hi_rate<br>converted | IMU Time remaining on the countdown timer which triggers the IDL interrupt (between the event strobe and the timetag of the next IDL data packet). IMU time at the reception of the last IMU time sync pulse. This word contains the time stamp that is recorded when the Event Strobe input to the SSIRU transitions to the active (low) state. |

**Group: /sc/inertial_measurement_unit/gyro_abcd**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to spacecraft IMU (Inertial Measurement Unit) gyros. | | |
| data_rate | (Attribute) | Data within this main group are stored at the data rate of the source IMU high_rate data within the Spacecraft Ancillary Science Data Packet. (nominally fifty per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| gyro_angle<br>(Chunked Dataset) | FLOAT<br>(:) | IMU Gyro Integrated<br>Angle Counter (Gyros<br>A, B, C, D)<br>(not_set) | degrees<br>ATL01/sc1/inertial_measurement_unit/hi_rate<br>converted | IMU integrated angle sensed by the SSIRU Gyro. The data word shall increment from 0 to full scale (0xFFFF) and roll over to zero for positive input rates about the Gyro input axis. The data word shall decrement from full scale to 0 and roll over to 0xFFFF for negative input rates about the Gyro input axis. |
| gyro_rate_f | INTEGER_1 | IMU Gyro Rate Valid | 1 | IMU Gyro Integrated Angular Rate data validity status. 0=invalid, 1=valid. |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| (Chunked Dataset) | (:) | (Gyros A, B, C, D)<br>(not_set) | ATL01/sc1/inertial_measurement_unit/hi_rate | flag_values: 0, 1<br>flag_meanings : invalid valid |
| gyro_sat_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | IMU Gyro Saturation<br>Bit (Gyros A, B, C, D)<br>(not_set) | 1<br>ATL01/sc1/inertial_measurement_unit/hi_rate | IMU Gyro saturation mode: Force to Rebalance (FTR) Mode (The gyro operates in this mode during low inertial rates) or Whole Angle Saturation (WAS) Mode (The gyro operates in this mode during high inertial rates).<br>flag_values: 0, 1<br>flag_meanings : ftr_mode was_mode |
| gyro_scal_f<br>(Chunked Dataset) | INTEGER_1<br>(:) | IMU Gyro Scaling<br>Factor (Gyros A, B, C, D)<br>(not_set) | 1<br>ATL01/sc1/inertial_measurement_unit/hi_rate | IMU Gyro scale factor mode: low scaling factor mode with the corresponding Integrated Angle word being 0.05 arc-sec/LSB or high scaling factor with the corresponding Integrated Angle word being 1.6 arc-sec/LSB.<br>flag_values: 0, 1<br>flag_meanings : low_scale_factor high_scale_factor |

**Group: /sc/solar_array**

| | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to solar array driver assembly. | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Spacecraft Ancillary Science Data Packets. (nominally one per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| azimuth_est<br>(Chunked Dataset) | FLOAT<br>(:) | SADA Azimuth<br>Estimated Position<br>(not_set) | degrees<br>ATL01/sc1/solar_array | Solar Array Drive Assembly (SADA) - Estimated Azimuth position used for ACS control |
| azimuth_meas_1<br>(Chunked Dataset) | FLOAT<br>(:) | SADA Azimuth<br>Measured Position (Pot 1)<br>(not_set) | degrees<br>ATL01/sc1/solar_array | Solar Array Drive Assembly (SADA) - Estimated Azimuth angle based on Potentiometer 1 (as reported by ACS software). |
| azimuth_meas_2<br>(Chunked Dataset) | FLOAT<br>(:) | SADA Azimuth<br>Measured Position (Pot 2)<br>(not_set) | degrees<br>ATL01/sc1/solar_array | Solar Array Drive Assembly (SADA) - Estimated Azimuth angle based on Potentiometer 2 (as reported by ACS software). |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | SC time at the initiation of the ACS task, relative to 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. |
| elev_est<br>(Chunked Dataset) | FLOAT<br>(:) | SADA Elevation<br>Estimated Position<br>(not_set) | degrees<br>ATL01/sc1/solar_array | Solar Array Drive Assembly (SADA) - Estimated Elevation position used for ACS control |
| elev_meas_1<br>(Chunked Dataset) | FLOAT<br>(:) | SADA Elevation<br>Measured Position (Pot 1)<br>(not_set) | degrees<br>ATL01/sc1/solar_array | Solar Array Drive Assembly (SADA) - Estimated Elevation angle based on Potentiometer 1 (as reported by ACS software). |
| elev_meas_2<br>(Chunked Dataset) | FLOAT<br>(:) | SADA Elevation<br>Measured Position (Pot 2)<br>(not_set) | degrees<br>ATL01/sc1/solar_array | Solar Array Drive Assembly (SADA) - Estimated Elevation angle based on Potentiometer 2 (as reported by ACS software). |

**Group: /sc/star_tracker**

| | | | | |
|---|---|---|---|---|
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Star Tracker data within the Spacecraft Ancillary Science Data Packets. (nominally ten per second.) | | |

| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
|---|---|---|---|---|
| atm_etr_counter<br>(Chunked Dataset) | UINT_2_BE<br>(:) | ATM ETR Counter<br>(not_set) | counts<br>ATL01/sc2/star_tracker | Star Tracker Electronics (STE) [ATM TM#1: Subaddress 13] - External Time Reference (ETR) delay ticks - Used to determine measurement time of reported ATM TLM with respect to SC-provided sync pulse; Additional delay of quaternion measurement time in ticks of 20 usec from ETR. |
| atm_frame_counter<br>(Chunked Dataset) | UINT_2_BE<br>(:) | ATM Frame Counter<br>(not_set) | counts<br>ATL01/sc2/star_tracker | Star Tracker Electronics (STE) [ATM TM#1: Subaddress 13] - External Time Reference (ETR) counter - Used to determine measurement time of reported ATM TLM with respect to SC-provided sync pulse; This item increments upon the reception of the SC-provided sync pulse. |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Time of the Star track subaddress 1 data, relative to the ATLAS SDP GPS Epoch and computed from raw_ace_time_sec/subseconds and etr_delay_tm1. 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. |
| etr_counter<br>(Chunked Dataset) | UINT_2_BE<br>(:) | STE Star Tracker ETR<br>Counter | counts<br>ATL01/sc2/star_tracker | Star Tracker Electronics (STE) [Star Tracker Status TM#1: Subaddress 1] - External Time Reference (ETR) counter - Used to determine measurement time of reported STE/OH mode status with respect to SC-provided sync pulse; This item |

| | | (not_set) | | increments upon the reception of the SC-provided sync pulse - Sample 1-10 |
|---|---|---|---|---|
| mode_status<br>(Chunked Dataset) | UINT_2_BE<br>(:) | STE Star Tracker Mode<br>Status<br>(not_set) | 1<br>ATL01/sc2/star_tracker | Star Tracker Electronics (STE) [Star Tracker Status TM#1: Subaddress 1] - Mode Status - Represents the current mode of the STE software . 0 = Initialization 1 = Standby 2 = Memory Read 3 = Memory Write 4 = Self Test 5 = Photo 9 = Angular Rate 10 = Attitude Acquisition 11 = Attitude Tracking 14 = AOM/Attitude Acquisition Phase 15 = AOM/Attitude Tracking Phase All other values invalid<br>flag_values: 0, 1, 2, 3, 4, 5, 9, 10, 11, 14, 15<br>flag_meanings : init stby mem_read mem_write self_test photon angular_rate att_acq att_track aom_acq aom_track |

| **Group: /sc/star_tracker/optical_head_1** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to spacecraft Star Tracker Optical Head 1 (STOH1). | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Star Tracker data within the Spacecraft Ancillary Science Data Packets. (nominally ten per second.) | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| atm_etr_counter<br>(Chunked Dataset) | UINT_2_LE<br>(:) | ATM ETR Counter<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Optical Head (STOH) 1 [ATM TM#7: Subaddress 19] - External Time Reference (ETR) counter - Used to determine measurement time of reported quaternions with respect to SC- provided sync pulse; This item increments upon the reception of the SC-provided sync pulse. |
| atm_frame_counter<br>(Chunked Dataset) | UINT_2_LE<br>(:) | STOH1 ATM Frame<br>Counter<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Optical Head (STOH) 1 [ATM TM#7: Subaddress 19] - Frame Counter |
| att_qa_x<br>(Chunked Dataset) | FLOAT<br>(:) | STOH Attitude Quality<br>(X)<br>(not_set) | arcsec<br>ATL01/sc2/star_tracker/optical_head_1<br>converted | Star Tracker Optical Head (STOH) Quality measurement of STOH computed quaternion (X) |
| att_qa_y<br>(Chunked Dataset) | FLOAT<br>(:) | STOH Attitude Quality<br>(Y)<br>(not_set) | arcsec<br>ATL01/sc2/star_tracker/optical_head_1<br>converted | Star Tracker Optical Head (STOH) Quality measurement of STOH computed quaternion (Y) |
| att_qa_z<br>(Chunked Dataset) | FLOAT<br>(:) | STOH Attitude Quality<br>(Z)<br>(not_set) | arcsec<br>ATL01/sc2/star_tracker/optical_head_1<br>converted | Star Tracker Optical Head (STOH) Quality measurement of STOH computed quaternion (Z) |
| delta_time<br>(Chunked Dataset) | DOUBLE<br>(:) | Elapsed GPS seconds<br>(time) | seconds since 2018-01-01<br>Derived via Time Tagging | Elapsed GPS seconds since the ATLAS SDP GPS Epoch, computed from raw_ace_time_sec and subseconds and atm_etr_delay_tm7. 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. |
| n_stars<br>(Chunked Dataset) | INTEGER_1<br>(:) | STOHx Number of<br>Coherent Stars<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Electronics (STE) [ATM TM#1: Subaddress 13] - Number of coherent stars used in STOH attitude calculation. |
| quaternion1<br>(Chunked Dataset) | DOUBLE<br>(:) | STOH1 Quaternion1<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 1 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| quaternion2<br>(Chunked Dataset) | DOUBLE<br>(:) | STOH1 Quaternion2<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 2 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| quaternion3<br>(Chunked Dataset) | DOUBLE<br>(:) | STOH1 Quaternion3<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 3 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| quaternion4<br>(Chunked Dataset) | DOUBLE<br>(:) | STOH1 Quaternion4<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 4 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| seq_mode_st<br>(Chunked Dataset) | INTEGER_1<br>(:) | Sequencing Mode<br>Status<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_1 | Star Tracker Optical Head (STOH) [Star Tracker Status TM#1: Subaddress 1] - Sequencing (Mode) Status<br>flag_values: 0, 1, 2, 3, 4, 5, 6, 7<br>flag_meanings : off standby photo acquire track autotest win_acq powered |

| **Group: /sc/star_tracker/optical_head_2** | | | | |
|---|---|---|---|---|
| Description | (Attribute) | Contains parameters related to spacecraft Star Tracker Optical Head 2 (STOH2). | | |
| data_rate | (Attribute) | Data within this group are stored at the data rate of the source Star Tracker data within the Spacecraft Ancillary Science Data Packets. (nominally ten per second.) | | |
| Label<br>(Layout) | Datatype<br>(Dimensions) | long_name<br>(standard_name) | units<br>source | description |
| atm_etr_counter<br>(Chunked Dataset) | UINT_2_LE<br>(:) | ATM ETR Counter<br>(not_set) | counts<br>ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) 2 [ATM TM#8: Subaddress 20] - External Time Reference (ETR) counter - Used to determine measurement time of reported quaternions with respect to SC- provided sync pulse; This item increments upon the reception of the SC-provided sync pulse |
| atm_frame_counter<br>(Chunked Dataset) | UINT_2_LE<br>(:) | STOH2 ATM Frame<br>Counter | counts<br>ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) 2 [ATM TM#8: Subaddress 20] - Frame Counter |

| | | | (not_set) | |
|---|---|---|---|---|
| att_qa_x (Chunked Dataset) | FLOAT (:) | STOH Attitude Quality (X) (not_set) | arcsec ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) Quality measurement of STOH computed quaternion (X) |
| att_qa_y (Chunked Dataset) | FLOAT (:) | STOH Attitude Quality (Y) (not_set) | arcsec ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) Quality measurement of STOH computed quaternion (Y) |
| att_qa_z (Chunked Dataset) | FLOAT (:) | STOH Attitude Quality (Z) (not_set) | arcsec ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) Quality measurement of STOH computed quaternion (Z) |
| delta_time (Chunked Dataset) | DOUBLE (:) | Elapsed GPS seconds (time) | seconds since 2018-01-01 Derived via Time Tagging | Elapsed GPS seconds from the ATLAS SDP GPS Epoch, computed from raw_ace_time_sec and subseconds and atm_etr_delay_tm8. 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. |
| n_stars (Chunked Dataset) | INTEGER_1 (:) | STOHx Number of Coherent Stars (not_set) | counts ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Electronics (STE) [ATM TM#1: Subaddress 13] - Number of coherent stars used in STOH attitude calculation |
| quaternion1 (Chunked Dataset) | DOUBLE (:) | STOH1 Quaternion1 (not_set) | counts ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 1 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| quaternion2 (Chunked Dataset) | DOUBLE (:) | STOH1 Quaternion2 (not_set) | counts ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 2 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| quaternion3 (Chunked Dataset) | DOUBLE (:) | STOH1 Quaternion3 (not_set) | counts ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 3 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| quaternion4 (Chunked Dataset) | DOUBLE (:) | STOH1 Quaternion4 (not_set) | counts ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) [ATM TM#7: Subaddress 19] - Attitude quaternion 4 - STOH reference frame to Earth-Centered Inertial (ECI) reference frame |
| seq_mode_st (Chunked Dataset) | INTEGER_1 (:) | Sequencing Mode Status (not_set) | counts ATL01/sc2/star_tracker/optical_head_2 | Star Tracker Optical Head (STOH) [Star Tracker Status TM#1: Subaddress 1] - Sequencing (Mode) Status. A value of 127 indicates that the data could not be filled from the vc5 packets. flag_values: 0, 1, 2, 3, 4, 5, 6, 7 flag_meanings : off standby photo acquire track autotest win_acq powered |