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**CHANGE RECORD**

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|  |  | Section 4.1.3.3 | Added HIS L2 data description section |
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# Introduction

## Purpose and Scope

This Data Product Definition Document (DPDD) describes the format and content of the Solar Wind Analyser (SWA) science data. It includes descriptions of the data products and associated metadata, including the data format, content, and any generation pipeline systems. These products will be stored and distributed from the Solar Orbiter Science Archive (SOAR) of the SOC.

The specifications described in this DPDD apply to all SWA science products submitted to ESA’s Solar Orbiter SOC for further archival and exploitation. This document only includes descriptions of science products delivered by the SWA science pipelines run by SWA. It does not address the Low Latency data which is described in [RD9].

## Reference Documents

The documents listed below form a part of this document, to the extent specified and described herein.

|  |  |  |
| --- | --- | --- |
| **Ref.** | **No** | **Title** |
| RD1 |  | CDF User’s Guide v3.5, available from <http://cdf.gsfc.nasa.gov> |
| RD2 | SOL-SGS-OTH-004-TPL\_DPDD | Solar Orbiter SWA Data Product Description Document template |
| RD3 | SOL-SGS-TN-0006 | SOC Engineering Guidelines for External Users |
| RD4 | ESA/SRE(2011)14 | Solar Orbiter definition study report (Red Book) |
| RD5 | SO-SWA-MSSL-RQ-010 | Solar Orbiter SWA Scientific Operations, Algorithms and Processes Requirements Document |
| RD6 | SOL-SGS-ICD-0004 | Solar Orbiter Interface Control Document for Low Latency Data CDF Files |
| RD7 | SOL-SGS-TN-0009 | Metadata Definition for Solar Orbiter Science |
| RD8 | SOL-SGS-PL-0009 | Solar Orbiter Archive Plan |
| RD9 | SO-SWA-MSSL-IF-005 | SWA Low Latency Data Product Description Document |
|  | SOL-SGS-ICD-002 | Data Producer to Archive ICD (DPAICD) |

## Acronyms, Abbreviations and Terms

| **Abbreviation** | **Meaning** |
| --- | --- |
| CCSDS | Consultative committee for space data systems |
| cdf | Common data format |
| CME | Coronal Mass Ejection |
| DPU | Data Processing Unit |
| EAS | Electron Analyser System |
| ESAC | European Space Astronomy Centre |
| FIP | First Ionisation Potential |
| FOV | Field of view |
| HIS | Heavy Ion System |
| LL | Low Latency |
| LLDPDD | Low Latency Data Product Definition Document |
| MHD | Magneto-Hydro-Dynamics |
| MOC | Mission Operations Centre |
| NM | Normal Mode |
| OBT | On board time |
| PAS | Proton Analyser System |
| PHA | Pulse Height Analysis |
| RPW | Radio Plasma Wave |
| S/C | Spacecraft |
| SCET | Space craft elapsed time |
| SEGU | Solar Orbiter engineering guidelines for external users |
| SOAR | Solar Orbiter Archive |
| SOC | Spacecraft Operations Centre |
| SSMM | Solid State Mass Memory |
| SWA | Solar Wind Analyser |
| TBC | To Be Confirmed |
| TBD | To Be Determined |
| TOF | Time of Flight |
| UTC | Universal coordinated time |
| VA | Virtual Appliance |
| VDF | Velocity Distribution Function |
| SOAR | Solar Orbiter Archive |
| OT | Operations Team at MSSL |
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# SWA Instrument Description

*High-level description of the instrument and instrument science objectives, with a reference to an external, publicly available instrument document (such as the instrument paper). The proposed structure for this section is indicated below (see sub-sections).*

## Science Objectives

*Describe the instrument science objectives.*

The overarching objective of SWA is to provide the comprehensive in situ measurements of the solar wind, which are critical if we are to establish the fundamental physical links between the Sun’s highly dynamic and inhomogeneous magnetised atmosphere and the solar wind in all its quiet and disturbed states.

This critical step requires comprehensive in-situ measurements of the various constituents of the solar wind plasma including high time resolution velocity distributions of solar wind ions and electrons and composition up to suprathermal energies – for example, the measurement of heavy ion charge states reflect coronal temperatures at their source. These measurements are vital if we are to discover the fundamental links between e.g. solar eruptions, shocks and the suprathermal ions that are the seed populations of hazardous solar particle events.

The SWA sensors will sample comparatively pristine solar wind plasma at the closest ever distances to the Sun, but also assess their radial evolution. This will provide key information on the evolution of the solar wind with distance from the Sun, providing a separation of those processes which are inherent in the solar wind itself from those which play a role in the formation of the wind near to the Sun. Furthermore, the SWA will for the first time measure the near-Sun solar wind at higher latitudes revealing the latitudinal dependence of these near-Sun phenomena as the spacecraft climbs out of the ecliptic. Solar Orbiter will thus extend our direct measurements of space plasmas into a new realm that will transform our view of the connections from the solar atmosphere into the solar wind, and help us project this understanding to other stellar environments. For further details see RD5.

SWA consists of four separate sensors, 2 Electron Analysers (EAS), a Proton/Alpha sensor (PAS) and a Heavy Ion Sensor (HIS). These sensors are connected to the central Data Processing Unit (DPU) that packets the sensor data and transmits them to the SSMM.

## SWA Operational Modes

*Description of the instrument modes, with references to the type of data products generated (defined in the following sections).*

The SWA sensors can each be operated in a variety of operational modes. These modes are sensor independent, meaning that each sensor can be a different mode from the other two sensors. The available modes are detailed below.

### Normal Mode

The default operating mode of all the SWA sensors is the ‘Normal Mode’. In this mode the full 3d data set from each sensor will be sent to the SSMM at the default cadence.

### Burst Mode

In ‘Burst Mode’, EAS, HIS and PAS data will be sent to the SSMM at higher cadences. This applies to various data types, not just Normal Mode. This is explained in detail below.

### Triggered Mode

This mode only applies to EAS. During Normal mode, the full, 1 second, 3d data is stored on a rolling buffer that can hold 5 minutes of data. Upon receipt of a ‘trigger’ from the RPW instrument. The entire, 5 minute buffer will be frozen and sent to the SSMM.

### Engineering Mode

All the SWA sensors have the ability to perform some calibration/engineering work. This data is intended to monitor the ‘health’ of the sensors in order to maintain the optimimum sensor configuration. In the event of sensor faults, the engineering mode data can be used in fault diagnosis.

## Calibration

### On-ground Calibration

*Description of the on-ground calibration performed on the instrument, and results. Include references to calibration performance reports.*

#### EAS On-ground Calibration

Geometric factor

#### PAS On-ground Calibration

The PAS on-ground calibration has been performed on the EQM, PFM and the FS using a large diameter, 300eV - 10 keV, He++beam.

The resulting calibration data file contains the following:

***A(ie, iel, iaz)*** The effective aperture in cm2 for each energy, ie = [0….95], each elevation, iel = [0…8], and each azimuth direction, iaz = [0….10] . Thus this is a (96, 9, 11) array. Note that these values already contain cosines since they are the results of the measurement. They also contain the detector efficiency as a function of the energy and individual CEM properties. These values may be updated in flight.

***ΔE(ie, iel, iaz) / E*** The unit-less energy resolution. It is also a (96, 9, 11) array. These values will also be updated in flight if the stepping voltages in the PAS sequencer are modified.

***Ω(ie, iel, iaz)*** The solid angle resolution in steradians (sr). It is also a (96, 9, 11). These values will be updated in flight if the stepping voltages in the PAS sequencer are modified.

***E(ie, iel, iaz)*** The energy per charge in electronvolts (eV). It is also a (96, 9, 11). These values will be updated in flight if the stepping voltages in the PAS sequencer are modified.

***Elev(ie, iel, iaz)*** The elevation angles, rad. It is also a (96, 9, 11). These values will be updated in flight if the stepping voltages in the PAS sequencer are modified.

***Az(iaz)*** Azimuth angles in radians (rad). This is an array of 11 values.

***ΔW(ie, iel, iaz)*** The integrating velocity volume in (cm3 sr / s3). This volume is defined by the measurement scheme rather than the calibration.

For the onboard moments calulation special tables will be included in the calibration data to include:

* Proton velocity value which depends on energy bin index *ie*



Here  is the *E(ie, iel, iaz)* averaged over Elevation and Azimuth

* Elevation angle which depends on elevation bin number *iel*



* Sines and cosines of the main directions, calculated from Aziaz and Eleviel

Sin(Aziaz), Cos(Aziaz), Sin(Eleviel), Cos(Eleviel)

* The Count to partial density conversion factor :



Here,  and is the “velocity”geometrical factor in cm2sr

#### HIS On-ground Calibration

### In-flight Calibration

*Description of the in-flight calibration, with references to existing document where applicable.*

#### EAS In-flight Calibration

The EAS in-flight calibration procedure varies the CEM HV and registers the CEM counts. The HV value that corresponds to the plateau of CEM counts is used as a nominal CEM HV until a next CEM gain adjust. This calibration is run by the DPU with a special engineering mode. The results of this are returned as a Low Latency product.

#### PAS In-flight Calibration

The PAS in-flight calibration consists of two parts:

1. CEM gain adjustment. This procedure varies the CEM HV and registers the CEM counts. The HV value that corresponds to the plateau of CEM counts is used as a nominal CEM HV until a next CEM gain adjust. To perform this calibration the DPU starts the “CEM Calibration” procedure. The results of this are returned as a Low Latency product.
2. HVPS levels calibration. This procedure provides a check of the HVPS optics voltages stability. To perform this calibration the DPU sets PAS to the “Ready\_To\_Science” state and then sends the “Engineering scheme” command. The results are packeted in the regular PAS HK packet.

#### HIS In-flight Calibration

# DATA GENERATION AND ANALYSIS PROCESS

The SWA science products are produced by the SWA Instrument Team. The data generation and analysis process is described in this section.

Science data received by the SOC from the SWA team are made available to end users through the Solar Orbiter archive following the policies described in the Archiving Plan [RD8].

The procedure for delivery of the Science data from the SWA Instrument Team to the SOC will be fully compliant with the IT-SOC Science Data Delivery ICD (TBW).

*(For Instrument Teams: please fill in each and all of the items below; in the exceptional case that your instrument is not producing one of the items, keep the item and explain why it is not being produced)*

## Scientific Measurement

*Top-level description of the data acquired by the instrument.*

### EAS

Each of the 2 EAS sensors measure electrons distributed over a spectrum of 64 energies, a 360o azimuthal range of 32 anodes and a 90o altitudinal range of 16 elevations, every second. Individually, each EAS will produce [64,32,16] arrays of data every second. Used together, the 2 EASs provide a full, 3d velocity space distribution covering the 4π space surrounding the EAS instrument every second.

The EAS instrument can operate in various modes or states that will return different subsets of the original 3d data. These are:

* **Normal Mode**: The two EAS sensors each send their respective sampling of the 3D VDF to the DPU every second. The DPU stores these data in a 5-minute rolling buffer. Every 100 seconds one full 64 × 32 × 16 3d distribution from each EAS is compressed and sent to the SSMM.
* **Single Strahl**: Every 100 seconds (offset by 50 seconds from the selection above) a single energy bin slice of the full 3d distribution of each EAS is compressed and sent to the SSMM for telemetry as a low-latency data product. The data array dimensions for this product are thus 2 × 1 × 32 × 16.
* **Burst Mode**: On command, the SWA DPU will place the EAS sensors into burst mode. The DPU will steer the SWA measurements with reference to the magnetic field unit vector provided by the MAG instrument over the Service 20 ’Inter Instrument Communication’ feed at 0.125 second cadence. In response, the EAS sensor whose central plane of field of view passes closest to the magnetic field direction makes measurements at only 2 elevations (but full energy and azimuth). These 2 elevations are chosen such that one set of observations includes the direction along the B-field direction, and the other along the anti-parallel direction. Given that only 2 elevations are sampled in this mode, the resulting 1 × 64 × 32 × 2 array of data can be captured every 0.125 second and transmitted to the DPU for addition to the SSMM and the telemetry stream. These data product can be reassembled on the ground to provide a measurement of the 2D pitch angle distribution of electrons (with some gyrophase information) at 0.125 second cadence.
* **Triggered Mode**: Autonomously, and following the receipt of a trigger flag over the Service 20 ’Inter Instrument Communication’ feed , the SWA/DPU will freeze the rolling buffer containing 5 minutes of 1-second-cadence, samples of the full 3d velocity distribution from each SWA/EAS sensor. The DPU will transmit the resulting 300 samples of 2 × 64 × 32 × 16 data arrays to the SSMM for inclusion in the SWA telemetry stream. It is expected that the trigger flag will be set by the RPW instrument in response to an autonomous evaluation of whether combined in situ data suggests the passage of an event of scientific interest (e.g. an interplanetary shock) passed the spacecraft in the previous 5 minute period.
* **Onboard partial moments**: Every 4 seconds the DPU selects the 3D VDF measurements from each sensor and performs a partial moment calculation (over 3 subsets of energy range and 2 angular ranges for each sensor) and adds the resulting 168 parameters to the SSMM for inclusion in the telemetry stream. Optionally, in the event of low counts, the DPU will add 4 consecutive measurements from EAS and then perform the moment calculation.

The relationship between the EAS modes and states and the DPU is illustrated in Figure 3.1 below.



Figure .: SWA EAS data flow within the sensors and DPU

The DPU will use the full 3d velocity space distributions from both EASs and create a set of on-board electron moments every 4 seconds that are transmitted to the SSMM. The scheme for generation of the onboard moments from EAS by the DPU is shown in Figure 3.2 below.



Figure .: EAS Moment generation scheme

Together with the Housekeeping from each EAS, there are also various engineering modes that allow instrument health monitoring and fault diagnosis to be performed on a semi-regular basis (~1 per week, for a limited duration) in order to ensure that the sensor is maintained in optimum configuration.

### PAS

The PAS sensor measures protons and alpha particles distributed over a spectrum of 96 energies, a 66o azimuthal range of 11 anodes and a 45o altitudinal range of 9 elevations, every second. PAS can produce [96,11,9] arrays of data every second.

PAS can operate in various modes and states that will return different subsets of the original 3d data. These modes are:

* **Normal Mode**. Every 4 seconds the full 3d distribution from PAS is sent to the SSMM. The data array dimensions will be [48,7,5];
* **Snap shot**. Every 300 seconds, a subset of the full 3d is collected at a faster rate of 4 times per second. The data array dimensions will be [48,7,3];
* **Burst Mode**. On command, PAS will send out data at 4 times per second, for 300 seconds. The data array dimensions will be [48,7,3].

The relationship between the PAS modes and states and the DPU is illustrated in Figure 3.3 below.



Figure . SWA PAS data flow within the sensors and DPU

From the normal 3D distributions, SWA DPU will calculate a set of proton/alpha moments every four seconds. The PAS moment product will consist of a single density value, a 3-element velocity vector, and 6 terms from a 9-element pressure tensor. Twenty-five PAS moment products will be packeted into one ccsds packet with the appropriate headers and sent to the SSMM LL01 packet store.

In order to ensure that the sensor is maintained in optimum configuration, the raw PAS data can also contain engineering mode data that allows instrument health monitoring of temperatures and voltages, and fault diagnosis to be performed on a semi-regular basis (~1 per week, for a limited duration). Some of this data will be compressed, packeted with header and sent to the SSMM LL01 packet store. The engineering mode data in the Low Latency packets will be used by the PAS team only. There will be no requirement of the SOC team to process this data.

### HIS

The HIS sensor is a time-of-flight – energy (TOF-E) ion mass spectrometer which measures ions up to 56 amu, identifying them by both mass and charge. The E/q, time-of-flight (TOF) and total energy of ion are measured, along with elevation and azimuthal angle from which they arrived. These measurements are grouped together for a single ion in ion event (PHA) words. (PHA refers to “pulse-height analysed” and is the historic name for ion event words.)

The number of ion event words telemetered for each energy scan is fixed but configurable, based on available resources. Typically, far more events can be measured than can be downlinked, so a sampling algorithm is employed to select the sample sent to the ground. This algorithm works as follows: All ion event words from an E/q scan are divided into 5 priority ranges, based on their average abundance in the solar wind. Priority ranges are defined by large Energy-TOF boxes, defined separately for each E/q. Events are chosen at random from each of these ranges, with the more events selected from ranges containing less abundant ions. In cases where there are insufficient events present in a given range, that number is added to those to be taken from the next range (and so on). The number of events in each range, subdivided by E/q and angle, are recorded to correct the weighting of telemetered ion event words for the effect of the sampling algorithm. For example, if the on board count (priority rate) for a given E/q step and elevation bin is 10, but only 5 of these ion event words were included in telemetry, then each event word counts for 2 in further processing.

m:

* **Normal Mode**. In Normal mode, HIS returns packets every 30 seconds.
* **Normal Low Cadence Mode (Normal LC)**.In Normal mode, HIS returns packets every 300 seconds.
* **Burst Mode**. In Burst mode, HIS returns packets every 4 seconds.

There is also an engineering mode that allows instrument health monitoring and fault diagnosis to ensure that the sensor is maintained in optimum configuration.

In order make maximum use of the variable data volume throughout the mission, i.e. to “fly the telemetry (TM) corridors “properly, HIS needs more data rate options than the those defined above. The new set of HIS mode – data combinations+ data products is given in the following table (originals in **bold**). Each is built off an original mode by including additional data products into telemetry. Since these products are assembled by the flight software anyway, the power used is that same as for the original mode on which a new mode is based. The housekeeping data rate is set independently, so it is not tied to any of these combinations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Mode – Data Combination** | **Ratio to Normal (target)** | **Rate (kbits/s)** | **Name** |
| **Normal LC** | **0.1** | **0.53** | **SWA\_HIS\_LOW\_1TENTH**  **SWA\_HIS\_LOW\_BURST\_1TENTH** |
| **Normal LC + 1 full VDF + 1.5x PHAs** | **0.25** | **1.32** | **SWA\_HIS\_LOW\_QUARTER**  **SWA\_HIS\_LOW\_BURST\_QUARTER** |
| **Normal LC + 1 full VDF + 2x PHAs** | **0.50** | **2.68** | **SWA\_HIS\_LOW\_HALF**  **SWA\_HIS\_LOW\_BURST\_HALF** |
| **Normal LC + 1 full VDF + 4x PHAs** | **0.66**  **(1.0)** | **3.44** | **SWA\_HIS\_LOW\_2THIRDS**  **SWA\_HIS\_LOW\_BURST\_2THIRDS** |
| **Normal** | **1.0** | **5.3** | **SWA\_HIS\_NORMAL**  **SWA\_HIS\_NORMAL\_BURST** |
| **Normal + 1 full VDF** | **2.1** | **11.33** | **SWA\_HIS\_NORMAL\_2X**  **SWA\_HIS\_NORMAL\_BURST\_2X** |
| **Normal + 1 full VDF + 2.2x PHAs** | **3.0** | **15.90** | **SWA\_HIS\_NORMAL\_3X**  **SWA\_HIS\_NORMAL\_BURST\_3X** |
| **Normal + 3 full VDFs + 2x PHAs** | **5.1** | **26.79** | **SWA\_HIS\_NORMAL\_5X**  **SWA\_HIS\_NORMAL\_BURST\_5X** |
| **Burst** | **10.1** | **52.13** | **N/A** |

Table 2: Suggested names for HIS operational modes for inclusion into SOOP Kitchen.

### SWA L0 Data

The data described above are returned in individual CCSDS packets. Once on the ground, these packets are decommutated and uncompressed to form the L0 raw data packets. These files are still in ccsds format and are saved in binary format.

The MSSL Operations team is responsible for retrieving the raw CCSDS data and creating the L0 binary packets. The process used to create these data files is a simple C code that searches on the data type, subtype and SID. If the data is compressed it is passed through an uncompressor before being grouped into appropriate files. Table 3.1 shows how the data files are grouped together.

#### SWA PAS L0 data specificity

PAS L0 data is constituted from a single binary file, grouping together all PAS ccsds telemetry packets (Housekeeping, Science data, In-flight calibration), corresponding to the list given in Table 3.1.

Moreover, the PAS L0 data processing software is able to filter out all ccsds packet that are not relative to PAS, and should handle L0 binary files containing all SWA telemetry packets (PID 95..99), and no special filtering by MSSL is possible.

|  |  |
| --- | --- |
| **SWA L0 Data filename** | **Possible Contents**  **Type, SubType, SID, SCOS\_ID** |
| solo\_L0\_swa-dpu-REP\_[YYYYMMDD]\_V01.bin | 200, 248, 0, YIA58970  200, 249, 0, YIA58166  200, 250, 0, YIA58900  200, 251, 0, YIA58901  200, 252, 0, YIA58902  200, 253, 0, YIA58903  201, 200, 0, YIA58904  202, 200, 0, YIA58905  203, 200, 0, YIA58906 |
| solo\_L0\_swa-dpu-HK\_[YYYYMMDD]\_V01.bin | 3, 25, 11, YIA58200  3, 25, 14, YIA58211  3, 25, 15, YIA58998  3, 25, 20, YIA58216  3, 26, 4, YIA58204  3, 26, 5, YIA58205  3, 26, 6, YIA58206  3, 26, 7, YIA58207  3, 26, 8, YIA58208  3, 26, 9, YIA58209  3, 26, 10, YIA58210  3, 26, 12, YIA58214  3, 26, 13, YIA58215 |
| solo\_L0\_swa-eas1-NM\_[YYYYMMDD]\_V01.bin | 21, 3, 0, YIA58703  21, 6, 1, YIA58704  21, 3, 2, YIA58708 (Uncompressed)  21, 6, 3, YIA58709 (Uncompressed) |
| solo\_L0\_swa-eas1-SS\_[YYYYMMDD]\_V01.bin | 21, 6, 8, YIA58712  21, 6, 9, YIA58713 (Uncompressed) |
| solo\_L0\_swa-eas1-TM\_[YYYYMMDD]\_V01.bin | 21, 3, 5, YIA58716 (Uncompressed)  21, 3, 6, YIA58720 (Uncompressed)  21, 6, 7, YIA58724 (Uncompressed)  21, 3, 10, YIA58717  21, 3, 11, YIA58721  21, 6, 12, YIA58725 |
| solo\_L0\_swa-eas1-ENG\_[YYYYMMDD]\_V01.bin | 21, 3, 13, YIA58917  21, 3, 14, YIA58927 (Uncompressed)  21, 3, 14, YIA58946 (Uncompressed)  21, 3, 15, YIA58929 (Uncompressed)  21, 3, 15, YIA58948 (Uncompressed)  21, 6, 16, YIA58931 (Uncompressed)  21, 6, 16, YIA58950 (Uncompressed)  21, 3, 17, YIA58920  21, 3, 17, YIA58940  21, 3, 18, YIA58921  21, 3, 18, YIA58942  21, 6, 19, YIA58922  21 6, 19, YIA58944 |
| solo\_L0\_swa-eas1-HK\_[YYYYMMDD]\_V01.bin | 3, 25, 1, YIA58201 |
| solo\_L0\_swa-eas2-NM\_[YYYYMMDD]\_V01.bin | 21, 3, 30, YIA58701  21, 6, 31, YIA58702  21, 3, 32, YIA58706 (Uncompressed)  21, 6, 33, YIA58707 (Uncompressed) |
| solo\_L0\_swa-eas2-SS\_[YYYYMMDD]\_V01.bin | 21, 6, 38, YIA58710  21, 6, 39, YIA58711 |
| solo\_L0\_swa-eas2-TM\_[YYYYMMDD]\_V01.bin | 21, 3, 35, YIA58714 (Uncompressed)  21, 3, 36, YIA58718 (Uncompressed)  21, 6, 37, YIA58722 (Uncompressed)  21, 3, 40, YIA58715  21, 3, 41, YIA58719  21, 6, 42, YIA58723 |
| solo\_L0\_swa-eas2-ENG\_[YYYYMMDD]\_V01.bin | 21, 3, 43, YIA58918  21, 3, 44, YIA58947 (Uncompressed)  21, 3, 44, YIA58926 (Uncompressed)  21, 3, 45, YIA58928 (Uncompressed)  21, 3, 45, YIA58949 (Uncompressed)  21, 6, 46, YIA58930 (Uncompressed)  21, 6, 46, YIA58951 (Uncompressed)  21, 3, 47, YIA58923  21, 3, 47, YIA58941  21, 3, 48, YIA58924  21, 3, 48, YIA58943  21, 6, 49, YIA58925  21 6, 49, YIA58945 |
| solo\_L0\_swa-eas2-HK\_[YYYYMMDD]\_V01.bin | 3, 25, 2, YIA58202 |
| solo\_L0\_swa-eas-MOM\_[YYYYMMDD]\_V01.bin | 21, 3, 20, YIA58727 |
| solo\_L0\_swa-eas-BM\_[YYYYMMDD]\_V01.bin | 21, 6, 4, YIA58726 (Uncompressed)  21, 6, 4, YIA58889 (Uncompressed) |
| solo\_L0\_swa-pas\_[YYYYMMDD]\_V01.bin | 3, 25, 3, YIA58203  21, 3, 192, YIA58700  21, 6, 193, YIA58705  21, 3, 194, YIA58977 (Uncompressed)  21, 6, 195, YIA58978 (Uncompressed)  21, 3, 196, YIA58979 (Uncompressed)  21, 3, 197, YIA58986 (Uncompressed)  21, 6, 198, YIA58987 (Uncompressed)  21, 3, 199, YIA58980  21, 3, 200, YIA58988  21, 3, 201, YIA58989  21, 3, 202, YIA58981 (Uncompressed)  21, 3, 203, YIA58990 (Uncompressed)  21, 6, 204, YIA58991 (Uncompressed)  21, 3, 205, YIA58982  21, 3, 206, YIA58992  21, 6, 207, YIA58993  21, 3, 208, YIA58883 (Uncompressed)  21, 3, 208, YIA58983 (Uncompressed)  21, 3, 209, YIA58884 (Uncompressed)  21, 3, 209, YIA58994 (Uncompressed)  21, 6, 210, YIA58885 (Uncompressed)  21, 6, 210, YIA58995 (Uncompressed)  21, 3, 211, YIA58886  21, 3, 211, YIA58984  21, 3, 212, YIA58887  21, 3, 212, YIA58996  21, 6, 213, YIA58888  21, 6, 213, YIA58997  21, 6, 214, YIA58985  21, 6, 215, YIA58729 |
| solo\_L0\_swa-his-TEST\_[YYYYMMDD]\_V01.bin | 21, 3, 191, YIA58968 (normal)  21, 3, 191, YIA58969 (burst) |
| solo\_L0\_swa-his-CONFIG\_[YYYYMMDD]\_V01.bin | 21, 3, 128, YIA58800 (normal)  21, 3, 128, YIA58801 (burst) |
| solo\_L0\_swa-his-PHA\_[YYYYMMDD]\_V01.bin | 21, 6, 128, YIA58808 (normal)  21, 6, 128, YIA58809 (burst) |
| solo\_L0\_swa-his-MATRIX\_[YYYYMMDD]\_V01.bin | 21, 6, 129, YIA58802 (normal)  21, 6, 129, YIA58803 (burst) |
| solo\_L0\_swa-his-VDF\_[YYYYMMDD]\_V01.bin | 21, 6, 130, YIA58806 (normal)  21, 6, 130, YIA58807 (burst) |
| solo\_L0\_swa-his-PRIO\_[YYYYMMDD]\_V01.bin | 21, 6, 131, YIA58804 (normal)  21, 6, 131, YIA58805 (burst) |
| solo\_L0\_swa-his-LL\_[YYYYMMDD]\_V01.bin | 21, 6, 132, YIA58810 (normal)  21, 6, 133, YIA58811 (burst)  21, 6, 134, YIA58812 (burst) |
| solo\_L0\_swa-his-HK\_[YYYYMMDD]\_V01.bin | 3, 25, 100, YIA58213  3, 25, 101, YIA58212  3, 25, 102, YIA58184 |

Table . Level L0 grouping of raw packets

## Data Flow Overview

*This section will include a top-level description of the data processing workflow.*

*[Include Block Diagram showing the data sources and the processing steps]*



Figure .. SWA data flow schematic

The SWA data processing flows from the MOC data delivery service through a series of processing pipelines and back out to the SOC archive and other archives as illustrated in Figure 3.4

In Figure 3.4 there are six distinct pipelines, shaded green:

1. SWA L0 Pipeline: This is located at MSSL. It retrieves the data from the EDDS and performs a first unpack, decommutating the ccsds packets into relevant files for HIS, PAS and EAS. If a packet has been compressed on-board, it will be uncompressed in this pipeline. The decommutated and uncompressed ccsds packet files are grouped together in 24 hour files and stored at MSSL. They are available to the wider SWA team.
2. SWA Low Latency Pipeline: This pipeline is identical to the SWA pipeline hosted as a virtual machine at SOC. This pipeline will take SOC raw data and produce L0 .cdf files. These will be stored in the MSSL L0 data store.
3. PAS/HIS/EAS L1, L2, L3 Pipeline: These pipelines are hosted at the relevant institute. The pipeline will be fed the L0 data and produce the L1, L2 and L3 data products. These pipelines may also use external data. The higher level products will then be piped back to MSSL where they will be archived.
4. SWA Archive Pipeline: This pipeline simply takes the higher level data products and sends them to the relevant external archives.

## Data Generation

The following sections describe the process used to produce the data products described in section 4.

### SWA L1 Data

The SWA L1 data is the uncalibrated, uncompressed L0 data in CDF format. The individual sensor teams are responsible for generating SWA L1 data from the L0 packets. These CDF files will have the ccsds header data and the ccsds science data combined.

#### SWA EAS L1 Data

MSSL is responsible for generating the SWA EAS L1 data form the L0 source. The EAS L1 data products are, for each EAS, as follows:

* Normal Mode Spectra in counts, one set for each EAS sensor. The angular bin directions are in the EAS sensor reference frames.
* Burst Mode spectra in counts, from one sensor viewing the magnetic field direction. The angular bin directions are in the relevant EAS sensor frame.
* Triggered Mode Spectra in counts, one set for each EAS sensor. The angular bin directions are in the EAS sensor reference frames. This data is at the highest cadence of 1 3d sweep per second for a period of 5 minutes.
* Partial moments calculated on board (6 sets per EAS sensor) in physical units. The frame references are the EAS sensor reference frames.
* Engineering mode data.

#### SWA PAS L1 Data

IRAP is responsible for generating the SWA PAS L1 data form the L0 source. The PAS L1 data products are as follows:

* PAS 3D spectra: unique dataset merging data from various modes (Normal mode, Burst mode and Snapshots). The angular bin directions are in PAS frame. Data records are in chronological order, but with a variable time-resolution, depending on various modes.
* Onboard moments in physical units. In the PAS frame of reference.
* Engineering data: housekeeping parameters, in physical values (Volf, mA, deg.C)
* Inflight Calibration data.

All Data products are made as CDF files according to “SOL-SGS-TN-0009 Metadata Definition for Solar Orbiter Science Data”. As well as being stored in the SWA Master Repository at MSSL with the L0 data. These files will also be stored in CDPP data archive. These files will also be converted to NetCDF format to fit the AMDA tool spec.

#### SWA HIS L1 Data

UMich is responsible for generating the L0 HIS data form the L0 source. This data will be in CDF format. SWA HIS L1 data products are as follows:

* Ion Event (PHA) words. Individual ion event data, containing full information on incident angles (elevation and azimuth), E/q, TOF and SSD energy in digital units. The resolution of this data product can be 30s or 300s. In Burst mode the resolution can be 4s but this can only be run on average 1% of the time due to telemetry constraints.
* Priority Rates: Counts of PHA events within a priority range, as a function of E/q and elevation. See below for description of typical use. The resolution of this data product can be 30s or 300s. In Burst mode the resolution can be 4s but this can only be run on average 1% of the time due to telemetry constraints.
* Sensor rates. Counts of unclassified ion event words on the HIS detectors (start MCP, stop MCP, SSD) as a function of E/q, integrated over incident angles, TOF and Energy. Includes full counts of events subject to decimation.S ensor rates also include two coincidence rates, the number of events with a valid TOF and energy (triple coincidence), and a count of those with only a valid TOF (double coincidence). These rates are primarily used to evaluate the performance of the instrument, rather than for science. In particular, they can be used for calculation of ion detection efficiency in-flight [von Steiger et al., 2000]. The resolution of this data product can be 30s or 300s. In Burst mode the resolution can be 4s but this can only be run on average 1% of the time due to telemetry constraints.
* Decimation Rates. Counts of ion event words in each of three decimation ranges as a function of E/q. In order to reduce the processing load in on-board processing caused by light ions and low-TOF noise sources, only a fraction (1 in N) of those events are transmitted to the HIS C&DH board from the HV bubble. Separate decimation ranges in E/q and TOF are included for alpha particles, protons and low-TOF events caused by accidental coindences. The fraction transmitted is commandable, from typically 1 in 4 for alphas to zero for low-TOF noise events.
* Rate-Based Velocity Distribution Functions: Counts of ion event words for a set of ions subdivided by E/q, elevation and azimuth. Selection of ions to include He2+, C5+, O6+, and Fe10+. Additional ions and charge states may be produced according to science needs and as counting statistics allow. Since these counts are not subject to the effect of the priority sampling algorithm, they represent the best possible statistics. However, because species are separated simply by boxes and no peak overlap removal is performed (see below), the counts are not as accurately assigned to a given species as they would be if formed on the ground. The resolution of this data product can be 30s or 300s. In Burst mode the resolution can be 4s but this can only be run on average 1% of the time due to telemetry constraints.
* Matrix Rates: Counts of ion event words within a specified Energy-TOF range, classified and counted onboard, for each E/q step. Summed over incident angle. HIS has 32 such species boxes intended to roughly select counts of ion event words measured for particular ion species. Classification transforms E/q, TOF and residual energy into the two dimensions of Energy and TOF. Classification is primarily used for other data products (below and in low-latency). This data product is not in telemetry for most instrument data rates. If resources allow, the following ions may be included are He2+, O6-7+, C4-6+, and Fe10+. Additional ions and charge states may be produced according to science needs and as counting statistics allow. The resolution of this data product can be 30s or 300s. In Burst mode the resolution can be 4s but this can only be run on average 1% of the time due to telemetry constraints.
* Low-latency Data. Two rate spectra plus two rate ratios packaged into a single packet. These packets are handled separately from other science data and are downlinked at high-priority, at essentially the same intervals as housekeeping data

All Data products are made as CDF files according to “SOL-SGS-TN-0009 Metadata Definition for Solar Orbiter Science Data”. As well as being stored at MSSL, these files shall be stored in \*\*NASA\*\* data archive.

Illustrations of the higher level data product flow for EAS and PAS are shown in Figure 3.5 and Figure 3.6 below.



Figure . Illustration of the SWA-EAS higher level data flow



Figure . Illustration of the SWA-PAS higher level data flow

### SWA L2 Data

#### SWA EAS L2 Data

The MSSL Operations team is responsible for generating SWA EAS L2 data. The generation of the full set of SWA EASA L2 data products requires a number of auxiliary files including:

* L0 data products;
* EAS Ground Calibration files;
* EAS Flight Calibration files (Obtained from L0 engineering/cal data);
* Spacecraft orbit and attitude information files (e.g. SPICE kernels);
* Spacecraft potential data from the RPW instrument;
* Magnetic field direction associated with each burst mode sample from the MAG instrument.

The set of SWA EAS L2 data products includes the following:

* Normal mode full onboard moment set for electrons in physical units and relevant heliospheric frame (produced by appropriately combining partial moments data with reference to the spacecraft potential from RPW) - at 4 second time resolution;
* Normal mode combined 3D electron distributions expressed as a distribution function with physical units and in a relevant heliospheric frame. These are produced by appropriately combining spectra from the 2 sensors. Time resolution 100 seconds;
* Normal mode combined 3D electron distributions expressed as a differential energy (number) flux and in a relevant heliospheric frame. These are again produced by appropriately combining spectra from the 2 sensors. Time resolution 100 seconds;
* Trigger event combined 3D electron distributions expressed as a distribution function with physical units and in a relevant heliospheric frame. These are produced by appropriately combining spectra from the 2 sensors. Time resolution 1 second for a 5 minute period;
* Trigger event combined 3D electron distributions expressed as a differential energy (number) flux and in a relevant heliospheric frame. These are again produced by appropriately combining spectra from the 2 sensors. Time resolution 1 second for a 5 minute period;
* Burst mode combined 2D electron pitch-angle distributions expressed with physical units and in a frame defined by the magnetic field direction. These are produced by appropriately rebinning the data from 2 elevation scans with respect to the field direction. Time resolution 0.125 seconds for a limited (few minute) period;
* Burst mode combined 2D electron pitch-angle distributions expressed as a differential energy (number) flux and in a frame defined by the magnetic field direction. These are produced by appropriately rebinning the data from 2 elevation scans with respect to the field direction. Time resolution 0.125 seconds for a limited (few minute) period;
* Normal mode combined single energy angle-angle electron distributions expressed as a distribution function with physical units and in a relevant heliospheric frame. These are produced by appropriately combining spectra from the 2 sensors. Time resolution 100 seconds;
* Normal mode combined single energy angle-angle electron distributions expressed as a differential energy (number) flux and in a relevant heliospheric frame. These are produced by appropriately combining spectra from the 2 sensors. Time resolution 100 seconds;
* Ground-calculated electron moments generated from the normal mode combined 3D electron distributions, in physical units and relevant heliospheric frame (produced with reference to the spacecraft potential from RPW) - at 100 second time resolution;
* Ground-calculated electron moments generated from the trigger events combined 3D electron distributions, in physical units and relevant heliospheric frame (produced with reference to the spacecraft potential from RPW) - at 1 second time resolution over a 5 minute period;

Again, all L2 data products described above will be stored, with appropriate metadata, within CDF files according to “SOL-SGS-TN-0009 Metadata Definition for Solar Orbiter Science Data”. These files will be stored in the SWA Master Repository at MSSL, along with the L2 data from the other SWA sensors and the auxiliary data generated from the mission. A number (all, subject to discussion?) of these data files will be submitted to the official ESA Solar Orbiter Archive, to the NASA NSSDC archive and the CDPP data archive in France following PI review and approval.

These files may be converted by the MSSL team to appropriate format (e.g. NetCDF format to fit the AMDA tool spec.) as requested by the archives.

#### SWA PAS L2 Data

IRAP is responsible for generating the SWA PAS L2 data.

To produce the SWA PAS L2 data, the following auxiliary files are required:

* PAS L1 3D CDF files
* PAS Ground Calibration files
* PAS L1 Inflight Calibration files
* Spacecraft orbit and attitude information files (e.g. SPICE kernels)

IRAP will produce the following SWA PAS L2 files:

* 3D ion distributions expressed as a differential flux in the Solar-Ecliptic Frame
* 3D ion distributions expressed as a distribution function in the Solar-Ecliptic Frame
* Ground calculated H+ moments in the Solar-Ecliptic Frame
* Ground calculated He++ moments in the Solar-Ecliptic Frame

All Data products are made as CDF files according to “SOL-SGS-TN-0009 Metadata Definition for Solar Orbiter Science Data”. As well as being stored at MSSL, the PAS L2 files shall be stored in CDPP data archive after a PI review and approvement. These files shall be converted also to NetCDF format to fit the AMDA tool spec.

All PAS L2 data can be delivered to ESAC archive after a PI review and approvement.

#### SWA HIS L2 Data

UMich is responsible for generating the SWA HIS L2 data. To produce the SWA HIS L2 data, the following auxiliary files are required:

* L0 data products
* HIS Ground Calibration files
* HIS Flight Calibration files (Obtained from L0)
* Spacecraft orbit and attitude information files (e.g. SPICE kernels)

UMich will provide the following SWA HIS L2 data products. These are the same products as L1 but in physical units:

* Ion Event (PHA) Words: Full information about measured ion events in physical units, including E/q (keV/e), time-of-flight (ns), total energy (keV) and elevation (degrees) and azimuth (degrees). These are the primary science data product from HIS and make up the bulk of HIS telemetry volume in Normal and Normal Low Cadence modes.
* Priority Rates: Total counts of ion event words in each priority range, divided by E/q and elevation angle bin. (Duplicate of L1 version.) These rates are used to correct the weighting of telemetered ion event words for the effect of the sampling algorithm. For example, if the priority rate for a given E/q step and elevation bin is 10, but only 5 of these ion event words were included in telemetry, then each counts for 2 in further processing;
* Sensor Rates: L1 Sensor Rates converted to differential flux units, (cm2 s sr keV) -1.
* Decimation Rates: Duplicate of L1 version since conversion to flux units does not makes sense.
* Matrix rates: L1 Matrix Rates converted to flux units, (cm2 s) -1.
* Rate-Based Velocity Distribution Functions: L1 Rate-Base Velocity Distribution Functions converted to differential flux units, (cm2 s sr keV) -1.



### SWA L3 Data

The SWA team may generate further L3 data products as required. At present these are still TBD. Possible data products that can be further generated from the L1 or L2 and auxiliary data files might include:

* EAS Pitch Angle Distributions generated from the Normal Mode 3D distributions with reference to the magnetic field direction (time resolution 100secs);
* EAS Pitch Angle Distributions generated from the Trigger event 3D distributions with reference to the magnetic field direction (time resolution 1 second for a 5 minute period;
* EAS Moments over reduced energy ranges (e.g. by appropriately combining partial moment data to provide a quantification of the plasma characteristics in only the strahl energy range – time resolution 4 seconds – or by moment integration performed on L2 normal mode 3D distributions over a limited energy range – time resolution 100 seconds);
* PAS All sky maps

In the case of SWA HIS, the most accurate and scientifically useful data products are formed via a peak overlap removal algorithm to assign counts to individual ion species in ground processing [von Steiger et al., 2000; Shearer et al., 2014}. This algorithm uses a forward model to predict the peak center location of each of the >75 analyzed ions in time-of-flight -- energy space at each E/q step. This forward model, which includes estimated peak width as well center, is developed from ground calibration and in-flight accumulated data. A set of two-dimensional Gaussian curves is formed from these centers and widths and provides an initial estimate of count vectors assigned each species. A maximum-likehood estimation method (MLE) then shuffles counts among these vectors to remove overlap in the statistically optimal way. Events at each pair of incident angle bins are processed independently to preserve distributions in these dimensions. Count vectors from all angle bins are then recombined and converted to phase-space density (s3 km-6) to form 3D velocity distribution functions (VDFs). Moments of density, velocity and temperature are then computed from these VDFs and used to produce the following data products form SWA/HIS:

* (cm-3) (km s-1) (K)
* (s3 km-6)

These are summarized in Table 3.2 below.

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MSSL will define a set of appropriate physical reference frames in which to produce and store the data (or produce one in which manipulations to other frames (e.g. using SPICE kernels) is straightforward for the community.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

TBD

*There are two coordinate reference systems that SWA can use to represent L2 data. Both are used for STERO mission. SWA team shall define which coordinate system we will use for L2/L3 data products:*

*Solar-Orbit (SO), X is the line connection Solar Orbiter and the Sun center, Y is in the plane of the S/C orbit towards the SC velocity vector.*

*Solar-Equator-Spacecraft (SES) that equals to STEREO* ***HGRTN/RTN :*** *X axis points from Sun center to the spacecraft, and the Y axis is the cross product of the solar rotational axis and X, and lies in the solar equatorial plane (towards the West limb).*

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## Validation

The following sections describe the process by which the data products are validated.

### Instrument Team Validation

Upon ingestion of the raw CCSDS telemetry at MSSL, initial testing will be performed on the raw data. This will include:

* SID counter tests to ensure all packets are present.

### SOC Validation

The SOC will check the data types that the SWA team intends to archive. The SOC might also perform spot checks on contents of the files. The exact procedure in which this routine check will take place is still TBD.

# Data Product Descriptions

SWA data products are formatted in accordance with the rules outlined in [RD7]. This section provides details on the filenames, formats and metadata for each of the products included in the SWA science data.

**Level Source Data Type Format and Metadata content**

|  |  |  |  |
| --- | --- | --- | --- |
| **Level** | **Source** | **Data Type** | **Format and Metadata content** |
| L0 | IT | "Raw" data, unpacked and uncompressed data | Decommutated and uncompressed CCSDS metadata reflect the information that was available in the TM packets only. |
| L1 | IT | "Engineering" data, uncalibrated | CDF, metadata follows Solar Orbiter standard for L1 |
| L2 | IT | "Calibrated" data, science quality | CDF, metadata follows Solar Orbiter standard for L2 (see Section Solar Orbiter Metadata Standard): full attitude information in WCS coordinate frame and time in UTC. |
| *L3* | *IT* | *Higher-level data* | *Data format as appropriate. The format of Level-3 data, calibration data and ancillary data can be chosen depending on the type of data product and the objectives. However, as much as possible standard formats should be used (MPEG, FITS, JPEG2000, CDF, PNG, ...).* |
| CAL | IT | Calibration data | Data format as appropriate. *Not all calibration data are necessarily open to the scientific community.* |
| ANC | IT/SOC | Ancillary data | Data format as appropriate. *Not all ancillary data are necessarily open to the scientific community.* |
| PLN | SOC | Planning data | Files related to mission planning issued by the SOC, for example the E-FECS (see E-FECS ICD). *Not all planning files are necessarily open to the scientific community* |
| LL01 | SOC | LL engineering data, output of LL pipeline | CDF, metadata follow Solar Orbiter standard, with some specifics for LL-01 data: time in OBT, attitude in instrument detector reference frame. |
| LL02 | SOC | Operational LL data, enhanced with S/C HK | CDF, metadata follow Solar Orbiter standard, with some specifics for LL-02 data : time in UTC, attitude in WCS coordinate frame. |
| LL03 | SOC | Visualisation of operational LL data, in "quicklook" format | 'Quicklook' data in PNG or JPEG2000 (details TBC). This level is also used for LL data products derived from (multiple) LL02 products. |

*Note that we do not specify a level for LL TM that has been fully processed and calibrated*

*by the instrument team. These should be classified as 'L2'. Higher level, derived data*

*products are part of 'L3' data.*

## Primary Products Format

The SWA instrument uses the CDF format for its science data products. This section describes the format and record structure of each of the science data file types.

The following information should be given for each of the data products:

* Product name
* Description
* Descriptor
* Free field
* Level
* Dataset dependencies (if any)
* Associated calibration set (if any)
* expected cadence and dataset volume

The definitions of these attributes can be found in the Data Products and Filenames Confluence document (0, section 2.1)

The definitions below shall include all metadata contained in the product, both Solar Orbiter mandatory metadata [AD.01] and Instrument Specific metadata if any. A description of the data content organisation (as described in the aforementioned section of 0) shall be given as well.

The filename will follow this format:

solo\_[DataLevel]\_swa-[Sensor]-[DataType]\_[StartEpoch- EndEpoch]\_[Version].cdf

An example of this is:

solo\_L0\_swa-eas-NM\_YYYYMMDDTHHMMSS- YYYYMMDDTHHMMSS\_V01.cdf

Where StartTime and EndTime are the coarse seconds from the first and last SCET. It is expected that these files will cover 86400 second periods.

### L0 – Raw data products

*Description of the process used to obtain this type of data*

#### EAS L0 data products

EAS Level-0 data files are created by decommutating and decompressing CCSDS telemetry data packets for EAS. CCSDS telemetry data is the only required input. Below is detailed description of EAS L0 files.

##### EAS normal mode electron counts

This file contains the Normal Mode Electron Counts data product from EAS[12]. The file format is .cdf.

**Filename**: solo\_L0\_swa-eas[12]-NMc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end times mentioned in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 100 seconds. It contains electron counts in 16 bit format covering 64 energies, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single 24 hour period approximately. In this case there will be 864 records per day.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L0>Level 0 Data |
| Descriptor | 1 | SWA-EAS[12]-NMc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L0\_swa-eas[12]-NMc |
| Logical File id | 1 | solo\_L0\_swa-eas[12]-NMc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Nominal Mode 3D counts data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | NMc>Nominal Mode Counts |
| Level | 1 | L0>Level 0 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS[12] observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_EPOCH | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_NMc\_Data | CDF\_UINT4 | 1 | 32768 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SWA\_EAS[12]\_NMc\_Data | | | |
| CATDESC | CDF\_CHAR | EAS[12] Nominal mode 3D electron distribution counts | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_SCET | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Mode | | | |
| CATDESC | CDF\_CHAR | The EAS[12] Mode data | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Full3DValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Full 3D Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags related to whole EAS[12] 3D data set | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ElevationValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each of the 16 elevations | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Elevation validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_DataValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each energy count for the 16 elevations | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Data validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS single strahl electron counts

This file contains the single strahl electron counts data product from EAS[12]. The file format is .cdf.

**Filename**: solo\_L0\_swa-eas[12]-SSc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end time mentioned in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 100 seconds. It contains electron counts in 16 bit format covering 1 energy, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single 24 hour period approximately. In this case there will be 864 records per day.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L0>Level 0 Data |
| Descriptor | 1 | SWA-EAS[12]-SSc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | Solo\_L0\_swa-eas[12]-SSc |
| Logical File id | 1 | solo\_L0\_swa-eas[12]\_SSc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Single Strahl data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | SSc>Single Strahl Counts |
| Level | 1 | L0>Level 0 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS[12] observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_EPOCH | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Mode | | | |
| CATDESC | CDF\_CHAR | The EAS[12] Mode data | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_DataValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each energy count for the 16 elevations | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Data validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_EnergyID | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EnergyID | | | |
| CATDESC | CDF\_CHAR | The EAS[12] Energy used for Strahl collection | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| FORMAT | CDF\_CHAR | I3 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 255 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 255 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_SSc\_Data | CDF\_UINT4 | 1 | 512 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Single Strahl Data | | | |
| CATDESC | CDF\_CHAR | Single strahl data from EAS[12] | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_SCET | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Triggered Mode Counts

This file contains the triggered mode electron counts data product from EAS[12]. The file format is .cdf.

**Filename**: solo\_L0\_swa-eas[12]-TMc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end times mentioned in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 1 second for 5 minutes. It contains electron counts in 16 bit format covering 64 energies, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single triggered event. In this case there will be 300 records per event.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L0>Level 0 Data |
| Descriptor | 1 | SWA-EAS[12]-TMc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L0\_swa-eas[12]-TMc |
| Logical File id | 1 | solo\_L0\_swa-eas[12]-TMc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Trigger Mode 3D counts data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | TMc>Trigger Mode Counts |
| Level | 1 | L0>Level 0 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS[12] observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_EPOCH | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_TMc\_Data | CDF\_UINT4 | 1 | 32768 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SWA\_EAS[12]\_TMc\_Data | | | |
| CATDESC | CDF\_CHAR | EAS[12] Trigger mode 3D electron distribution counts | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_SCET | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Mode | | | |
| CATDESC | CDF\_CHAR | The EAS[12] Mode data | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Full3DValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Full 3D Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags related to whole EAS[12] 3D data set | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ElevationValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each of the 16 elevations | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Elevation validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_DataValidity | CDF\_UINT4 | 1 | 64 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each energy count for the 16 elevations | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Data validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_HRTBT | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | RPW Heartbeat | | | |
| CATDESC | CDF\_CHAR | The RPW Heartbeat data coming in from S20 packet | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | RPW Heartbeat (Time) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_REAL8 | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_REAL8 | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_ShkTrigQlty | CDF\_UINT4 | 1 | 1 | F | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] RPW Shock Trigger Quality | | | |
| CATDESC | CDF\_CHAR | RPW Shock Trigger quality flag coming in from S20 packet | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | RPW Shock Trigger quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_Pot | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | RPW Potential | | | |
| CATDESC | CDF\_CHAR | RPW potential coming in from S20 packet – set to zero if PA is zero | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I5 | | | |
| LABLAXIS | CDF\_CHAR | RPW Potential data | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | Linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_RPW\_HRTBT | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_PA | CDF\_UINT1 | 1 | 1 | F | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] RPW PA | | | |
| CATDESC | CDF\_CHAR | RPW Potential Availability flag coming in from S20 packet | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT1 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | RPW Potential Availability Flag | | | |
| VALIDMIN | CDF\_UINT1 | 0 | | | |
| VALIDMAX | CDF\_UINT1 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT1 | 0 | | | |
| SCALEMAX | CDF\_UINT1 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_TF | CDF\_UINT1 | 1 | 1 | F | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] RPW TF | | | |
| CATDESC | CDF\_CHAR | RPW Trigger Flag coming in from S20 packet | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT1 | 255 | | | |
| FORMAT | CDF\_CHAR | I3 | | | |
| LABLAXIS | CDF\_CHAR | RPW Trigger Flag | | | |
| VALIDMIN | CDF\_UINT1 | 0 | | | |
| VALIDMAX | CDF\_UINT1 | 2 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT1 | 0 | | | |
| SCALEMAX | CDF\_UINT1 | 2 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Burst Mode Counts

This file contains the Burst mode electron (pitch angle) counts data product from EAS. The file format is .cdf.

**Filename**: solo\_L0\_swa-eas-padc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end times mentioned in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 0.125 second It contains electron counts in 16 bit format covering 64 energies, 32 anodes and 16 deflectors for each time-stamp. In this case the number of records vary depending on the telemetry availability.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L0>Level 0 Data |
| Descriptor | 1 | SWA-EAS-padc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L0\_swa-eas-padc |
| Logical File id | 1 | solo\_L0\_swa-eas-padc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Electron Pitch Angle counts data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | padc>Pitch Angle Distribution Counts |
| Level | 1 | L0>Level 0 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_EPOCH | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_PAD\_Data | CDF\_UINT4 | 1 | 4096 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS PAD Data | | | |
| CATDESC | CDF\_CHAR | EAS electron pitch angle distribution counts | | | |
| DISPLAY\_TYPE | CDF\_CHAR | Spectrogram | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS\_SCET | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Mode | | | |
| CATDESC | CDF\_CHAR | The EAS Mode data | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Validity | CDF\_UINT4 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with energies | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_EASUsed | CDF\_UINT1 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS sensor used | | | |
| CATDESC | CDF\_CHAR | The EAS sensor use for Pitch Angle data collection | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT1 | 255 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS | | | |
| VALIDMIN | CDF\_UINT1 | 0 | | | |
| VALIDMAX | CDF\_UINT1 | 3 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT1 | 0 | | | |
| SCALEMAX | CDF\_UINT1 | 3 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_ElevationUsed | CDF\_UINT1 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Elevation used | | | |
| CATDESC | CDF\_CHAR | The EAS Elevation used for Pitch Angle data collection | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT1 | 255 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Elevation | | | |
| VALIDMIN | CDF\_UINT1 | 0 | | | |
| VALIDMAX | CDF\_UINT1 | 16 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT1 | 0 | | | |
| SCALEMAX | CDF\_UINT1 | 16 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_MagDataUsed | CDF\_UINT4 | 1 | 4 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | MAG vector | | | |
| CATDESC | CDF\_CHAR | The MAG vector used to calculate pitch angles collected | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | F14.4 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| UNITS | CDF\_CHAR | nT | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+09>T | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Onboard Partial Moments

This file contains onboard calculated partial electron moments from both EAS1 and EAS2. The file format is .cdf.

EAS onboard partial moments are calculated over three energy ranges in two sensor look directions. The three energy ranges are low, core-halo and strahl energy ranges. The look directions are one sensor only and two sensor overlap look directions.

This data product contains variables to describe SCET, data validity, summed distributions usage, spacecraft potential, 78 Moments values and 12 Moments Sums for each sensor. The 78 moments values come from three energy ranges in two sensor look directions. The two sensor look directions are one sensor only look direction and overlap with other sensor direction.

**Filename**: solo\_L0\_swa-eas-OnbPartMoms\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the StartTime and EndTime in the file name. The start and end times are spacecraft elapsed time (SCET) at 4 second resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 4 seconds.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L0>Level 0 Data |
| Descriptor | 1 | SWA-EAS-OnbPartMoms |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L0\_swa-eas-padc |
| Logical File id | 1 | solo\_L0\_swa-eas- OnbPartMoms \_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Onboard Partial Moments |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | OnbPartMoms>Onboard Partial Moments |
| Level | 1 | L0>Level 0 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS1 observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_EPOCH | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS1 time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS2 observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_EPOCH | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_EPOCH | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_EPOCH | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS2 time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_dataValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_dataValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SumEAS1 | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Summed EAS1 distributions | | | |
| CATDESC | CDF\_CHAR | This flag indicates if 4 successive 3D distributions are summed to calculate Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Summed flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SumEAS2 | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Summed EAS2 distributions | | | |
| CATDESC | CDF\_CHAR | This flag indicates if 4 successive 3D distributions are summed to calculate Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 Summed flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SCPotential | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Spacecraft Potential | | | |
| CATDESC | CDF\_CHAR | Spacecraft Potential used to discard lowest energies – needs conversion. | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Potential | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_SumMoms | CDF\_UINT4 | 1 | 12 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Moment Sums | | | |
| CATDESC | CDF\_CHAR | The partial sum of the EAS1 Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Partial Sum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_SumMoms | CDF\_UINT4 | 1 | 12 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 Moment Sums | | | |
| CATDESC | CDF\_CHAR | The partial sum of the EAS2 Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 Partial Sum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyLowEne N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyLowEne P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyCoreHalo N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyCoreHalo P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyStrahl N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyStrahl P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapLowEne N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapLowEne P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapCoreHalo N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapCoreHalo P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapStrahl N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapStrahl P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS1\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapLowEne N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapLowEne P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapCoreHalo N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapCoreHalo P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapStrahl N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapStrahl P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS2\_SCET | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

#### PAS L0 data

This PAS L0 data is a single file, constituted of a sequence of ccsds telemetry data packets.

This file shall provide at least all the telemetry products relative to PAS, as listed in Table 3.1, covering a whole 24H period.

Some additional telemetry packets are accepted, like TCs and TC’s acknowledgments, SWA memory dump, SWA events…

PAS data processing software is also able to filter out telemetry packets not related to PAS, and should accept as input a single file with the complete SWA telemetry, i.e. all packets with PID in range [95, 99]

The file format should be;

* a binary file, composed of a sequence of ccsds telemetry packets
* an Ascii file, composed of a sequence a lines, corresponding to the hexadecimal dump of a individuals telemetry packets. Each line may start with a timestamp, in ISO format (yyyy-mm-ddThh:mm:ss.xxxZ)

**Filename**:

solo\_L1\_swa-pas-tm\_yyyymmdd\_V01.bin

solo\_L1\_swa-pas-tm\_yyyymmdd\_V01.ascii

#### HIS L0 data

HIS L0 data products to be defined…

### L1 – Raw data products

*Description of the process used to obtain this type of data*

#### EAS L1 data products

EAS Level-1 data is made at MSSL using the Level-0 data files. Below is detailed description of EAS L1 data.

##### EAS normal mode electron counts

This file contains the Normal Mode Electron Counts data product from EAS[12]. The file format is .cdf.

**Filename**: solo\_L1\_swa-eas[12]-NMc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end time in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 100 seconds. It contains electron counts in 16 bit format covering 64 energies, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single 24 hour period approximately. In this case there will be 864 records per day.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-EAS[12]-NMc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L1\_swa-eas[12]-NMc |
| Logical File id | 1 | solo\_L1\_swa-eas[12]-NMc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Nominal Mode 3D counts data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | NMc>Nominal Mode Counts |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SCET | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS[12] observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 1577836800.0 | | | |
| VALIDMAX | CDF\_REAL8 | 1893456000.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 1577836800.0 | | | |
| SCALEMAX | CDF\_REAL8 | 1893456000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ELEVATION | CDF\_REAL8 | 1 | 16 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ENERGY | CDF\_REAL8 | 1 | 64 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Energy | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy values of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_NMc\_Data | CDF\_REAL8 | 3 | 16,64,32 | T | T,T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SWA\_EAS[12]\_NMc\_Data | | | |
| CATDESC | CDF\_CHAR | EAS[12] Nominal mode 3D electron distribution counts | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS[12]\_ELEVATION | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS[12]\_ENERGY | | | |
| DEPEND\_3 | CDF\_CHAR | SWA\_EAS[12]\_AZIMUTH | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS[12] | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Mode | | | |
| CATDESC | CDF\_CHAR | The EAS[12] Mode data | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Full3DValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Full 3D Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags related to whole EAS[12] 3D data set | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ElevationValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each of the 16 elevations | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Elevation validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_DataValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each energy count for the 16 elevations | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Data validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EAS[12]\_TO\_RTN | CDF\_REAL8 | 2 | 3,3 | F | T,T |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Rotation Matrix | | | |
| CATDESC | CDF\_CHAR | The rotation matrix that will transform EAS1 to RTN frame | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS[12] single strahl electron counts

This file contains the single strahl electron counts data product from EAS[12]. The file format is .cdf.

**Filename**: solo\_L1\_swa-eas[12]-SSc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end times mentioned in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 100 seconds. It contains electron counts in 16 bit format covering 1 energy, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single 24 hour period approximately. In this case there will be 864 records and the file size will be of the order of 1 Mbyte per day.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-EAS[12]-SSc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | Solo\_L1\_swa-eas[12]-SSc |
| Logical File id | 1 | solo\_L1\_swa-eas[12]\_SSc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Single Strahl data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | SSc>Single Strahl Counts |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SCET | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS[12] observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 1577836800.0 | | | |
| VALIDMAX | CDF\_REAL8 | 1893456000.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 1577836800.0 | | | |
| SCALEMAX | CDF\_REAL8 | 1893456000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Mode | | | |
| CATDESC | CDF\_CHAR | The EAS[12] Mode data | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ELEVATION | CDF\_REAL8 | 1 | 16 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ENERGY | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Energy | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy value used to obtain the single strahl from the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_DataValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each energy count for the 16 elevations | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Data validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_SSc\_Data | CDF\_REAL8 | 2 | 32, 16 | T | T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Single Strahl Data | | | |
| CATDESC | CDF\_CHAR | Single strahl data from EAS[12] | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS[12]\_AZIMUTH | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS[12]\_ELEVATION | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS[12] | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EAS[12]\_TO\_RTN | CDF\_REAL8 | 2 | 3,3 | F | T,T |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Rotation Matrix | | | |
| CATDESC | CDF\_CHAR | The rotation matrix that will transform EAS1 to RTN frame | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Triggered Mode Counts

This file contains the triggered mode electron counts data product from EAS[12]. The file format is .cdf.

**Filename**: solo\_L1\_swa-eas[12]-TMc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end times mentioned in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 1 second for 5 minutes. It contains electron counts in 16 bit format covering 64 energies, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single triggered event. In this case there will be 300 records and the file size will be of the order of 21 Mbytes per event.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-EAS[12]-TMc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L1\_swa-eas[12]-TMc |
| Logical File id | 1 | solo\_L1\_swa-eas[12]-TMc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Trigger Mode 3D counts data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | TMc>Trigger Mode Counts |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS[12] observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 1577836800.0 | | | |
| VALIDMAX | CDF\_REAL8 | 1893456000.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 1577836800.0 | | | |
| SCALEMAX | CDF\_REAL8 | 1893456000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ELEVATION | CDF\_REAL8 | 1 | 16 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS[12] sensor | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ENERGY | CDF\_REAL8 | 1 | 64 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Energy | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy values of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_TMc\_Data | CDF\_REAL8 | 3 | 16,64,32 | T | T,T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SWA\_EAS[12]\_TMc\_Data | | | |
| CATDESC | CDF\_CHAR | EAS[12] Trigger mode 3D electron distribution counts | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS[12]\_ELEVATION | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS[12]\_ENERGY | | | |
| DEPEND\_3 | CDF\_CHAR | SWA\_EAS[12]\_AZIMUTH | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS[12] | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Mode | | | |
| CATDESC | CDF\_CHAR | The EAS[12] Mode data | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_Full3DValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Full 3D Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags related to whole EAS[12] 3D data set | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ElevationValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each of the 16 elevations | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Elevation validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_DataValidity | CDF\_UINT4 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with each energy count for the 16 elevations | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Data validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_HRTBT | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | RPW Heartbeat | | | |
| CATDESC | CDF\_CHAR | The RPW Heartbeat data coming in from S20 packet | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | RPW Heartbeat (Time) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_REAL8 | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_REAL8 | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_ShkTrigQlty | CDF\_UINT4 | 1 | 1 | F | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] RPW Shock Trigger Quality | | | |
| CATDESC | CDF\_CHAR | RPW Shock Trigger quality flag coming in from S20 packet | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_RPW\_HRTBT | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | RPW Shock Trigger quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_Pot | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | RPW Potential | | | |
| CATDESC | CDF\_CHAR | RPW potential coming in from S20 packet – set to zero if PA is zero | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | RPW Potential data | | | |
| UNITS | CDF\_CHAR | Volts | | | |
| VALIDMIN | CDF\_REAL8 | -100.0 | | | |
| VALIDMAX | CDF\_REAL8 | 100.0 | | | |
| SCALETYP | CDF\_CHAR | Linear | | | |
| SCALEMIN | CDF\_REAL8 | -100.0 | | | |
| SCALEMAX | CDF\_REAL8 | 100.0 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_RPW\_HRTBT | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_PA | CDF\_UINT4 | 1 | 1 | F | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] RPW PA | | | |
| CATDESC | CDF\_CHAR | RPW Potential Availability flag coming in from S20 packet | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_RPW\_HRTBT | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | RPW Potential Availability Flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_TF | CDF\_UINT4 | 1 | 1 | F | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] RPW TF | | | |
| CATDESC | CDF\_CHAR | RPW Trigger Flag coming in from S20 packet | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_RPW\_HRTBT | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | RPW Trigger Flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EAS[12]\_TO\_RTN | CDF\_REAL8 | 2 | 3,3 | F | T,T |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Rotation Matrix | | | |
| CATDESC | CDF\_CHAR | The rotation matrix that will transform EAS1 to RTN frame | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Burst Mode Counts

This file contains the triggered mode electron counts data product from EAS sensors. The file format is .cdf.

**Filename**: solo\_L1\_swa-eas-padc\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end time in the file name. The start and end times are spacecraft elapsed time (SCET) at 0.125 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 0.125 second. It contains electron counts in 16 bit format covering 64 energies, 32 anodes and 2 deflectors for each time-stamp. The file size and number of records will vary depending on availability of telemetry.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-EAS-padc |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L1\_swa-eas-padc |
| Logical File id | 1 | solo\_L1\_swa-eas-padc\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Electron Pitch Angle counts data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | padc>Pitch Angle Distribution Counts |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**



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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SCET | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 1577836800.0 | | | |
| VALIDMAX | CDF\_REAL8 | 1893456000.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 1577836800.0 | | | |
| SCALEMAX | CDF\_REAL8 | 1893456000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_PAD\_Data | CDF\_REAL8 | 3 | 16,64,32 | T | T,T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS PAD Data | | | |
| CATDESC | CDF\_CHAR | EAS electron pitch angle distribution counts | | | |
| DISPLAY\_TYPE | CDF\_CHAR | Spectrogram | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron Counts | | | |
| UNITS | CDF\_CHAR | Counts/Accum | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS\_ELEVATION | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS\_ENERGY | | | |
| DEPEND\_3 | CDF\_CHAR | SWA\_EAS\_AZIMUTH | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_ELEVATION | CDF\_REAL8 | 1 | 2 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal angles of the EAS sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_ENERGY | CDF\_REAL8 | 1 | 64 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Energy | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy values of the EAS sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Mode | CDF\_UINT4 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Mode | | | |
| CATDESC | CDF\_CHAR | The EAS Mode data | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Mode | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Validity | CDF\_UINT4 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with energies | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_EASUsed | CDF\_UINT1 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS sensor used | | | |
| CATDESC | CDF\_CHAR | The EAS sensor use for Pitch Angle data collection | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT1 | 255 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS | | | |
| VALIDMIN | CDF\_UINT1 | 0 | | | |
| VALIDMAX | CDF\_UINT1 | 3 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT1 | 0 | | | |
| SCALEMAX | CDF\_UINT1 | 3 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_ElevationUsed | CDF\_UINT1 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Elevation used | | | |
| CATDESC | CDF\_CHAR | The EAS Elevation used for Pitch Angle data collection | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT1 | 255 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | Elevation | | | |
| VALIDMIN | CDF\_UINT1 | 0 | | | |
| VALIDMAX | CDF\_UINT1 | 3 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT1 | 0 | | | |
| SCALEMAX | CDF\_UINT1 | 3 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_MagDataUsed | CDF\_REAL8 | 1 | 4 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | MAG vector | | | |
| CATDESC | CDF\_CHAR | The MAG vector used to calculate pitch angles collected | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | F14.4 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| UNITS | CDF\_CHAR | nT | | | |
| VALIDMIN | CDF\_REAL8 | -65535.0 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -65535.0 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+09>T | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EAS[12]\_TO\_MAG | CDF\_REAL8 | 2 | 3,3 | F | T,T |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Rotation Matrix | | | |
| CATDESC | CDF\_CHAR | The rotation matrix that will transform EAS1 to magnetic field aligned frame | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Onboard Partial Moments

This file contains the triggered mode electron counts data product from EAS1. The file format is .cdf.

**Filename**: solo\_L1\_swa-eas-OnbPartMoms\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end time in the file name. The start and end times are spacecraft elapsed time (SCET) at 1 second coarse resolution, from the reference point (1 Jan 2000 TBC). The time resolution of the file is nominally 1 second for 5 minutes. It contains electron counts in 16 bit format covering 64 energies, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single triggered event. In this case there will be 300 records and the file size will be of the order of 21 Mbytes per event.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-EAS-OnbPartMoms |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L1\_swa-eas-padc |
| Logical File id | 1 | solo\_L1\_swa-eas- OnbPartMoms \_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Onboard Partial Moments |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | OnbPartMoms>Onboard Partial Moments |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SCET | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS1 observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 1577836800.0 | | | |
| VALIDMAX | CDF\_REAL8 | 1893456000.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 1577836800.0 | | | |
| SCALEMAX | CDF\_REAL8 | 1893456000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS1 time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH\_1 | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SCET\_1 | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 SCET | | | |
| CATDESC | CDF\_CHAR | Elapsed time of the onboard clock at the time of EAS2 observation | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Elapsed Time (Ticks) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 1577836800.0 | | | |
| VALIDMAX | CDF\_REAL8 | 1893456000.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 1577836800.0 | | | |
| SCALEMAX | CDF\_REAL8 | 1893456000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS2 time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_dataValidity | CDF\_UINT4 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_dataValidity | CDF\_UINT4 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 Data Validity | | | |
| CATDESC | CDF\_CHAR | The Validity flags associated with EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 validity flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SumEAS1 | CDF\_UINT4 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Summed EAS1 distributions | | | |
| CATDESC | CDF\_CHAR | This flag indicates if 4 successive 3D distributions are summed to calculate Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Summed flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SumEAS2 | CDF\_UINT4 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Summed EAS2 distributions | | | |
| CATDESC | CDF\_CHAR | This flag indicates if 4 successive 3D distributions are summed to calculate Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 Summed flag | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SCPotential | CDF\_REAL8 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Spacecraft Potential | | | |
| CATDESC | CDF\_CHAR | Spacecraft Potential used to discard lowest energies | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | F14.4 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Potential | | | |
| VALIDMIN | CDF\_UINT4 | -100.0 | | | |
| VALIDMAX | CDF\_UINT4 | 100.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | -100.0 | | | |
| SCALEMAX | CDF\_UINT4 | 100.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | Volts | | | |
| SI\_CONVERSION | CDF\_CHAR | > | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_SumMoms | CDF\_UINT4 | 1 | 12 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Moment Sums | | | |
| CATDESC | CDF\_CHAR | The partial sum of the EAS1 Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 Partial Sum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_SumMoms | CDF\_UINT4 | 1 | 12 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 Moment Sums | | | |
| CATDESC | CDF\_CHAR | The partial sum of the EAS2 Moments | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 Partial Sum | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyLowEne N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyLowEne P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyLowEne\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyLowEne Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyCoreHalo N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyCoreHalo P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyCoreHalo\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyCoreHalo Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 only look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyStrahl N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 OnlyStrahl P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_onlyStrahl\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 onlyStrahl Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 only look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 only look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapLowEne N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapLowEne P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapLowEne\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapLowEne Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapCoreHalo N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapCoreHalo P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapCoreHalo\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapCoreHalo Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapStrahl N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 overlapStrahl P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_overlapStrahl\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 overlapStrahl Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS1 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapLowEne N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapLowEne P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapLowEne\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapLowEne Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS2 overlap look direction in low energy range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapCoreHalo N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapCoreHalo P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapCoreHalo\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapCoreHalo Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS2 overlap look direction in CoreHalo range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Density | | | |
| CATDESC | CDF\_CHAR | Number density from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapStrahl N | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_V | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_P | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Pressure | | | |
| CATDESC | CDF\_CHAR | Pressure tensor from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 overlapStrahl P | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

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| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS2\_overlapStrahl\_H | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 overlapStrahl Heat Flux | | | |
| CATDESC | CDF\_CHAR | Heat Flux from EAS2 overlap look direction in Strahl range | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS2 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EAS1\_TO\_RTN | CDF\_REAL8 | 2 | 3,3 | F | T,T |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 to RTN Rotation Matrix | | | |
| CATDESC | CDF\_CHAR | The rotation matrix that will transform EAS1 to RTN frame | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EAS2\_TO\_RTN | CDF\_REAL8 | 2 | 3,3 | F | T,T |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 to RTN Rotation Matrix | | | |
| CATDESC | CDF\_CHAR | The rotation matrix that will transform EAS2 to RTN frame | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS1 Data Quality flag | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG\_1 | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS2 Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS2 Data Quality flag | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH\_1 | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS2 data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

#### PAS L1 products

IRAP is responsible for generating the SWA PAS L1 data form the L0 source.

The PAS L1 data products are as follows:

* PAS 3D spectra: unique dataset merging data from various modes (Normal mode, Burst mode and Snapshots). The angular bin directions are in PAS frame. Data records are in chronological order, but with a variable time-resolution, depending on various modes.
* Onboard moments in physical units. In the PAS frame of reference.
* Engineering data: housekeeping parameters, in physical values (Volf, mA, deg.C)
* Inflight Calibration data.

All Data products are made as CDF files according to “SOL-SGS-TN-0009 Metadata Definition for Solar Orbiter Science Data”.

##### PAS 3D spectra

**Filename**: solo\_L1\_swa-pas-3d\_yyyymmdd\_V01.cdf

**Global attributes**

|  |  |  |
| --- | --- | --- |
| Name | Entry | Value |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-PAS-3d |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | solo\_L1\_swa-pas-3d |
| Logical File id | 1 | solo\_L1\_swa-pas-3d\_yyyymmdd\_V01 |
| Logical Source Description | 1 | SWA-PAS 3D counts data |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | 3D>3D Counts |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-PAS>Solar-Wind-Analyser Proton-Analyser-Sensor |

**Variables**

|  |  |  |  |
| --- | --- | --- | --- |
| Variable name | Variable type | Dimensions | Record vary |
| Epoch | CDF\_TIME\_TT2000 | [] | True |
| Duration | CDF\_FLOAT | [] | True |
| CCSDS\_coarse\_time | CDF\_UINT4 | [] | True |
| CCSDS\_fine\_time | CDF\_UINT2 | [] | True |
| SCET\_coarse\_time | CDF\_UINT4 | [] | True |
| SCET\_fine\_time | CDF\_UINT2 | [] | True |
| SOURCE | CDF\_UINT1 | [] | True |
| SAMPLE | CDF\_INT2 | [] | True |
| NB\_SAMPLE | CDF\_INT2 | [] | True |
| FIRST\_ENERGY | CDF\_INT2 | [] | True |
| NB\_ENERGY | CDF\_INT2 | [] | True |
| FIRST\_ELEVATION | CDF\_INT2 | [] | True |
| NB\_ELEVATION | CDF\_INT2 | [] | True |
| NB\_CEM | CDF\_INT2 | [] | True |
| INFO | CDF\_UINT1 | [] | True |
| SCHEME | CDF\_UINT1 | [] | True |
| FULL\_3D | CDF\_UINT1 | [] | True |
| COMPRESSED | CDF\_UINT1 | [] | True |
| MAX\_CNT\_ENERGY | CDF\_INT2 | [] | True |
| MAX\_CNT\_ELEVATION | CDF\_INT2 | [] | True |
| MAX\_CNT\_CEM | CDF\_INT2 | [] | True |
| NB\_K | CDF\_INT2 | [] | True |
| K | CDF\_INT2 | [] | True |
| COUNTS | CDF\_UINT2 | [11, 9, 96] | True |
| Energy\_table | CDF\_REAL4 | [96] | False |
| Energy\_delta\_plus | CDF\_REAL4 | [96] | False |
| Energy\_delta\_minus | CDF\_REAL4 | [96] | False |
| CEM\_table | CDF\_REAL4 | [11] | False |
| CEM\_table\_delta | CDF\_REAL4 | [11] | False |
| Elevation\_table | CDF\_REAL4 | [9] | False |
| Elevation\_table\_delta | CDF\_REAL4 | [9] | False |

**Detailed variable attributes**

|  |  |  |
| --- | --- | --- |
| Variable name | Epoch | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Default time |
| FIELDNAM | CDF\_CHAR | Epoch |
| FILLVAL | CDF\_TIME\_TT2000 | 9999-12-31 23:59:59.999999 |
| LABLAXIS | CDF\_CHAR | Epoch |
| UNITS | CDF\_CHAR | ns |
| VALIDMIN | CDF\_TIME\_TT2000 | 2000-01-01 00:00:00:000000 |
| VALIDMAX | CDF\_TIME\_TT2000 | 2029-12-31 23:59:59.999000 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| MONOTON | CDF\_CHAR | INCREASE |
| TIME\_BASE | CDF\_CHAR | J2000 |
| TIME\_SCALE | CDF\_CHAR | Terrestrial Time |
| REFERENCE\_POSITION | CDF\_CHAR | Rotating Earth Geoid |
| DELTA\_PLUS\_VAR | CDF\_CHAR | Duration |

|  |  |  |
| --- | --- | --- |
| Variable name | Duration | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Acquisition duration |
| FIELDNAM | CDF\_CHAR | Duration |
| FILLVAL | CDF\_FLOAT | -1,00E+31 |
| LABLAXIS | CDF\_CHAR | Duration |
| UNITS | CDF\_CHAR | s |
| VALIDMIN | CDF\_FLOAT | 0.0 |
| VALIDMAX | CDF\_FLOAT | 60.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| MONOTON | CDF\_CHAR | INCREASE |
| TIME\_BASE | CDF\_CHAR | J2000 |
| TIME\_SCALE | CDF\_CHAR | Terrestrial Time |

|  |  |  |
| --- | --- | --- |
| Variable name | CCSDS\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS coarse time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | CCSDS\_coarse\_time |
| UNITS | CDF\_CHAR | s |
| VALIDMIN | CDF\_UINT4 | 0 |
| VALIDMAX | CDF\_UINT4 | 4294967294 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | CCSDS\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS fine time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | CCSDS\_fine\_time |
| UNITS | CDF\_CHAR | 1/65536 s |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET coarse time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | SCET\_coarse\_time |
| UNITS | CDF\_CHAR | s |
| VALIDMIN | CDF\_UINT4 | 0 |
| VALIDMAX | CDF\_UINT4 | 4294967294 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET fine time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SCET\_fine\_time |
| UNITS | CDF\_CHAR | 1/65536 s |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SOURCE | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Source (0: Normal, 1: Snapshot, 2: Burst, 3: Trigger |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | Source |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I1 |
| LABLAXIS | CDF\_CHAR | Source |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 15 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SAMPLE | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Current sample |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SAMPLE |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SAMPLE |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 1000 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | NB\_SAMPLE | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Number of samples |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | NB\_SAMPLE |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SAMPLE |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 1000 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | FIRST\_ENERGY | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | First energy bin |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | EN\_FIRST |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | FIRST\_ENERGY |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 96 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | NB\_ENERGY | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Number energy bins |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | EN\_NUM |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | EN\_NUM |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 96 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | FIRST\_ELEVATION | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | First elevation bin |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | EL\_FIRST |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | EL\_FIRST |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 9 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | NB\_ELEVATION | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Number elevation bins |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | EL\_NUM |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | EL\_NUM |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 9 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | NB\_CEM | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Number CEM |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | EL\_NUM |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | EL\_NUM |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 9 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | INFO | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Info |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | INFO |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | INFO |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 7 |
| VALIDMAX | CDF\_UINT1 | 11 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCHEME | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Scheme |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCHEME |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | INFO |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 15 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | FULL\_3D | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Full 3D |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | FULL\_3D |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | INFO |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 1 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | COMPRESSED | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Compressed data |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | COMPRESSED |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | COMPRESSED |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 1 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | MAX\_CNT\_ENERGY | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Max count energy bin |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MAX\_CNT\_ENERGY |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | MAX\_CNT\_ENERGY |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 96 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | MAX\_CNT\_ELEVATION | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Max count elevation number |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MAX\_CNT\_ELEVATION |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | MAX\_CNT\_ENERGY |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 9 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | MAX\_CNT\_CEM | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Max count CEM |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MAX\_CNT\_CEM |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | MAX\_CNT\_ENERGY |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 11 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | NB\_K | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Number of sub-samping per second |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | NB\_K |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | NB\_K |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 8 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | K | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Current sub-sampling |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | K |
| FILLVAL | CDF\_INT2 | -32768 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | NB\_K |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 8 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | COUNTS | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | 3D counts |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | COUNTS |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | COUNTS |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | Energy\_table | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Center of energy bins |
| FIELDNAM | CDF\_CHAR | Energy table |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | Energy\_table |
| UNITS | CDF\_CHAR | eV |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 40000.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| DELTA\_PLUS\_VAR | CDF\_CHAR | Energy\_delta\_plus |
| DELTA\_MINUS\_VAR | CDF\_CHAR | Energy\_delta\_minus |

|  |  |  |
| --- | --- | --- |
| Variable name | Energy\_delta\_plus | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Energy bins delta plus values |
| FIELDNAM | CDF\_CHAR | Energy delta plus |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | Energy\_table |
| UNITS | CDF\_CHAR | eV |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 40000.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | Energy\_delta\_minus | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Energy bins delta minus values |
| FIELDNAM | CDF\_CHAR | Energy table delta minus |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | Energy\_table |
| UNITS | CDF\_CHAR | eV |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 40000.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | CEM\_table | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Center of CEM bins |
| FIELDNAM | CDF\_CHAR | CEM\_table |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | CEM\_table |
| UNITS | CDF\_CHAR | deg |
| VALIDMIN | CDF\_REAL4 | -90.0 |
| VALIDMAX | CDF\_REAL4 | 90.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| DELTA\_PLUS\_VAR | CDF\_CHAR | CEM\_table\_delta |
| DELTA\_MINUS\_VAR | CDF\_CHAR | CEM\_table\_delta |

|  |  |  |
| --- | --- | --- |
| Variable name | Elevation\_table | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Center of elevation bins |
| FIELDNAM | CDF\_CHAR | Elevation table |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | Elevation\_table |
| UNITS | CDF\_CHAR | deg |
| VALIDMIN | CDF\_REAL4 | -90.0 |
| VALIDMAX | CDF\_REAL4 | 90.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| DELTA\_PLUS\_VAR | CDF\_CHAR | Elevation\_table\_delta |
| DELTA\_MINUS\_VAR | CDF\_CHAR | Elevation\_table\_delta |

|  |  |  |
| --- | --- | --- |
| Variable name | CEM\_table\_delta | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CEM\_table\_delta |
| FIELDNAM | CDF\_CHAR | CEM\_table\_delta |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | CEM\_table\_delta |
| UNITS | CDF\_CHAR | deg |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 45.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | Elevation\_table\_delta | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Delta elevation |
| FIELDNAM | CDF\_CHAR | Elevation\_table\_delta |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | Delta elevation |
| UNITS | CDF\_CHAR | deg |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 45.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

##### PAS onboard moments

**Filename:** solo\_L1\_swa-pas-mom\_yyyymmdd\_V01.cdf

**Global metadata**

|  |  |  |
| --- | --- | --- |
| Name | Entry | Value |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-PAS-MOM |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | solo\_L1\_swa-pas-mom |
| Logical File id | 1 | solo\_L1\_swa-pas-mom\_yyyymmdd\_V01 |
| Logical Source Description | 1 | SWA-PAS Onboard calculated moments |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | MOM>Onboard calculated moments |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-PAS>Solar-Wind-Analyser Proton-Analyser-Sensor |

**Variables**

|  |  |  |  |
| --- | --- | --- | --- |
| Variable name | Variable type | Dimensions | Record vary |
| Epoch | CDF\_TIME\_TT2000 | [] | True |
| Half\_interval | CDF\_FLOAT | [] | False |
| CCSDS\_coarse\_time | CDF\_UINT4 | [] | True |
| CCSDS\_fine\_time | CDF\_UINT2 | [] | True |
| SCET\_coarse\_time | CDF\_UINT4 | [] | True |
| SCET\_fine\_time | CDF\_UINT2 | [] | True |
| Sample | CDF\_INT2 | [] | True |
| Validity | CDF\_UINT1 | [] | True |
| sum\_PAS | CDF\_UINT1 | [] | True |
| Density | CDF\_REAL4 | [] | True |
| Velocity | CDF\_REAL4 | [3] | True |
| Pressure | CDF\_REAL4 | [6] | True |

**Detailed variable attributes**

|  |  |  |
| --- | --- | --- |
| Variable name | Epoch | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Default time |
| FIELDNAM | CDF\_CHAR | Epoch |
| FILLVAL | CDF\_TIME\_TT2000 | 9999-12-31 23:59:59.999999 |
| LABLAXIS | CDF\_CHAR | Epoch |
| UNITS | CDF\_CHAR | ns |
| VALIDMIN | CDF\_TIME\_TT2000 | 2000-01-01 00:00:00:000000 |
| VALIDMAX | CDF\_TIME\_TT2000 | 2029-12-31 23:59:59.999000 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| MONOTON | CDF\_CHAR | INCREASE |
| TIME\_BASE | CDF\_CHAR | J2000 |
| TIME\_SCALE | CDF\_CHAR | Terrestrial Time |
| REFERENCE\_POSITION | CDF\_CHAR | Rotating Earth Geoid |

|  |  |  |
| --- | --- | --- |
| Variable name | CCSDS\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS\_coarse\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | CCSDS\_coarse\_time |
| UNITS | CDF\_CHAR | s |
| VALIDMIN | CDF\_UINT4 | 0 |
| VALIDMAX | CDF\_FLOAT | 1.8446744e+19 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | CCSDS\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS\_fine\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | CCSDS\_fine\_time |
| UNITS | CDF\_CHAR | 1/65536 s |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET\_coarse\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | SCET\_coarse\_time |
| UNITS | CDF\_CHAR | s |
| VALIDMIN | CDF\_UINT4 | 0 |
| VALIDMAX | CDF\_FLOAT | 1.8446744e+19 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET\_fine\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SCET\_fine\_time |
| UNITS | CDF\_CHAR | 1/65536 s |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | sample | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | sample # over 25 possibles |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | sample / 25 |
| FILLVAL | CDF\_INT2 | -32767 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | sample |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 25 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | validity | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | validity flag (0 = OK) |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | validity |
| FILLVAL | CDF\_INT2 | 254 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | sample |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 255 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | sum\_PAS | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | summation type |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | sum PAS |
| FILLVAL | CDF\_INT2 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | sample |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_INT2 | 0 |
| VALIDMAX | CDF\_INT2 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | density | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | density |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | density |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | density |
| UNITS | CDF\_CHAR | particles cm^-3 |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 10000.0 |
| VAR\_TYPE | CDF\_CHAR | data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | velocity | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | velocity |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | velocity |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | velocity |
| UNITS | CDF\_CHAR | km/s |
| VALIDMIN | CDF\_REAL4 | -100000.0 |
| VALIDMAX | CDF\_REAL4 | 100000.0 |
| VAR\_TYPE | CDF\_CHAR | data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | pressure | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | pressure tensor |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | pressure |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | pressure |
| UNITS | CDF\_CHAR | J.cm^-3 |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | data |
| SCALETYP | CDF\_CHAR | linear |

##### PAS engineering data

**Filename:** solo\_L1\_swa-pas-hsk\_yyyymmdd\_V01.cdf

**Global attributes**

|  |  |  |
| --- | --- | --- |
| Name | Entry | Value |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-PAS-HSK |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | solo\_L1\_swa-pas-hsk |
| Logical File id | 1 | solo\_L1\_swa-pas-hsk\_yyyymmdd\_V01 |
| Logical Source Description | 1 | SWA-PAS Housekeepings |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | HSK>Housekeepings |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-PAS>Solar-Wind-Analyser Proton-Analyser-Sensor |

**Variables**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable name** | **Variable type** | **Dimensions** | **Record vary** |
| Epoch | CDF\_TIME\_TT2000 | [] | True |
| SID\_counter | CDF\_UINT2 | [] | True |
| CCSDS\_coarse\_time | CDF\_UINT4 | [] | True |
| CCSDS\_fine\_time | CDF\_UINT2 | [] | True |
| SCET\_coarse\_time | CDF\_UINT4 | [] | True |
| SCET\_fine\_time | CDF\_UINT2 | [] | True |
| V\_MON\_C | CDF\_REAL4 | [] | True |
| V\_MON\_L | CDF\_REAL4 | [] | True |
| I\_MON\_C | CDF\_REAL4 | [] | True |
| I\_MON\_L | CDF\_REAL4 | [] | True |
| T\_MON\_C | CDF\_REAL4 | [] | True |
| T\_MON\_L | CDF\_REAL4 | [] | True |
| T1\_HEATHER | CDF\_REAL4 | [] | True |
| T2\_HEATHER | CDF\_REAL4 | [] | True |
| PLUS\_24\_V\_CEM\_OUT | CDF\_REAL4 | [] | True |
| PLUS\_5\_V\_CEM\_OUT | CDF\_REAL4 | [] | True |
| PLUS\_12\_V\_HT\_OUT | CDF\_REAL4 | [] | True |
| MINUS\_12\_V\_HT\_OUT | CDF\_REAL4 | [] | True |
| PLUS\_4V\_FPGA\_OUT | CDF\_REAL4 | [] | True |
| 2V5\_FPGA\_OUT | CDF\_REAL4 | [] | True |
| TEMP\_DCDC | CDF\_REAL4 | [] | True |
| TEMP\_FPGA | CDF\_REAL4 | [] | True |
| HK\_I\_PLUS\_24V\_CEM | CDF\_REAL4 | [] | True |
| HK\_I\_PLUS\_5V\_CEM | CDF\_REAL4 | [] | True |
| HK\_I\_PLUS\_12V\_HT | CDF\_REAL4 | [] | True |
| HK\_I\_MINUS\_12V\_HT | CDF\_REAL4 | [] | True |
| HK\_I\_PLUS\_5V\_FPGA | CDF\_REAL4 | [] | True |
| HK\_I\_PLUS\_28V\_PRI | CDF\_REAL4 | [] | True |
| HK\_I\_2V5\_FPGA | CDF\_REAL4 | [] | True |
| T3\_HEATHER | CDF\_REAL4 | [] | True |
| TEMP\_HVPS | CDF\_REAL4 | [] | True |
| TEMP\_EA | CDF\_REAL4 | [] | True |
| HK\_MHV\_POS | CDF\_REAL4 | [] | True |
| HK\_MHV\_NEG | CDF\_REAL4 | [] | True |
| HK\_ANL | CDF\_REAL4 | [] | True |
| HK\_TOP\_DEFL | CDF\_REAL4 | [] | True |
| HK\_TOP\_CAP | CDF\_REAL4 | [] | True |
| HK\_BOT\_DEFL | CDF\_REAL4 | [] | True |
| HEATER\_HK\_CHANNEL\_SELECT | CDF\_UINT1 | [] | True |
| OP\_HEATER\_ON | CDF\_UINT1 | [] | True |
| SEQ\_STATE\_RUNNING | CDF\_UINT1 | [] | True |
| UPLOADED | CDF\_UINT1 | [] | True |
| PRE\_AMP\_1\_OVER\_CURRENT | CDF\_UINT1 | [] | True |
| PRE\_AMP\_2\_OVER\_CURRENT | CDF\_UINT1 | [] | True |
| HV\_DISABLE | CDF\_UINT1 | [] | True |
| HV\_AIRSAFE | CDF\_UINT1 | [] | True |
| MEMORY\_ERROR\_COUNT | CDF\_UINT1 | [] | True |
| IDLE\_1 | CDF\_UINT1 | [] | True |
| IDLE\_2 | CDF\_UINT1 | [] | True |
| ANALYSER\_GAIN | CDF\_UINT1 | [] | True |
| BOTTOM\_DEF\_GAIN | CDF\_UINT1 | [] | True |
| TOP\_DEF\_GAIN | CDF\_UINT1 | [] | True |
| TOP\_CAP\_GAIN | CDF\_UINT1 | [] | True |
| BOTTOM\_DEF\_SIGN | CDF\_UINT1 | [] | True |
| TOP\_DEF\_SIGN | CDF\_UINT1 | [] | True |
| TOP\_CAP\_SIGN | CDF\_UINT1 | [] | True |
| SEQ\_INTERNAL\_STATUS | CDF\_UINT2 | [] | True |

**Detailed variable attributes**

|  |  |  |
| --- | --- | --- |
| Variable name | Epoch | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Default time |
| FIELDNAM | CDF\_CHAR | Epoch |
| FILLVAL | CDF\_TIME\_TT2000 | 9999-12-31 23:59:59.999999 |
| LABLAXIS | CDF\_CHAR | Epoch |
| UNITS | CDF\_CHAR | ns |
| VALIDMIN | CDF\_TIME\_TT2000 | 01/01/1990 00:00 |
| VALIDMAX | CDF\_TIME\_TT2000 | 2029-12-31 23:59:59.999000 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| MONOTON | CDF\_CHAR | INCREASE |
| TIME\_BASE | CDF\_CHAR | J2000 |
| TIME\_SCALE | CDF\_CHAR | Terrestrial Time |
| REFERENCE\_POSITION | CDF\_CHAR | Rotating Earth Geoid |

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| --- | --- | --- |
| Variable name | SID\_counter | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SID\_COUNTER |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SID\_COUNTER |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SID\_COUNTER |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65535 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

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| --- | --- | --- |
| Variable name | CCSDS\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS\_coarse\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | CCSDS\_coarse\_time |
| VALIDMIN | CDF\_UINT4 | 0 |
| VALIDMAX | CDF\_UINT4 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

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| --- | --- | --- |
| Variable name | CCSDS\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS\_fine\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | CCSDS\_fine\_time |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET\_coarse\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | SCET\_coarse\_time |
| VALIDMIN | CDF\_UINT4 | 0 |
| VALIDMAX | CDF\_UINT4 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET\_fine\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SCET\_fine\_time |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | V\_MON\_C | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM High Voltage channeltron 4->10 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | V\_MON\_C |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | F8.3 |
| LABLAXIS | CDF\_CHAR | V\_MON\_C |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 800.0 |
| VALIDMAX | CDF\_REAL4 | 2500.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| SCALEMIN | CDF\_REAL4 | 100.0 |
| SCALEMAX | CDF\_REAL4 | 3000.0 |

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| --- | --- | --- |
| Variable name | V\_MON\_L | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM High Voltage channeltron 1-3-11 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | V\_MON\_L |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | F8.3 |
| LABLAXIS | CDF\_CHAR | V\_MON\_L |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 800.0 |
| VALIDMAX | CDF\_REAL4 | 2500.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| SCALEMIN | CDF\_REAL4 | 100.0 |
| SCALEMAX | CDF\_REAL4 | 3000.0 |

|  |  |  |
| --- | --- | --- |
| Variable name | I\_MON\_C | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM current channeltron 4->10 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | I\_MON\_C |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | F8.3 |
| LABLAXIS | CDF\_CHAR | I\_MON\_C |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 50.0 |
| VALIDMAX | CDF\_REAL4 | 220.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| SCALEMIN | CDF\_REAL4 | 0.0 |
| SCALEMAX | CDF\_REAL4 | 300.0 |

|  |  |  |
| --- | --- | --- |
| Variable name | I\_MON\_L | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM current channeltron 1-3-11 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | I\_MON\_L |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | F8.3 |
| LABLAXIS | CDF\_CHAR | I\_MON\_L |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 0.0 |
| VALIDMAX | CDF\_REAL4 | 120.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| SCALEMIN | CDF\_REAL4 | 0.0 |
| SCALEMAX | CDF\_REAL4 | 200.0 |

|  |  |  |
| --- | --- | --- |
| Variable name | T\_MON\_C | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM board temperature channeltron 4->10 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | T\_MON\_C |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | F8.3 |
| LABLAXIS | CDF\_CHAR | T\_MON\_C |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -50.0 |
| VALIDMAX | CDF\_REAL4 | 65.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| SCALEMIN | CDF\_REAL4 | -100.0 |
| SCALEMAX | CDF\_REAL4 | 100.0 |

|  |  |  |
| --- | --- | --- |
| Variable name | T\_MON\_L | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM board temperature channeltron 1-3-11 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | T\_MON\_L |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | F8.3 |
| LABLAXIS | CDF\_CHAR | T\_MON\_L |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -50.0 |
| VALIDMAX | CDF\_REAL4 | 65.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| SCALEMIN | CDF\_REAL4 | -100.0 |
| SCALEMAX | CDF\_REAL4 | 100.0 |

|  |  |  |
| --- | --- | --- |
| Variable name | T1\_HEATHER | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM Operationnal heater temp1 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | T1\_HEATHER |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | T1\_HEATHER |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | T2\_HEATHER | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS CEM Operationnal heater temp2 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | T2\_HEATHER |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | T2\_HEATHER |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | PLUS\_24\_V\_CEM\_OUT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +24V CEM voltage |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | PLUS\_24\_V\_CEM\_OUT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | PLUS\_24\_V\_CEM\_OUT |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 21.0 |
| VALIDMAX | CDF\_REAL4 | 30.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | PLUS\_5\_V\_CEM\_OUT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +5V voltage |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | PLUS\_5\_V\_CEM\_OUT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | PLUS\_5\_V\_CEM\_OUT |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 4.0 |
| VALIDMAX | CDF\_REAL4 | 6.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | PLUS\_12\_V\_HT\_OUT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +12V voltage |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | PLUS\_12\_V\_HT\_OUT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | PLUS\_12\_V\_HT\_OUT |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 10.0 |
| VALIDMAX | CDF\_REAL4 | 16.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | MINUS\_12\_V\_HT\_OUT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS -12V voltage |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MINUS\_12\_V\_HT\_OUT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | MINUS\_12\_V\_HT\_OUT |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 10.0 |
| VALIDMAX | CDF\_REAL4 | 16.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | PLUS\_4V\_FPGA\_OUT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +4V FPGA voltage |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | PLUS\_4V\_FPGA\_OUT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | PLUS\_4V\_FPGA\_OUT |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 3.0 |
| VALIDMAX | CDF\_REAL4 | 4.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | 2V5\_FPGA\_OUT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +2.5V FPGA voltage |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | 2V5\_FPGA\_OUT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | 2V5\_FPGA\_OUT |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 1.3 |
| VALIDMAX | CDF\_REAL4 | 3.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TEMP\_DCDC | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS DC/DC board temperature |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TEMP\_DCDC |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | TEMP\_DCDC |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -50.0 |
| VALIDMAX | CDF\_REAL4 | 60.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TEMP\_FPGA | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS FPGA board temperature |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TEMP\_FPGA |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | TEMP\_FPGA |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -50.0 |
| VALIDMAX | CDF\_REAL4 | 55.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_I\_PLUS\_24V\_CEM | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +24V CEM current |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_I\_PLUS\_24V\_CEM |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_I\_PLUS\_24V\_CEM |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 5.0 |
| VALIDMAX | CDF\_REAL4 | 50.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_I\_PLUS\_5V\_CEM | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +5V current |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_I\_PLUS\_5V\_CEM |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_I\_PLUS\_5V\_CEM |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 0.5 |
| VALIDMAX | CDF\_REAL4 | 100.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_I\_PLUS\_12V\_HT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +12V current |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_I\_PLUS\_12V\_HT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_I\_PLUS\_12V\_HT |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 40.0 |
| VALIDMAX | CDF\_REAL4 | 80.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_I\_MINUS\_12V\_HT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS -12V current |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_I\_MINUS\_12V\_HT |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_I\_MINUS\_12V\_HT |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 30.0 |
| VALIDMAX | CDF\_REAL4 | 70.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_I\_PLUS\_5V\_FPGA | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +5V FPGA current |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_I\_PLUS\_5V\_FPGA |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_I\_PLUS\_5V\_FPGA |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 25.0 |
| VALIDMAX | CDF\_REAL4 | 50.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_I\_PLUS\_28V\_PRI | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +28V primary current |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_I\_PLUS\_28V\_PRI |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_I\_PLUS\_28V\_PRI |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 120.0 |
| VALIDMAX | CDF\_REAL4 | 450.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_I\_2V5\_FPGA | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS +2.5V FPGA current |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_I\_2V5\_FPGA |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_I\_2V5\_FPGA |
| UNITS | CDF\_CHAR | mA |
| VALIDMIN | CDF\_REAL4 | 100.0 |
| VALIDMAX | CDF\_REAL4 | 180.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | T3\_HEATHER | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS MB Operational Heater (Transistor) Temperature |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | T3\_HEATHER |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | T3\_HEATHER |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TEMP\_HVPS | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS HV Temperature Analyzer Entry |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TEMP\_HVPS |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | TEMP\_HVPS |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -50.0 |
| VALIDMAX | CDF\_REAL4 | 55.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TEMP\_EA | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS Temperature HV EA board |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TEMP\_EA |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | TEMP\_EA |
| UNITS | CDF\_CHAR | deg.C |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_MHV\_POS | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS HV MHV positive voltage monitor |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_MHV\_POS |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_MHV\_POS |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 6000.0 |
| VALIDMAX | CDF\_REAL4 | 6500.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_MHV\_NEG | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS HV MHV negative voltage monitor |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_MHV\_NEG |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_MHV\_NEG |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | 6000.0 |
| VALIDMAX | CDF\_REAL4 | 6500.0 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_ANL | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS HV Analyzer voltage monitor |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_ANL |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_ANL |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_TOP\_DEFL | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS HV Top deflector voltage monitor |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_TOP\_DEFL |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_TOP\_DEFL |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_TOP\_CAP | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS HV Top plate voltage monitor |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_TOP\_CAP |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_TOP\_CAP |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HK\_BOT\_DEFL | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PAS HV Bottom deflector voltage monitor |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HK\_BOT\_DEFL |
| FILLVAL | CDF\_REAL4 | -1,00E+31 |
| FORMAT | CDF\_CHAR | E12.2 |
| LABLAXIS | CDF\_CHAR | HK\_BOT\_DEFL |
| UNITS | CDF\_CHAR | V |
| VALIDMIN | CDF\_REAL4 | -1,00E+30 |
| VALIDMAX | CDF\_REAL4 | -1,00E+30 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HEATER\_HK\_CHANNEL\_SELECT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | HEATER HK CHANNEL SELECT |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HEATER\_HK\_CHANNEL\_SELECT |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | HEATER HK CHANNEL SELECT |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | OP\_HEATER\_ON | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | OP HEATER ON |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | OP\_HEATER\_ON |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | OP HEATER ON |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SEQ\_STATE\_RUNNING | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SEQ STATE RUNNING |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SEQ\_STATE\_RUNNING |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | SEQ STATE RUNNING |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | UPLOADED | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | UPLOADED |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | UPLOADED |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | UPLOADED |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | PRE\_AMP\_1\_OVER\_CURRENT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PRE AMP 1 OVER CURRENT |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | PRE\_AMP\_1\_OVER\_CURRENT |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | PRE AMP 1 OVER CURRENT |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | PRE\_AMP\_2\_OVER\_CURRENT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | PRE AMP 2 OVER CURRENT |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | PRE\_AMP\_2\_OVER\_CURRENT |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | PRE AMP 2 OVER CURRENT |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HV\_DISABLE | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | HV DISABLE |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HV\_DISABLE |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | HV DISABLE |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | HV\_AIRSAFE | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | HV AIRSAFE |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | HV\_AIRSAFE |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | HV AIRSAFE |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | MEMORY\_ERROR\_COUNT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | MEMORY ERROR COUNT |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MEMORY\_ERROR\_COUNT |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | MEMORY ERROR COUNT |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | IDLE\_1 | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | IDLE 1 |
| FIELDNAM | CDF\_CHAR | IDLE\_1 |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | IDLE 1 |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | IDLE\_2 | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | IDLE 2 |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | IDLE\_2 |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | IDLE 2 |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | ANALYSER\_GAIN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | ANALYSER GAIN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | ANALYSER\_GAIN |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | ANALYSER GAIN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | BOTTOM\_DEF\_GAIN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | BOTTOM DEF GAIN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | BOTTOM\_DEF\_GAIN |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | BOTTOM DEF GAIN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TOP\_DEF\_GAIN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | TOP DEF GAIN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TOP\_DEF\_GAIN |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | TOP DEF GAIN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TOP\_CAP\_GAIN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | TOP CAP GAIN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TOP\_CAP\_GAIN |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | TOP CAP GAIN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | BOTTOM\_DEF\_SIGN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | BOTTOM DEF SIGN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | BOTTOM\_DEF\_SIGN |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | BOTTOM DEF SIGN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TOP\_DEF\_SIGN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | TOP DEF SIGN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TOP\_DEF\_SIGN |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | TOP DEF SIGN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | TOP\_CAP\_SIGN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | TOP CAP SIGN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | TOP\_CAP\_SIGN |
| FILLVAL | CDF\_UINT1 | 255 |
| FORMAT | CDF\_CHAR | I3 |
| LABLAXIS | CDF\_CHAR | TOP CAP SIGN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT1 | 0 |
| VALIDMAX | CDF\_UINT1 | 254 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SEQ\_INTERNAL\_STATUS | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SEQ INTERNAL STATUS |
| FIELDNAM | CDF\_CHAR | SEQ\_INTERNAL\_STATUS |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SEQ INTERNAL STATUS |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

##### PAS inflight calibration files

**Filename:** solo\_L1\_swa-pas-cal\_yyyymmdd\_V01.cdf

**Global metadata**

|  |  |  |
| --- | --- | --- |
| Name | Entry | Value |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L1>Level 1 Data |
| Descriptor | 1 | SWA-PAS-CAL |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | solo\_L1\_swa-pas-cal |
| Logical File id | 1 | solo\_L1\_swa-pas-cal\_yyyymmdd\_V01 |
| Logical Source Description | 1 | SWA-PAS Inflight calibrations |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | CAL>Inglight calibrations |
| Level | 1 | L1>Level 1 Data |
| Instrument | 1 | SWA-PAS>Solar-Wind-Analyser Proton-Analyser-Sensor |

**Variables**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable name** | **Variable type** | **Dimensions** | **Record vary** |
| Epoch | CDF\_TIME\_TT2000 | [] | True |
| CCSDS\_coarse\_time | CDF\_UINT4 | [] | True |
| CCSDS\_fine\_time | CDF\_UINT2 | [] | True |
| SCET\_coarse\_time | CDF\_UINT4 | [] | True |
| SCET\_fine\_time | CDF\_UINT2 | [] | True |
| START | CDF\_UINT2 | [] | True |
| FINAL | CDF\_UINT2 | [] | True |
| CURRENT | CDF\_UINT2 | [] | True |
| ACQUISITION | CDF\_UINT2 | [] | True |
| NB\_ACQUISITION | CDF\_UINT2 | [] | True |
| STEP | CDF\_UINT2 | [] | True |
| MAX\_EN | CDF\_UINT2 | [] | True |
| MAX\_EL | CDF\_UINT2 | [] | True |
| MAX\_CEM | CDF\_UINT2 | [] | True |
| MAX\_COUNT | CDF\_UINT2 | [] | True |

**Detailed variable attributes**

|  |  |  |
| --- | --- | --- |
| Variable name | Epoch | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | Default time |
| FIELDNAM | CDF\_CHAR | Epoch |
| FILLVAL | CDF\_TIME\_TT2000 | 9999-12-31 23:59:59.999999 |
| LABLAXIS | CDF\_CHAR | Epoch |
| UNITS | CDF\_CHAR | ns |
| VALIDMIN | CDF\_TIME\_TT2000 | 2000-01-01 00:00:00:000000 |
| VALIDMAX | CDF\_TIME\_TT2000 | 2029-12-31 23:59:59.999000 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |
| MONOTON | CDF\_CHAR | INCREASE |
| TIME\_BASE | CDF\_CHAR | J2000 |
| TIME\_SCALE | CDF\_CHAR | Terrestrial Time |
| REFERENCE\_POSITION | CDF\_CHAR | Rotating Earth Geoid |

|  |  |  |
| --- | --- | --- |
| Variable name | CCSDS\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS\_coarse\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | |
| VALIDMIN | CDF\_UINT4 | 4294967294 |
| VALIDMAX | CDF\_UINT4 | 4294967294 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | CCSDS\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CCSDS\_fine\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CCSDS\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | CCSDS\_fine\_time |
| VALIDMIN | CDF\_UINT2 | 65534 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_coarse\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET\_coarse\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_coarse\_time |
| FILLVAL | CDF\_UINT4 | 4294967295 |
| FORMAT | CDF\_CHAR | I8 |
| LABLAXIS | CDF\_CHAR | SCET\_coarse\_time |
| VALIDMIN | CDF\_UINT4 | 4294967294 |
| VALIDMAX | CDF\_UINT4 | 4294967294 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | SCET\_fine\_time | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | SCET\_fine\_time |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | SCET\_fine\_time |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | SCET\_fine\_time |
| VALIDMIN | CDF\_UINT2 | 65534 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | START | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | START |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | START |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | START |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | FINAL | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | FINAL |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | FINAL |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | FINAL |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | CURRENT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | CURRENT |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | CURRENT |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | CURRENT |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | ACQUISITION | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | ACQUISITION |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | ACQUISITION |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | ACQUISITION |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | NB\_ACQUISITION | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | NB\_ACQUISITION |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | NB\_ACQUISITION |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | NB\_ACQUISITION |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | STEP | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | STEP |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | STEP |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | STEP |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |
| SCALETYP | CDF\_CHAR | linear |

|  |  |  |
| --- | --- | --- |
| Variable name | MAX\_EN | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | MAX\_EN |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MAX\_EN |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | MAX\_EN |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |

|  |  |  |
| --- | --- | --- |
| Variable name | MAX\_EL | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | MAX\_EL |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MAX\_EL |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | MAX\_EL |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |

|  |  |  |
| --- | --- | --- |
| Variable name | MAX\_CEM | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | MAX\_CEM |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MAX\_CEM |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | MAX\_CEM |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |

|  |  |  |
| --- | --- | --- |
| Variable name | MAX\_COUNT | |
| Attribute name | Data type | Value |
| CATDESC | CDF\_CHAR | MAX\_COUNT |
| DEPEND\_0 | CDF\_CHAR | Epoch |
| FIELDNAM | CDF\_CHAR | MAX\_COUNT |
| FILLVAL | CDF\_UINT2 | 65535 |
| FORMAT | CDF\_CHAR | I5 |
| LABLAXIS | CDF\_CHAR | MAX\_COUNT |
| UNITS | CDF\_CHAR | unitless |
| VALIDMIN | CDF\_UINT2 | 0 |
| VALIDMAX | CDF\_UINT2 | 65534 |
| VAR\_TYPE | CDF\_CHAR | support\_data |

#### HIS L1 products

HIS L1 product details to be defined…

solo\_L1\_swa-his-TESTn\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-TESTb\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-CONFIGn\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-CONFIGb\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-PHAn\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-PHAb\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-MATRIXn\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-MATRIXb\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-VDFn\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-VDFb\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-PRIOn\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-PRIOb\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-LLn\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-LLb\_[StartTime-EndTime]\_V01.cdf

solo\_L1\_swa-his-HK\_[StartTime-EndTime]\_V01.cdf

### L2 – Science data products

*Detailed description of the content and format of the calibrated data products.*

#### EAS L2 data products

EAS Level-2 data is generated at MSSL and requires the following inputs:

1. EAS Level-1 Science data files
2. Ground calibration files
3. Onboard calibration files
4. SPICE kernels

Below is detailed description of EAS L2 data descriptions.

##### EAS normal mode electron 3D distribution

This file contains the Normal Mode Electron 3D distribution function data product from EAS[12]. The file format is .cdf.

**Filename:**solo\_L2\_swa-eas[12]-NM3D-[unit]\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the data between the start time and end times mentioned in the file name and in the units mentioned by [unit]. The start and end times are in UT. The time resolution of the file is nominally 100 seconds but may also contain either 10 or 400 seconds resolution when EAS[12] is operated in high or low cadence. It contains 3D electron distribution in units of either psd, dnf,def, covering 64 energies, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single 24 hour period approximately. In this case there will be 864 records per day if the instruments were in continuous operation in this mode.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L2>Level 2 Data |
| Descriptor | 1 | SWA-EAS[12]-NM3D-[unit] |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L2\_swa-eas[12]-NM3D |
| Logical File id | 1 | solo\_L2\_swa-eas[12]-NM3D-[unit]\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Nominal Mode 3D psd/dnf/def data |
| Rules of Use | 1 | Publication quality science data |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | NM3D-[unit]>Nominal Mode 3D in psd/dnf/def |
| Level | 1 | L2>Level 2 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ELEVATION | CDF\_REAL8 | 1 | 16 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ENERGY | CDF\_REAL8 | 1 | 64 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Energy | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy values of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_NM3D-[unit]\_Data | CDF\_REAL8 | 3 | 16,64,32 | T | T,T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SWA\_EAS[12]\_NM3D-[unit]\_Data | | | |
| CATDESC | CDF\_CHAR | EAS[12] Nominal mode 3D electron distribution in phase space density | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron flux | | | |
| UNITS | CDF\_CHAR | psd/dnf/dpf | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS[12]\_ELEVATION | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS[12]\_ENERGY | | | |
| DEPEND\_3 | CDF\_CHAR | SWA\_EAS[12]\_AZIMUTH | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS single strahl electron distribution

This file contains the calibrated single strahl electron distribution data product from EAS[12]. The file format is .cdf.

**Filename**:solo\_L1\_swa-eas[12]-SS-[unit]\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the single strahl data between the start time and end times mentioned in the file name and in the units mentioned by [unit]. The start and end times are in UT. Electron fluxes are provided in one of the units of psd, dnf and dpf separately.The time resolution of the file is nominally 100 seconds. It contains strahl electron distribution for one energy from 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single 24 hour period approximately. In this case there will be 864 records per day if the instruments were in continuous operation.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L2>Level 2 Data |
| Descriptor | 1 | SWA-EAS[12]-SS-[unit] |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | Solo\_L2\_swa-eas[12]-SS-[unit] |
| Logical File id | 1 | solo\_L2\_swa-eas[12]\_SS-[unit]\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Single Strahl data in Phase Space Density |
| Rules of Use | 1 | Publication quality science data |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | SS-[unit]>Single Strahl – [psd/dnf/dpf] |
| Level | 1 | L2>Level 2 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ELEVATION | CDF\_REAL8 | 1 | 16 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ENERGY | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Energy | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy value used to obtain the single strahl from the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_SS-[unit]\_Data | CDF\_REAL8 | 2 | 32, 16 | T | T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Single Strahl Data | | | |
| CATDESC | CDF\_CHAR | Single strahl data from EAS[12] | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron flux | | | |
| UNITS | CDF\_CHAR | Psd/dnf/def | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS[12]\_AZIMUTH | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS[12]\_ELEVATION | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Triggered Mode 3D distribution

This file contains the triggered mode 3D electron distribution function data product from EAS[12]. The file format is .cdf.

**Filename**:solo\_L2\_swa-eas[12]-TM3D-[unit]\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the trigger mode 3D distribution data between the start time and end time shown in the file name and in units of either psd, dnf, or dpf as mentioned for *unit*. The start and end times are in UT. The time resolution of the file is nominally 1 second for 5 minutes. It contains electron fluxes from 64 energies, 32 anodes and 16 deflectors for each time-stamp. It is expected that the file will cover 1 single triggered event. In this case there will be 300 records per event.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L2>Level 2 Data |
| Descriptor | 1 | SWA-EAS[12]-TM3D-[unit] |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L2\_swa-eas[12]-TM3D-[unit] |
| Logical File id | 1 | solo\_L2\_swa-eas[12]-TM3D-[unit]\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS[12] Trigger Mode 3D data in psd/dnf/def |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | TM3D-[unit]>Trigger Mode 3D in Phase Space Density |
| Level | 1 | L2>Level 2 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ELEVATION | CDF\_REAL8 | 1 | 16 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal angles of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_ENERGY | CDF\_REAL8 | 1 | 64 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Energy | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy values of the EAS[12] sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_TM3D-[unit]\_Data | CDF\_REAL8 | 3 | 16,64,32 | T | T,T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | SWA\_EAS[12]\_TM3D-psd\_Data | | | |
| CATDESC | CDF\_CHAR | EAS[12] Trigger mode 3D electron distribution in psd/dnf/def | | | |
| DISPLAY\_TYPE | CDF\_CHAR | spectrogram | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Electron flux | | | |
| UNITS | CDF\_CHAR | Psd/dnf/def | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS[12]\_ELEVATION | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS[12]\_ENERGY | | | |
| DEPEND\_3 | CDF\_CHAR | SWA\_EAS[12]\_AZIMUTH | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | EAS[12] | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_HRTBT | CDF\_EPOCH | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | RPW Heartbeat | | | |
| CATDESC | CDF\_CHAR | The RPW Heartbeat data coming in from S20 packet | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | 1900-01-01 00:00:00.000 | | | |
| LABLAXIS | CDF\_CHAR | RPW Heartbeat (Time) | | | |
| UNITS | CDF\_CHAR | s | | | |
| VALIDMIN | CDF\_REAL8 | 2010-01-01 00:00:00.000 | | | |
| VALIDMAX | CDF\_REAL8 | 2039-12-31 23:59:59.999 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 2010-01-01 00:00:00.000 | | | |
| SCALEMAX | CDF\_REAL8 | 2039-12-31 23:59:59.999 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_ShkTrigQlty | CDF\_UINT4 | 1 | 1 | F | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] RPW Shock Trigger Quality | | | |
| CATDESC | CDF\_CHAR | RPW Shock Trigger quality flag coming in from S20 packet | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_RPW\_HRTBT | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_UINT4 | 4294967294 | | | |
| FORMAT | CDF\_CHAR | I10 | | | |
| LABLAXIS | CDF\_CHAR | RPW Shock Trigger quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 65535 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 65535 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS[12]\_RPW\_Pot | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | RPW Potential | | | |
| CATDESC | CDF\_CHAR | RPW potential coming in from S20 packet – set to zero if PA is zero | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | RPW Potential data | | | |
| UNITS | CDF\_CHAR | Volts | | | |
| VALIDMIN | CDF\_REAL8 | -100.0 | | | |
| VALIDMAX | CDF\_REAL8 | 100.0 | | | |
| SCALETYP | CDF\_CHAR | Linear | | | |
| SCALEMIN | CDF\_REAL8 | -100.0 | | | |
| SCALEMAX | CDF\_REAL8 | 100.0 | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS[12]\_RPW\_HRTBT | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS[12] Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS[12] data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Burst Mode (pitch angle data)

This file contains the onboard selected electron pitch angle data product from EAS[12]. The file format is .cdf.

**Filename**: solo\_L2\_swa-eas-pad-[unit]\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the onboard selected pitch angle data between the start time and end time mentioned in the file name and in units of either psd, dnf or def mentioned by *unit*. The start and end times are in UT. The time resolution of the file is nominally 0.125 seconds for 10 minutes, nominally, but the duration of the data varies depending on telemetry availability. It contains electron pitch angle data for 64 energies, 32 pitch angles from 2 deflectors for each time-stamp. The amount of data in this file depends on the telemetry available.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L2>Level 2 Data |
| Descriptor | 1 | SWA-EAS-pad-[unit] |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L2\_swa-eas-pad-[unit] |
| Logical File id | 1 | solo\_L2\_swa-eas-pad-[unit]\_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Electron Pitch Angle data in psd/dnf/def |
| Rules of Use | 1 | Publication quality science data |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | pad-[unit]>Pitch Angle Distribution in psd/dnf/def |
| Level | 1 | L2>Level 2 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_PAD-[unit]\_Data | CDF\_REAL8 | 3 | 16,64,32 | T | T,T,T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS pitch angle Data | | | |
| CATDESC | CDF\_CHAR | EAS electron pitch angle distribution in psd/dnf/def | | | |
| DISPLAY\_TYPE | CDF\_CHAR | Spectrogram | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Pitch angle distribution | | | |
| UNITS | CDF\_CHAR | Psd/dnf/def | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| DEPEND\_1 | CDF\_CHAR | SWA\_EAS\_ELEVATION | | | |
| DEPEND\_2 | CDF\_CHAR | SWA\_EAS\_ENERGY | | | |
| DEPEND\_3 | CDF\_CHAR | SWA\_EAS\_AZIMUTH | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_ELEVATION | CDF\_REAL8 | 1 | 2 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Elevation | | | |
| CATDESC | CDF\_CHAR | The bin-centred elevation angles of the EAS sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Elevation Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | -45.0 | | | |
| VALIDMAX | CDF\_REAL8 | 45.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -45.0 | | | |
| SCALEMAX | CDF\_REAL8 | 45.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_AZIMUTH | CDF\_REAL8 | 1 | 32 | F | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Azimuth | | | |
| CATDESC | CDF\_CHAR | The bin-centred azimuthal (Pitch angles) angles of the EAS sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Azimuthal Angle | | | |
| UNITS | CDF\_CHAR | Degrees | | | |
| VALIDMIN | CDF\_REAL8 | 0.0 | | | |
| VALIDMAX | CDF\_REAL8 | 360.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | 0.0 | | | |
| SCALEMAX | CDF\_REAL8 | 360.0 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_ENERGY | CDF\_REAL8 | 1 | 64 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Energies | | | |
| CATDESC | CDF\_CHAR | The bin-centred Energy values of the EAS sensor | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Energy | | | |
| UNITS | CDF\_CHAR | ElectronVolts | | | |
| VALIDMIN | CDF\_REAL8 | 0.1 | | | |
| VALIDMAX | CDF\_REAL8 | 6000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 0.1 | | | |
| SCALEMAX | CDF\_REAL8 | 6000.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1.60217646E-19>J | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

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| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_MagDataUsed | CDF\_REAL8 | 1 | 4 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | MAG vector | | | |
| CATDESC | CDF\_CHAR | The MAG vector used to calculate pitch angles collected | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | F14.4 | | | |
| LABLAXIS | CDF\_CHAR | Full 3D validity flag | | | |
| UNITS | CDF\_CHAR | nT | | | |
| VALIDMIN | CDF\_REAL8 | -65535.0 | | | |
| VALIDMAX | CDF\_REAL8 | 65535.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_REAL8 | -65535.0 | | | |
| SCALEMAX | CDF\_REAL8 | 65535.0 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+09>T | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### EAS Onboard Moments

This file contains the onboard calculated electron moments data product from EAS. The file format is .cdf.

**Filename**:solo\_L2\_swa-eas-OnbMoms\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains the onboard calculated electron moments data between the start time and end times mentioned in the file name. The start and end times are in UT. The time resolution of the file is nominally 4 seconds. In this case there will be a maximum of 21600 records in the file.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L2>Level 2 Data |
| Descriptor | 1 | SWA-EAS-OnbMoms |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | SWA\_L2\_swa-eas-OnbMoms |
| Logical File id | 1 | solo\_L2\_swa-eas-OnbMoms \_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Onboard calculated Moments |
| Rules of Use | 1 | Consult with MSSL-UCL before using |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | OnbMoms>Onboard Moments |
| Level | 1 | L2>Level 2 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SCPotential | CDF\_REAL8 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Spacecraft Potential | | | |
| CATDESC | CDF\_CHAR | Spacecraft Potential used to discard lowest energies | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | F14.4 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Potential | | | |
| VALIDMIN | CDF\_UINT4 | -100.0 | | | |
| VALIDMAX | CDF\_UINT4 | 100.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | -100.0 | | | |
| SCALEMAX | CDF\_UINT4 | 100.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | Volts | | | |
| SI\_CONVERSION | CDF\_CHAR | > | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Density | | | |
| CATDESC | CDF\_CHAR | Electron Number Density | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Density | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Velocity | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron bulk Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity of electrons | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Pressure | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Pressure | | | |
| CATDESC | CDF\_CHAR | Electron Pressure tensor | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Pressure | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_Heatflux | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Heat Flux | | | |
| CATDESC | CDF\_CHAR | Electron Heat Flux | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_VEL\_LABEL | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Velocity | | | |
| CATDESC | CDF\_CHAR | The vector representation for the velocity vector [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_HFlux\_LABEL | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Heat flux | | | |
| CATDESC | CDF\_CHAR | The vector representation for the Heat flux vector [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_EAS\_PRES\_1 | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Rows of Pressure Tensor | | | |
| CATDESC | CDF\_CHAR | The vector representation for the rows of the pressure tensor [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_EAS\_PRES\_2 | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Columns of the Pressure Tensor | | | |
| CATDESC | CDF\_CHAR | The vector representation for the columns of the pressure tensor [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS1 Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### Normal Mode EAS Ground Moments

This file contains the ground calculated electron moments data product from EAS Nominal mode electron distributions. The file format is .cdf.

**Filename**:solo\_L2\_swa-eas-NM-GrndMoms\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains electron moments data between the start time and end times mentioned in the file name. The start and end times are in UT. The time resolution of data in this file follows the resolution of nominal mode electron distributions.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L2>Level 2 Data |
| Descriptor | 1 | SWA-EAS-NM-GrndMoms |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | solo\_L2\_swa-eas-NM-GrndMoms |
| Logical File id | 1 | solo\_L2\_swa-eas-NM-GrndMoms \_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Onboard calculated Moments |
| Rules of Use | 1 | Publication quality science data |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | NM-GrndMoms>Normal Mode - Ground Moments |
| Level | 1 | L2>Level 2 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SCPotential | CDF\_REAL8 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Spacecraft Potential | | | |
| CATDESC | CDF\_CHAR | Spacecraft Potential used to discard lowest energies | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | F14.4 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Potential | | | |
| VALIDMIN | CDF\_UINT4 | -100.0 | | | |
| VALIDMAX | CDF\_UINT4 | 100.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | -100.0 | | | |
| SCALEMAX | CDF\_UINT4 | 100.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | Volts | | | |
| SI\_CONVERSION | CDF\_CHAR | > | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Density | | | |
| CATDESC | CDF\_CHAR | Electron Number Density | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Density | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Velocity | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron bulk Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity of electrons | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Pressure | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Pressure | | | |
| CATDESC | CDF\_CHAR | Electron Pressure tensor | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Pressure | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_Heatflux | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Heat Flux | | | |
| CATDESC | CDF\_CHAR | Electron Heat Flux | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_VEL\_LABEL | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Velocity | | | |
| CATDESC | CDF\_CHAR | The vector representation for the velocity vector [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_HFlux\_LABEL | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Heat flux | | | |
| CATDESC | CDF\_CHAR | The vector representation for the Heat flux vector [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_EAS\_PRES\_1 | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Rows of Pressure Tensor | | | |
| CATDESC | CDF\_CHAR | The vector representation for the rows of the pressure tensor [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_EAS\_PRES\_2 | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Columns of the Pressure Tensor | | | |
| CATDESC | CDF\_CHAR | The vector representation for the columns of the pressure tensor [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS1 Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

##### Trigger Mode EAS Ground Moments

This file contains the ground calculated electron moments data product from EAS Trigger mode electron distributions. The file format is .cdf.

**Filename**:solo\_L2\_swa-eas-TM-GrndMoms\_[StartTime-EndTime]\_V??.cdf

**Expected data volume and time resolution**: This file contains electron moments data between the start time and end times mentioned in the file name. The start and end times are in UT. The time resolution of data in this file is 1 second and the number of records depend on the number of triggers on a given day.

**Global Attributes**

|  |  |  |
| --- | --- | --- |
| **Name** | **Entry** | **Value** |
| Project | 1 | Solar Orbiter |
| Project | 2 | Cosmic Visions |
| Source Name | 1 | SOLO>Solar Orbiter |
| Discipline | 1 | Space Physics>Interplanetary Studies |
| Data Type | 1 | L2>Level 2 Data |
| Descriptor | 1 | SWA-EAS-TM-GrndMoms |
| Data Version | 1 | 01 |
| Software Version | 1 | 01.00.00 |
| PI Name | 1 | C. J. Owen |
| PI Affiliation | 1 | MSSL-UCL, University College London, UK |
| Instrument Type | 1 | Plasma and Solar Wind |
| Mission Group | 1 | Solar Orbiter |
| Logical Source | 1 | solo\_L2\_swa-eas-TM-GrndMoms |
| Logical File id | 1 | solo\_L2\_swa-eas-TM-GrndMoms \_yyyymmddTHHMMSS-yyyymmddTHHMMSS\_V01 |
| Logical Source Description | 1 | SWA-EAS Onboard calculated Moments |
| Rules of Use | 1 | Publication quality science data |
| Generated by | 1 | MSSL-UCL |
| Generation date | 1 | YYYY-MM-DDTHH:MN:SS |
| Mods | 1 | V01 First Version |
| Data Product | 1 | NM-GrndMoms>Trigger Mode - Ground Moments |
| Level | 1 | L2>Level 2 Data |
| Instrument | 1 | SWA-EAS>Solar-Wind-Analyser-Electron-Analyser-System |

**Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| EPOCH | CDF\_TIME\_TT2000 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS[12] EPOCH | | | |
| CATDESC | CDF\_CHAR | Epoch in nano-seconds since J2000, encoded as Terrestrial Time on rotating Earth Geoid | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| FILLVAL | CDF\_INT8 | -9223372036854775807 | | | |
| LABLAXIS | CDF\_CHAR | EPOCH | | | |
| UNITS | CDF\_CHAR | ns | | | |
| VALIDMIN | CDF\_INT8 | 1577836800000000000 | | | |
| VALIDMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_INT8 | 1577836800000000000 | | | |
| SCALEMAX | CDF\_INT8 | 1893456000000000000 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1>1e+09 s | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |
| VAR\_NOTES | CDF\_CHAR | The EAS[12] time tag is from the centre of the acquisition interval which is 1 sec | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_SCPotential | CDF\_REAL8 | 1 | 1 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Spacecraft Potential | | | |
| CATDESC | CDF\_CHAR | Spacecraft Potential used to discard lowest energies | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | F14.4 | | | |
| LABLAXIS | CDF\_CHAR | Spacecraft Potential | | | |
| VALIDMIN | CDF\_UINT4 | -100.0 | | | |
| VALIDMAX | CDF\_UINT4 | 100.0 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | -100.0 | | | |
| SCALEMAX | CDF\_UINT4 | 100.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | Volts | | | |
| SI\_CONVERSION | CDF\_CHAR | > | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_N | CDF\_REAL8 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Density | | | |
| CATDESC | CDF\_CHAR | Electron Number Density | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Density | | | |
| VALIDMIN | CDF\_UINT4 | 1E-9 | | | |
| VALIDMAX | CDF\_UINT4 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_UINT4 | 1E-9 | | | |
| SCALEMAX | CDF\_UINT4 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | cm^-3 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-06>m^-3 | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Velocity | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron bulk Velocity | | | |
| CATDESC | CDF\_CHAR | Bulk velocity of electrons | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_VEL\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | -10000.0 | | | |
| VALIDMAX | CDF\_REAL8 | +10000.0 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | -10000.0 | | | |
| SCALEMAX | CDF\_REAL8 | +10000.0 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | km s^-1 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E+03>m s^-1 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_VEL\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS\_Pressure | CDF\_REAL8 | 1 | 9 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Pressure | | | |
| CATDESC | CDF\_CHAR | Electron Pressure tensor | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABLAXIS | CDF\_CHAR | Pressure | | | |
| VALIDMIN | CDF\_REAL8 | 1E-6 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+3 | | | |
| SCALETYP | CDF\_CHAR | Log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-6 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+3 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | nPa | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-09>P | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_EAS\_PRES\_1 | | | |
| REPRESENTATION\_2 | CDF\_CHAR | REP\_EAS\_PRES\_2 | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| SWA\_EAS1\_Heatflux | CDF\_REAL8 | 1 | 3 | T | T |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Electron Heat Flux | | | |
| CATDESC | CDF\_CHAR | Electron Heat Flux | | | |
| COORDINATE\_SYSTEM | CDF\_CHAR | Solar Ecliptic | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | SWA\_EAS\_EPOCH | | | |
| FILLVAL | CDF\_REAL8 | -1E+31 | | | |
| FORMAT | CDF\_CHAR | f14.4 | | | |
| LABL\_PTR\_1 | CDF\_CHAR | EAS\_HFlux\_LABEL | | | |
| VALIDMIN | CDF\_REAL8 | 1E-05 | | | |
| VALIDMAX | CDF\_REAL8 | 1E+05 | | | |
| SCALETYP | CDF\_CHAR | log | | | |
| SCALEMIN | CDF\_REAL8 | 1E-05 | | | |
| SCALEMAX | CDF\_REAL8 | 1E+05 | | | |
| VAR\_TYPE | CDF\_CHAR | data | | | |
| UNITS | CDF\_CHAR | erg s^-1 cm^-2 | | | |
| SI\_CONVERSION | CDF\_CHAR | 1E-03>J s^-1 m^-2 | | | |
| REPRESENTATION\_1 | CDF\_CHAR | REP\_HFlux\_LABEL | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_VEL\_LABEL | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Velocity | | | |
| CATDESC | CDF\_CHAR | The vector representation for the velocity vector [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_HFlux\_LABEL | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Heat flux | | | |
| CATDESC | CDF\_CHAR | The vector representation for the Heat flux vector [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_EAS\_PRES\_1 | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Rows of Pressure Tensor | | | |
| CATDESC | CDF\_CHAR | The vector representation for the rows of the pressure tensor [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| REP\_EAS\_PRES\_2 | CDF\_CHAR | 1 | 3 | F | F |
|  |  |  | | | |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | Vector Representation for Columns of the Pressure Tensor | | | |
| CATDESC | CDF\_CHAR | The vector representation for the columns of the pressure tensor [‘x’,’y’,’z’] | | | |
| FORMAT | CDF\_CHAR | A1 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable\_Name** | **Data\_type** | **DIMS** | **SIZES** | **R\_VARY** | **D\_VARY** |
| QUALITY\_FLAG | CDF\_UINT1 | 1 | 1 | T | F |
| **Attribute Name** | **Data Type** | **Value** | | | |
| FIELDNAM | CDF\_CHAR | EAS1 Data Quality | | | |
| CATDESC | CDF\_CHAR | EAS1 Data Quality flag | | | |
| DISPLAY\_TYPE | CDF\_CHAR | time\_series | | | |
| DEPEND\_0 | CDF\_CHAR | EPOCH | | | |
| FILLVAL | CDF\_UINT4 | 255 | | | |
| LABLAXIS | CDF\_CHAR | EAS1 data quality | | | |
| VALIDMIN | CDF\_UINT4 | 0 | | | |
| VALIDMAX | CDF\_UINT4 | 4 | | | |
| SCALETYP | CDF\_CHAR | linear | | | |
| SCALEMIN | CDF\_UINT4 | 0 | | | |
| SCALEMAX | CDF\_UINT4 | 4 | | | |
| VAR\_TYPE | CDF\_CHAR | support\_data | | | |

#### PAS L2 Products

IRAP will produce the L2 CDF following files:

* 3D ion distributions expressed as distribution functions in the Solar-Ecliptic reference frame

solo\_L2\_swa-pas-3d-flux\_yyyymmdd\_V01.cdf

* 3D ion distributions expressed as differential flux in the Solar-Ecliptic reference frame

solo\_L2\_swa-pas-3d-flux\_yyyymmdd\_V01.cdf

* Ground calculated H+ moments in the Solar-Ecliptic frame

solo\_L2\_swa-pas-mom\_yyyymmdd\_V01.cdf

These L2 data products will require as input:

* PAS L1 3D ion distribution files in raw counts
* PAS ground Calibration files
* PAS L1 In-flight Calibration files
* SPICE kernels

The detailed description of L2 data products is not yet finalized, but we can provide a synthetic view of their data structure.

##### PAS 3D ion distribution (differential flux)

**Filename**: solo\_L2\_swa-pas-3d-flux\_yyyymmdd\_V01.cdf

The data structure will looks similar to L1 3D ion distribution data, but with the following differences:

* Epoch variable will correspond to the center of each acquisition interval, and have DELTA\_PLUS\_VAR and DELTA\_MINUS\_VAR pointing to Half\_interval variable
* 3D ion distribution variable, named “flux” will be a CDF\_REAL4 array, and expressed in differential flux units (cm^-2.s^-1.sr^-1.keV^-1)

|  |  |  |  |
| --- | --- | --- | --- |
| Variable name | Variable type | Dimensions | Record vary |
| Epoch | CDF\_TIME\_TT2000 | [] | True |
| Half\_interval | CDF\_FLOAT | [] | True |
| CCSDS\_coarse\_time | CDF\_UINT4 | [] | True |
| CCSDS\_fine\_time | CDF\_UINT2 | [] | True |
| SCET\_coarse\_time | CDF\_UINT4 | [] | True |
| SCET\_fine\_time | CDF\_UINT2 | [] | True |
| SOURCE | CDF\_UINT1 | [] | True |
| SAMPLE | CDF\_INT2 | [] | True |
| NB\_SAMPLE | CDF\_INT2 | [] | True |
| FIRST\_ENERGY | CDF\_INT2 | [] | True |
| NB\_ENERGY | CDF\_INT2 | [] | True |
| FIRST\_ELEVATION | CDF\_INT2 | [] | True |
| NB\_ELEVATION | CDF\_INT2 | [] | True |
| NB\_CEM | CDF\_INT2 | [] | True |
| INFO | CDF\_UINT1 | [] | True |
| SCHEME | CDF\_UINT1 | [] | True |
| FULL\_3D | CDF\_UINT1 | [] | True |
| COMPRESSED | CDF\_UINT1 | [] | True |
| MAX\_CNT\_ENERGY | CDF\_INT2 | [] | True |
| MAX\_CNT\_ELEVATION | CDF\_INT2 | [] | True |
| MAX\_CNT\_CEM | CDF\_INT2 | [] | True |
| NB\_K | CDF\_INT2 | [] | True |
| K | CDF\_INT2 | [] | True |
| flux | CDF\_REAL4 | [11, 9, 96] | True |
| Energy\_table | CDF\_REAL4 | [96] | False |
| Energy\_delta\_plus | CDF\_REAL4 | [96] | False |
| Energy\_delta\_minus | CDF\_REAL4 | [96] | False |
| CEM\_table | CDF\_REAL4 | [11] | False |
| CEM\_table\_delta | CDF\_REAL4 | [11] | False |
| Elevation\_table | CDF\_REAL4 | [9] | False |
| Elevation\_table\_delta | CDF\_REAL4 | [9] | False |

##### PAS 3D ion (distribution function)

**Filename**: solo\_L2\_swa-pas-3d-fdist\_yyyymmdd\_V01.cdf

The data structure will looks similar to L1 3D ion distribution data, but with the following differences:

* Epoch variable will correspond to the center of each acquisition interval, and have DELTA\_PLUS\_VAR and DELTA\_MINUS\_VAR pointing to Half\_interval variable
* 3D ion distribution variable, named “fdist” will be a CDF\_REAL4 array, and expressed in distribution function units (s^3.km^-6)

|  |  |  |  |
| --- | --- | --- | --- |
| Variable name | Variable type | Dimensions | Record vary |
| Epoch | CDF\_TIME\_TT2000 | [] | True |
| Half\_interval | CDF\_FLOAT | [] | True |
| CCSDS\_coarse\_time | CDF\_UINT4 | [] | True |
| CCSDS\_fine\_time | CDF\_UINT2 | [] | True |
| SCET\_coarse\_time | CDF\_UINT4 | [] | True |
| SCET\_fine\_time | CDF\_UINT2 | [] | True |
| SOURCE | CDF\_UINT1 | [] | True |
| SAMPLE | CDF\_INT2 | [] | True |
| NB\_SAMPLE | CDF\_INT2 | [] | True |
| FIRST\_ENERGY | CDF\_INT2 | [] | True |
| NB\_ENERGY | CDF\_INT2 | [] | True |
| FIRST\_ELEVATION | CDF\_INT2 | [] | True |
| NB\_ELEVATION | CDF\_INT2 | [] | True |
| NB\_CEM | CDF\_INT2 | [] | True |
| INFO | CDF\_UINT1 | [] | True |
| SCHEME | CDF\_UINT1 | [] | True |
| FULL\_3D | CDF\_UINT1 | [] | True |
| COMPRESSED | CDF\_UINT1 | [] | True |
| MAX\_CNT\_ENERGY | CDF\_INT2 | [] | True |
| MAX\_CNT\_ELEVATION | CDF\_INT2 | [] | True |
| MAX\_CNT\_CEM | CDF\_INT2 | [] | True |
| NB\_K | CDF\_INT2 | [] | True |
| K | CDF\_INT2 | [] | True |
| fdist | CDF\_REAL4 | [11, 9, 96] | True |
| Energy\_table | CDF\_REAL4 | [96] | False |
| Energy\_delta\_plus | CDF\_REAL4 | [96] | False |
| Energy\_delta\_minus | CDF\_REAL4 | [96] | False |
| CEM\_table | CDF\_REAL4 | [11] | False |
| CEM\_table\_delta | CDF\_REAL4 | [11] | False |
| Elevation\_table | CDF\_REAL4 | [9] | False |
| Elevation\_table\_delta | CDF\_REAL4 | [9] | False |

##### PAS ground calculated H+ moments

**Filename**: solo\_L2\_swa-pas-mom\_yyyymmdd\_V01.cdf

The data structure will looks similar to L1 onboard calculed moments, but the density, velocity and pressure moments will be calculated from L1 3D ion distributions, and expressed in Solar-Ecliptic frame.

|  |  |  |  |
| --- | --- | --- | --- |
| Variable name | Variable type | Dimensions | Record vary |
| Epoch | CDF\_TIME\_TT2000 | [] | True |
| Half\_interval | CDF\_FLOAT | [] | False |
| CCSDS\_coarse\_time | CDF\_UINT4 | [] | True |
| CCSDS\_fine\_time | CDF\_UINT2 | [] | True |
| SCET\_coarse\_time | CDF\_UINT4 | [] | True |
| SCET\_fine\_time | CDF\_UINT2 | [] | True |
| Sample | CDF\_INT2 | [] | True |
| Validity | CDF\_UINT1 | [] | True |
| sum\_PAS | CDF\_UINT1 | [] | True |
| Density | CDF\_REAL4 | [] | True |
| Velocity | CDF\_REAL4 | [3] | True |
| Pressure | CDF\_REAL4 | [3,3] | True |

#### HIS L2 products

HIS Product details to be added…

solo\_L2\_swa-his-ElemAbun\_[StartTime-EndTime]\_V01.cdf

solo\_L2\_swa-his-IonChState\_[StartTime-EndTime]\_V01.cdf

solo\_L2\_swa-his-ChStateDist\_[StartTime-EndTime]\_V01.cdf

solo\_L2\_swa-his-KinProp\_[StartTime-EndTime]\_V01.cdf

solo\_L2\_swa-his-VelDist\_[StartTime-EndTime]\_V01.cdf

### L3 – Higher level data products

*Detailed description of the content and format of the derived data products.*

TBD

solo\_L3\_swa-eas-NMpa\_[StartTime-EndTime]\_V01.cdf

solo\_L3\_swa-eas-TMpa\_[StartTime-EndTime]\_V01.cdf

solo\_L3\_swa-eas-MOMred\_[StartTime-EndTime]\_V01.cdf

### CAL – Calibration data products

*Detailed description of the content and format of the calibration data products.*

### ANC – Ancillary data products

*Detailed description of the content and format of the Ancilliary data products.*

#### SPICE kernels

#### Mag Data

#### RPW data

# SWA Data products matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Product Name | Description | Descriptor | Free field | Level |
| solo\_L0\_swa-eas[12]-NMc\_[StartTime-EndTime]\_V??.cdf | Single Energy 2D VDF (Low Laterncy) |  |  |  |
| solo\_L0\_swa-eas[12]-SSc\_[StartTime-EndTime]\_V??.cdf | On board Electron Moments (4s) |  |  |  |
| solo\_L0\_swa-eas[12]-TMc\_[StartTime-EndTime]\_V??.cdf | Full 3D VDF |  |  |  |
| solo\_L0\_swa-eas-padc\_[StartTime-EndTime]\_V??.cdf | Burst Mode |  |  |  |
| solo\_L0\_swa-eas-OnbPartMoms\_[StartTime-EndTime]\_V??.cdf | Pitch angle distributions |  |  |  |
| solo\_L0\_swa-pas-tm\_yyyymmdd\_V01.bin  solo\_L1\_swa-pas-tm\_yyyymmdd\_V01.ascii | On Ground Moments |  |  |  |
| solo\_L1\_swa-eas[12]-NMc\_[StartTime-EndTime]\_V??.cdf | House keeping |  |  |  |
| solo\_L1\_swa-eas[12]-SSc\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L1\_swa-eas[12]-TMc\_[StartTime-EndTime]\_V??.cdf | Single Energy 2D VDF (Low Laterncy) |  |  |  |
| solo\_L1\_swa-eas-padc\_[StartTime-EndTime]\_V??.cdf | On board Electron Moments (4s) |  |  |  |
| solo\_L1\_swa-eas-OnbPartMoms\_[StartTime-EndTime]\_V??.cdf | Full 3D VDF |  |  |  |
| solo\_L1\_swa-pas-3d\_yyyymmdd\_V01.cdf | Burst Mode |  |  |  |
| solo\_L1\_swa-pas-mom\_yyyymmdd\_V01.cdf | Pitch angle distributions |  |  |  |
| solo\_L1\_swa-pas-hsk\_yyyymmdd\_V01.cdf | House keeping |  |  |  |
| solo\_L1\_swa-pas-cal\_yyyymmdd\_V01.cdf |  |  |  |  |
| solo\_L1\_swa-his-TESTn\_[StartTime-EndTime]\_V01.cdf | 2x Charge State Ratios |  |  |  |
| solo\_L1\_swa-his-TESTb\_[StartTime-EndTime]\_V01.cdf | 2x Rate spectra |  |  |  |
| solo\_L1\_swa-his-CONFIGn\_[StartTime-EndTime]\_V01.cdf | Normal Mode Rates |  |  |  |
| solo\_L1\_swa-his-CONFIGb\_[StartTime-EndTime]\_V01.cdf  solo\_L1\_swa-his-PHAn\_[StartTime-EndTime]\_V01.cdf | Normal Mode PHA's |  |  |  |
| solo\_L1\_swa-his-PHAb\_[StartTime-EndTime]\_V01.cdf | Burst Mode Rates |  |  |  |
| solo\_L1\_swa-his-MATRIXn\_[StartTime-EndTime]\_V01.cdf | Burst Mode PHA's |  |  |  |
| solo\_L1\_swa-his-MATRIXb\_[StartTime-EndTime]\_V01.cdf | House keeping |  |  |  |
| solo\_L1\_swa-his-VDFn\_[StartTime-EndTime]\_V01.cdf |  |  |  |  |
| solo\_L1\_swa-his-VDFb\_[StartTime-EndTime]\_V01.cdf |  |  |  |  |
| solo\_L1\_swa-his-PRIOn\_[StartTime-EndTime]\_V01.cdf | Ion Moments (4s) |  |  |  |
| solo\_L1\_swa-his-PRIOb\_[StartTime-EndTime]\_V01.cdf | 3D VDFs (4 sec cadence) |  |  |  |
| solo\_L1\_swa-his-LLn\_[StartTime-EndTime]\_V01.cdf | House keeping |  |  |  |
| solo\_L1\_swa-his-LLb\_[StartTime-EndTime]\_V01.cdf |  |  |  |  |
| solo\_L1\_swa-his-HK\_[StartTime-EndTime]\_V01.cdf |  |  |  |  |
| solo\_L2\_swa-eas[12]-NM3D-[unit]\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L1\_swa-eas[12]-SS-[unit]\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L2\_swa-eas[12]-TM3D-[unit]\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L2\_swa-eas-pad-[unit]\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L2\_swa-eas-OnbMoms\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L2\_swa-eas-NM-GrndMoms\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L2\_swa-eas-TM-GrndMoms\_[StartTime-EndTime]\_V??.cdf |  |  |  |  |
| solo\_L2\_swa-pas-fdist\_yyyymmdd\_V01.cdf |  |  |  |  |
| solo\_L2\_swa-pas-3d-flux\_yyyymmdd\_V01.cdf |  |  |  |  |
| solo\_L2\_swa-pas-mom\_yyyymmdd\_V01.cdf |  |  |  |  |
|  |  |  |  |  |

Table . SWA science data product