Cluster Active Archive
Interface Control Document
Digital Wave Processor

prepared by

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Version 14.0

Document Status Sheet

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6	2010-03-01	Updates to meta data entries
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		Updates following PM24

Acronyms

ACF	Auto-Correlation Function
BM1	Burst Mode 1 - Cluster high resolution science operational mode
CAA	Cluster Active Archive
CEF	Cluster Exchange Format - Cluster data format
CSA	Cluster Science Archive
DSN	Deep Space Network - NASA network of ground stations
DWP	Digital Wave Processor - Cluster instrument
EFW	Electric Fields and Waves - Cluster instrument
ESA	European Space Agency
ESOC	European Satellite Operations Center
FFT	Fast Fourier Transform
HAR	High Angular Resolution - PEACE operational mode
HEEA	High Energy Electron Analyser - PEACE sensor
IEL	Inter-Experiment Link - Onboard data link between PEACE and DWP
LAR	Low Angular Resolution - PEACE operational mode
LEEA	Low Energy Electron Analyser - PEACE sensor
MAR	Medium Angular Resolution - PEACE operational mode
MCP	Microchannel plate - PEACE detector
NASA	National Aeronautical and Space Agency
NM	Normal Mode - Cluster nominal science operational mode
OBDH	Onboard Data Handling
PEACE	Plasma Electron And Current Experiment - Cluster instrument
RT	Real Time - Data telemeted as soon as collected
SSR	Solid State Recorder - Used to store data between ground station passes
STAFF	Spatio-Temporal Analysis of Field Fluctuations - Cluster instrument
TCAL	Time Calibration - calibration of clock count into UT
TED	Telemetry Extraction and Decommutation - Software application
UT	Universal time
WBD	WideBand Data - Cluster instrument
WEC	Wave Experiment Consortium
WHISPER	Waves of HIgh frequency and Sounder for Probing Electron density by Relaxation - Cluster instrument

Table of Contents

1 Purpose

The purpose of this document is to provide a broad outline of the archiving of the data from the Digital Wave Processor (DWP) instrument on Cluster in the ESA Cluster Active Archive (CAA) and to define the agreement of the CAA and PI of DWP on this broad outline.

The scientific rationale underpinning the CAA activities is as follows:

- Maximise the scientific return from the mission by making all Cluster data available to the world-wide scientific community.
- Ensure that the unique data set returned by the Cluster mission is preserved in a stable, long-term archive for scientific analysis beyond the end of the mission.
- Provide this archive as a major contribution by ESA and the Cluster science community to the International Living With a Star (ILWS) programme.
- To provide the calibrated, high resolution, particle correlator data. The software was originally developed by The University of Sussex and is now under the control of The University of Sheffield.
- To provide data and software required enhancing the timing accuracy of the WEC data.
- To provide coordinated Wave Experiment Consortium (WEC) status information in the form of a WEC operations log.
- To provide a copy of the WEC Telemetry Extraction and Decommutation decommutation software together with its associated documentation. This software was originally developed by the University of Sussex and is now under the control of The University of Sheffield.
- To describe the DWP instrument, its operation, commanding and telemetry.
- Provision of Commanding files and PIORs.

2 Points of Contact

For the operation of archiving the high-resolution data from DWP the following contacts have been agreed:

Scientific correspondents C. P. Escoubet for the CAA and S. Walker/K. Yearby for DWP,

Technical correspondents C. Perry/C. P. Escoubet for the CAA and S. Walker/K. Yearby for DWP.

Managerial correspondents C. P. Escoubet for the CAA and M. Balikhin for DWP.

The DWP team email list is presently:

Michael Balikhin, DWP PI m.balikhin@sheffield.ac.uk

Keith Yearby, DWP Instrument manager k.h.yearby@sheffield.ac.uk

Simon Walker, DWP archive scientist simon.walker@sheffield.ac.uk

3 Related Documentation

CAA-EST-TN-0020	Active Archive: Delivery Procedure
DS-QMW-TN-0010	Cluster Exchange File syntax
CAA-MDD-0001	CAA metadata dictionary
CAA-EST-UG-DWP	CAA DWP User Guide

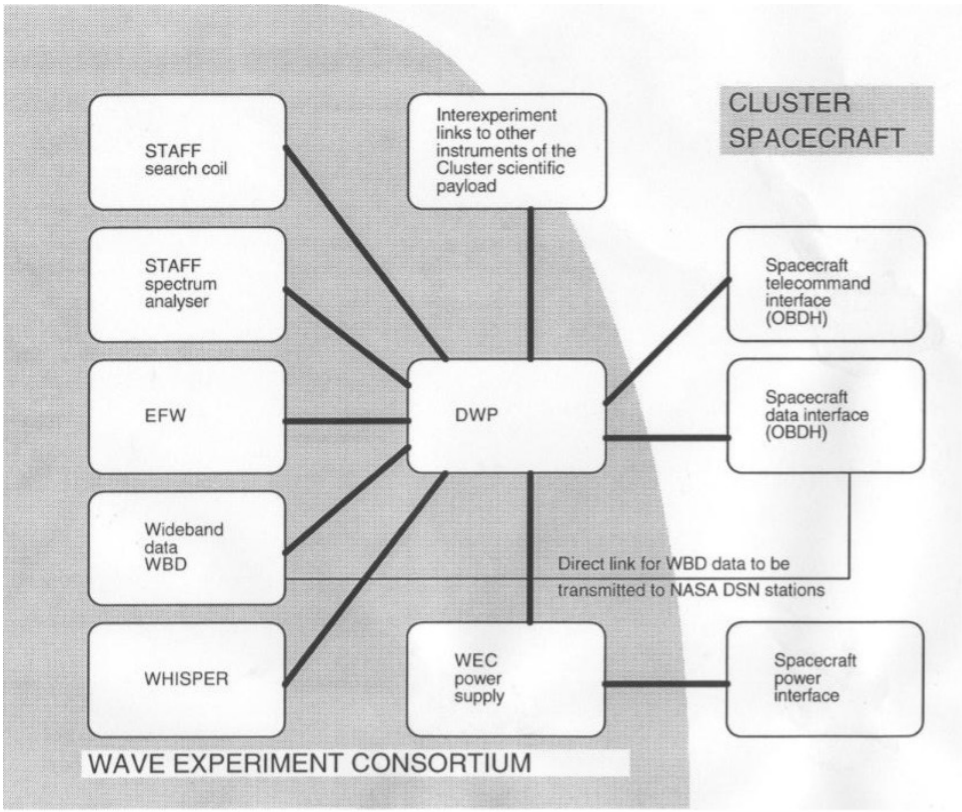

Figure 1: Diagram of the WEC showing DWP in the centre of the consortium

4 Instrument Description

4.1 Science objectives

DWP supports the common scientific objectives of the Cluster WEC and, in particular, produces scientific data from the embedded particle correlator experiment.

4.2 Hardware overview

The Digital Wave Processor (DWP) instrument is the central control and data processing unit for the Wave Experiment Consortium (WEC) that comprises the EFW, STAFF, WHISPER and WBD instruments (as shown in Figure 1). All nominal operations commanding and all telemetry acquisition for these instruments is routed via DWP, except for WBD. Originally, all WBD telemetry was collected by the NASA DSN ground stations independently of operations run by ESA. Time synchronisation of WEC modes is controlled by DWP, and the WEC science telemetry acquisition is dynamically allocated between the WEC instruments, according to the requirements of each WEC mode. Housekeeping data for all WEC instruments is also acquired by DWP. Since US funding for the PI of WBD was withdrawn, the operation and production of WBD data sets have been performed jointly by IAU (Prague) and the University of Sheffield. Data from normal operations (NM1 and BM1) are collected by the DSN station at Panska Ves and processed by IAU while data collected in BM2, which are routed via DWP to the normal ESA telemetry system (following decimation), are processed by the University of Sheffield.

In addition, DWP contains a particle correlator experiment that computes the auto-correlation of electron counts received by the PEACE HEEA sensor via the onboard inter-experiment link (IEL) between these

two instruments (see Figure 1). The ACFs are constructed in 1 of 15 correlator electron energy bands, each of which correspond to either two or four PEACE energy levels. Constraints on the processing and WEC telemetry allow ACFs for only 2 of the possible 15 energy bands to be processed at any particular time. One energy band is pre-selected while the other available band steps through the remaining 14 energies at the rate of one energy level per spin. Individual ACFs are constructed within each individual 1.111 millisecond DWP clock cycle. The time series of electron counts is of duration 732 microseconds (66% duty cycle) and comprises 61 "count bins" of 12 microsecond duration. Each resulting ACF comprises 32 points representing the Zero and 31 lag values. Individual ACFs, based on separate 1.111 millisecond DWP clock cycles, are summed lag-for-lag on board and the summed ACF is transmitted in telemetry. This gives with particle correlator the following characteristics:

Frequency range: 1.4 to 41 .6 kHz (32 frequency bands) and DC to 4 Hz based on successive ACF outputs.

Energy range: 0.6 eV to 26 keV in 15 energy bands (PEACE mode dependent).

4.3 Data processing chain

The WEC telemetry data acquired via DWP is distributed to each WEC instrument team. A software package provided by DWP is used to decommutate this data and extract the raw telemetry data for each instrument. This process includes determination of the precise time at which the data was acquired on board by DWP. The software is called TED - Telemetry Extraction and Decommutation.

In the case of the particle correlator, the raw telemetry data are processed by the DWP team to give calibrated high-resolution data to be included in the Cluster Science Archive.

For burst mode waveform data the timing accuracy required exceeds the standard 2 ms accuracy provided by ESOC, so the DWP team have developed a method of enhancing the timing accuracy using time difference measurements provided by ESOC and WBD. The time corrections are archived as TCOR files.

4.4 Instrument data products

4.4.1 Particle correlator data (PCOR)

The software particle correlator running within DWP generates time stamped Autocorrelation Functions (ACFs) consisting of the Zero lag correlation and 31 time lagged values, the PEACE energy range in units of eV of the count data, an estimate of the total PEACE count rate reconstructed from the ACF zero lag value, and a set of statistical values aimed at indicating the occurrence of significant correlations. The time resolution normally 1 spin in NM, and can be as high as 1/16 spin in burst mode.

4.4.2 WEC time correction (TCOR) files (for accurate time calibration)

This data set contains the time difference between the ESOC time stamps provided on the RDM and UT together with time offset values that depend upon the satellite mode. Details of how to use this data set are given in the DWP User Guide.

4.4.3 WEC operations log (DWP_LOG)

Dataset indicating overall WEC mode, main instrument parameters, anomalies (watch dogs, latchups, power cycles etc.).

4.4.4 WEC PIORs (DWP_UT_PIOR)

These provide a record of commands uplinked to the spacecraft. They are archived as documents indexed by the time span covered.

4.4.5 The TED software

This will be archived as documentation for reference purposes only.

4.4.6 The WEC User Manual

The WEC User Manual provides a detailed description of the WEC instruments, commanding, housekeeping telemetry, and operations procedures. This is available within the DWP documentation of the CAA.

4.4.7 Correlator documentation

Information relating to the background and operation of the particle correlator may be found in the DWP Calibration Report [CAA-EST-CR-DWP]. A description of the data set and its associated caveats may be found in the DWP User Guide [CAA-EST-UG-DWP].

4.5 Support activities

DWP provides essential support activities for the whole of WEC. These are vital for the delivery of other WEC data to the CAA/CSA and are performed in addition to the delivery of DWP data products.

- High-resolution timing correction using the TCOR dataset
- Anomaly support providing technical support for understanding WEC data issues.
- TED support. Delivery to instrument teams, maintenance, operation on a variety of platforms.
- Incorporation of DIFF correction.
- Other internal timing issues.
- Commanding, coordination and operations related support.

5 Data Provision - General Conventions

5.1 Formats

DWP scientific data products will be delivered using the following formats.

CEF – correlator data (PCOR), time correction files (TCOR), the WEC status log (DWP_LOG), and engineering and commanding information (UT_PIOR).

PDF – Documentation

Plain text – software in the form of ASCII source code.

PS – Correlator overview plots.

PNG – DWP_LOG overview plots, plots of correlator ACF statistical values

When a number of similar files are delivered, TAR archive files will be created and compressed using GZIP.

5.2 Standards

CEF Version 2.0, ASCII, PDF, TAR, GZIP, PS, PNG.

5.3 Production procedures

All DWP data products will be produced by the DWP team and delivered to the archive. Production pipelines for the DWP related products were created by the DWP PI team. Products related to the WBD BM2 data sets are generated by software written by the WBD PI team and implemented at the University of Sheffield.

5.4 Quality control procedures

Data products will be validated by the DWP team prior to delivery. The specific procedure for each data product is given in Section 6.

5.5 Delivery procedures

This delivery procedure conforms to the procedures defined in the document "Cluster Active Archive: Delivery Procedure" (CAA-EST-TN-0020 issue 3.0).

Batches of data files for a particular data stream will be combined as a TAR archive and compressed using GZIP prior to delivery.

Data files will be transferred to the archive using SCP, the secure copy client of SSH2. Public key authentication is preferred. Data will be delivered to caa-delivery.esac.esa.int and placed in the appropriate directory as defined in CAA-EST-TN-0020. A list of all files in a particular delivery, together with their md5 check sums will be provided to enable automatic processing and ingestion of the new data files.

The results of the auto-ingestion process are emailed to the DWP team.

5.6 Common meta data

All CEF files contain common sections of metadata related to the mission, observatory (satellite), experiment (DWP) and instrument (DWP-n). These are detailed in the following subsections.

5.6.1 Mission

The mission level metadata are given in the file "CL_CH_MISSION.ceh". The contents of this file are provided and maintained by the CAA team at ESAC.

5.6.2 Observatory

The observatory level metadata are given in the files "Cn_CH_OBS.ceh" where n is satellite number $1 <= n <= 4$. There is one file for each spacecraft and they are provided/maintained by the CAA team at ESAC.

5.6.3 Experiment

Experimental level information is stored in the header file "CL_CH_CWP_EXP.ceh". There is one file that applies to all DWP instruments. The contents of this file are shown below.

```
!
! ============================================================
! Include file .. CL_CH_DWP_EXP.ceh
!    Created .... 2024-05-02 19:49:43
!    Code ....... make_headers V1.0
!    Src file ... exp_cp_header.txt (2024-04-17 16:03:28)
! ============================================================
!
```

```
! ============================================================
! Experiment level metadata
! ============================================================
!
START_META = EXPERIMENT
     ENTRY = "DWP"
END_META   = EXPERIMENT
!
START_META = EXPERIMENT_DESCRIPTION
     ENTRY = "The Cluster DWP instrument is responsible for the "
     ENTRY = "coordination of WEC operations. "
     ENTRY = "DWP coordinates the configuration and sampling modes of the "
     ENTRY = "WEC instruments enabling the execution of complex sampling "
     ENTRY = "strategies to maximise use of spacecraft resources, "
     ENTRY = "provides signals to synchronise the sampling of WEC "
     ENTRY = "instruments, and collects, processes and packages the WEC "
     ENTRY = "data before placing it into the telemetry stream. "
     ENTRY = "In addition to its role in the control and management of "
     ENTRY = "the WEC instruments the DWP experiment runs an onboard "
     ENTRY = "software application - known as the particle correlator. "
     ENTRY = "Using data provided by the PEACE HEEA sensor via the Inter "
     ENTRY = "Experiment Link this application calculates the "
     ENTRY = "autocorrelation function of the electron count rate to "
     ENTRY = "investigate possible particle flux bursts on short time "
     ENTRY = "scales that may be indicative of regions of velocity space "
     ENTRY = "in which wave-particle interactions are occurring. A full "
     ENTRY = "description of the operation of the particle correlator "
     ENTRY = "may be found in the DWP Users Guide available from CAA/CSA."
END_META   = EXPERIMENT_DESCRIPTION
!
START_META = INVESTIGATOR_COORDINATES
     ENTRY = "M. Balikhin>PI>m.balikhin@sheffield.ac.uk"
     ENTRY = "H. St.C. K. Alleyne>Previous PI>retired"
     ENTRY = "L. J. C. Woolliscroft>Previous PI>deceased"
END_META   = INVESTIGATOR_COORDINATES
!
START_META = EXPERIMENT_REFERENCES
     ENTRY = "*CL_CD_CAA_DWP_ICD_0001_V0_8.pdf"
     ENTRY = "*CL_CD_DWP_USERMAN.pdf"
     ENTRY = "*CL_CD_DWP_UM"
     ENTRY = "Woolliscroft, L.J.C., H.St.C.K> Alleyne, C.M.Dunford,"
     ENTRY = "A. Sumner, J.A. Thompson, S.N. Walker, K.H. Yearby, "
     ENTRY = "A. Buckley, S. Chapman, M.P. Gough, and the DWP"
     ENTRY = "Co-Investigators, The Digital Wave-Processing Experiment"
     ENTRY = "on Cluster, Space Science Reviews 79, 209-231, 1997"
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = EXPERIMENT_REFERENCES
!
START_META = EXPERIMENT_KEY_PERSONNEL
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
     ENTRY = "A Buckley>Correlator Scientist>A.M.Buckley@sussex.ac.uk"
```

```
END_META    = EXPERIMENT_KEY_PERSONNEL
```

5.6.4 Instrument

Instrument level information is stored in the header file Cn_CH_DWP_INST.ceh. There is one file per satellite. The contents of the INST header file for Cluster 1 are shown below.

```
!
! ============================================================
! Include file .. C1_CH_DWP_INST.ceh
!    Created .... 2024-05-02 19:51:23
!    Code ....... make_headers V1.0
!    Src file ... inst_cp_header.txt (2022-03-07 15:04:30)
! ============================================================
!
! ============================================================
! Instrument level metadata
! ============================================================
!
START_META = INSTRUMENT_NAME
     ENTRY = "DWP1"
END_META   = INSTRUMENT_NAME
!
START_META = INSTRUMENT_DESCRIPTION
     ENTRY = "DWP of Cluster spacecraft C1"
     ENTRY = "The Cluster DWP instrument is responsible for the "
     ENTRY = "coordination of WEC operations. In particular DWP "
     ENTRY = "coordinates the configuration and sampling modes of the "
     ENTRY = "WEC instruments enabling the execution of complex sampling "
     ENTRY = "strategies to maximise use of spacecraft resources, "
     ENTRY = "provides signals to synchronise the sampling of WEC "
     ENTRY = "instruments, and collects, processes and packages the WEC "
     ENTRY = "data before placing it into the telemetry stream. In "
     ENTRY = "addition, the DWP instrument runs a software application - "
     ENTRY = "a particle correlator - that calculates the "
     ENTRY = "autocorrelation function of the electron count rate from "
     ENTRY = "the PEACE HEEA sensor. "
     ENTRY = "A fuller description of DWP may be found in the "
     ENTRY = "references listed below."
END_META   = INSTRUMENT_DESCRIPTION
!
START_META = INSTRUMENT_TYPE
     ENTRY = "Particle_Correlator"
     ENTRY = "Data_Processing_Unit"
END_META   = INSTRUMENT_TYPE
!
START_META = MEASUREMENT_TYPE
     ENTRY = "Particle_Correlator"
     ENTRY = "Thermal_Plasma"
END_META   = MEASUREMENT_TYPE
!
START_META = INSTRUMENT_CAVEATS
     ENTRY = "*C1_CQ_DWP_INST"
```

```
END_META    = INSTRUMENT_CAVEATS
```

6 Data Provision - Specific Descriptions

6.1 Particle correlator

6.1.1 Formats

The correlator data sets Cx_CP_DWP_PCOR_FX and Cx_CP_DWP_PCOR_ST will be formatted as CEF files.

6.1.2 Standards

The CEF files will conform to the standards defined in "Cluster Exchange File syntax" (DS-QMW-TN-0010) and the "CAA metadata dictionary" (CAA-MDD-0001).

6.1.3 Production procedures

The high resolution correlator data will be processed by the DWP team in monthly batches. Individual files for a particular satellite and/or date may also be produced depending upon need.

Production requires the FGM 5VPS and Summary Parameter AUX data sets. Files containing these data sets are retrieved from CSA prior to production.

There will be two data files per satelite per day, one containing the fixed energy data set (FX) and the other the stepped energy (ST).

The file name will be the logical file ID as specified in section 6.1.7.2, with the extension .cef.

6.1.4 Quality control procedures

The CEF generation procedure will include checks for anomalous data. High resolution plots of the resulting CEF files will be visually inspected by the DWP team. Sections of bad data will be removed and caveat files updated where necessary. Prior to delivery, the CEF files will be validated using the CSA tool CEFMDD.

6.1.5 Delivery procedures

Monthly sets of CEF formatted PCOR data files will be written to a TAR archive and then compressed using GZIP. These zipped files will be delivered to CAA using SCP, together with their accompanying LISTING file.

6.1.6 Product specification

The high resolution correlator data consists of two almost identical datasets, one for the fixed energy band (FX), and the other for the stepped energy band (ST). Both datasets contain the same set of parameters. The metadata specification that follows is for the fixed energy dataset, CP_DWP_PCOR_FX. The stepped energy dataset is identical except that FX is replaced by ST in the dataset name. The parameters contained in the two data sets are listed in Table 1.

6.1.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

Table 1: Contents of the PCOR data sets.

Parameter	Description
Time	Interval centred time tag
Half_Interval	Half interval for data accumulation
Look_Angle_Azimuth	PEACE azimuthal look direction for which ACF has been calculated
Half_Azimuth	Half azimuth angle over which ACF accumulated
Look_Angle_Polar	PEACE polar look direction for which ACF has been calculated
EnergyBinNumber	Energy band (number) in which the electrons are correlated
Energy	PEACE energy at which ACF has been calculated
MCP_level	The PEACE HEEA MCP high voltage level setting (number)
NumberACFsummed	Number of Auto Correlation Functions summed in this accumulation
ACF	Electron Auto Correlation Function (32 lags)
Lag_Time	The time offsets for each lag in the ACF
CntRateEst	Estimate of the electron count rate as determined from the ACF
MinPitchAngle	Estimate of the minimum pitch angle of particles
MaxPitchAngle	Estimate of the maximum pitch angle of particles
Correl_Fisher_T	Fisher T statistic - max(power)/sum(power)
Correl_Frequency	Frequency of maximum power
Correl_Fisher_Significance	Fisher significance of spectral peak
Correl_IVar	Index of variation - (ZL-<NZL>)/count rate estimate
Peace_mode	PEACE operational mode (LAR/MAR/HAR)

6.1.7.1 Dataset

The metadata for the PCOR particle correlator data set for the Cluster 1 PCOR FX dataset are shown below.

```
!
! ================================================================
! Include file .. C1_CH_DWP_PCOR_FX.ceh
!    Created .... 2024-05-02 19:52:42
!    Code ....... make_headers V1.0
!    Src file ... pcor_cp_header.txt (2022-03-22 16:48:11)
! ================================================================
!
! ================================================================
! Dataset level metadata
! ================================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CP_DWP_PCOR_FX"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CP>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "DWP Particle Correlator High Resolution Data, fixed energy band"
END_META   = DATASET_TITLE
!
```

```
START_META = DATASET_DESCRIPTION
     ENTRY = "The DWP particle correlator data sets provide the result of the "
     ENTRY = "onboard autocorrelation of the PEACE HEEA count rate. Due to "
     ENTRY = "telemetry restrictions, only two of the possible 16 correlator "
     ENTRY = "energy channels are returned. One data set, PCOR_FX (this file) "
     ENTRY = "provides ACFs at a fixed energy whilst the other PCOR_ST data "
     ENTRY = "set steps through the remaining energy steps at a rate of one "
     ENTRY = "step per spin. The 32 ACF lag values provide count rate "
     ENTRY = "information in the range 1.4-41.6kHz at a particular energy. In "
     ENTRY = "normal mode, one ACF is produced every spin where as in burst "
     ENTRY = "modes there may be either 4, 8, or 16 ACFs per spin depending "
     ENTRY = "upon the WEC operational mode implemented. In addition to the "
     ENTRY = "ACF and energy, this data set also contains the HEEA polar "
     ENTRY = "sensor from which the data were collected, the azimuth of "
     ENTRY = "observations (BM only), the maximum and minimum pitch angles of "
     ENTRY = "the electrons recorded and an estimate of the count rate based "
     ENTRY = "on the ACF. For further details, the user is referred to the "
     ENTRY = "DWP User Manual, available from CSA,  which contains a complete "
     ENTRY = "description of all parameters within the data set as well as a "
     ENTRY = "list of the general caveats that apply to this data set."
     ENTRY = "Note: Operation of the correlator in normal mode ended on "
     ENTRY = "2013-09-10."
END_META   = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
     ENTRY = "A M Buckley>DWP correlator scientist>A.M.Buckley@sussex.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = TIME_RESOLUTION
     ENTRY = 4.0
END_META   = TIME_RESOLUTION
!
START_META = MIN_TIME_RESOLUTION
     ENTRY = 4.4
END_META   = MIN_TIME_RESOLUTION
!
START_META = MAX_TIME_RESOLUTION
     ENTRY = 0.22
END_META   = MAX_TIME_RESOLUTION
!
START_META = PROCESSING_LEVEL
     ENTRY = "Derived"
END_META   = PROCESSING_LEVEL
!
START_META = DATASET_CAVEATS
     ENTRY = "See User Guide for general caveat information."
     ENTRY = "*C1_CQ_DWP_PCOR_[FX/ST]"
     ENTRY = "This caveat list is complemented by the PEACE operational log."
     ENTRY = "www.mssl.ucl.ac.uk/missions/cluster/about_operations/PEACE_ops_history.php"
END_META   = DATASET_CAVEATS
```

```
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = ACKNOWLEDGEMENT
!
START_META = DATASET_VERSION
     ENTRY = "1"
END_META   = DATASET_VERSION
!
START_META = FILE_TYPE
     ENTRY = "cef"
END_META   = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META   = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META   = METADATA_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Particle_Distribution"
END_META   = DATASET_TYPE
!
```

6.1.7.2 File

The logical file ID is based on the date of the first record in the file.

```
START_META = LOGICAL_FILE_ID
   ENTRY = C1_CP_DWP_PCOR_FX__20061001_V01
END_META   = LOGICAL_FILE_ID

START_META = VERSION_NUMBER
   ENTRY = "1"
END_META   = VERSION_NUMBER

START_META = FILE_TIME_SPAN
 VALUE_TYPE = ISO_TIME_RANGE
   ENTRY = 2006-10-01T00:00:00Z/2006-10-01T23:59:51Z
END_META   = FILE_TIME_SPAN

START_META = GENERATION_DATE
 VALUE_TYPE = ISO_TIME
   ENTRY = 2007-01-10T11:09:26Z
END_META   = GENERATION_DATE

START_META = FILE_CAVEATS
   ENTRY = "CEF written by CORR2CEF version 1.18"
```

```
   ENTRY = "Correlator DSD file:  /Users/simon/Documents/cluster/peace/2009/090701w5.na1"
   ENTRY = "PEACE interface file: /Users/simon/Documents/cluster/peace/2009/090701pi.na1"
   ENTRY = "Use data with caution."
   ENTRY = "See User Guide for general caveat list."
END_META    = FILE_CAVEATS
```

6.1.7.3 Parameters

```
!
! ================================================================
! V a r i a b l e s
! ================================================================
!
! ================================================================
! T i m e  R a n g e
! ================================================================
!
START_VARIABLE = Time__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Interval centred time tag"
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
          VALUE_TYPE = ISO_TIME
  SIGNIFICANT_DIGITS = 27
             FILLVAL = 9999-12-31T23:59:59Z
            FIELDNAM = "Universal Time"
            LABLAXIS = "UT"
          DELTA_PLUS = Half_Interval__C1_CP_DWP_PCOR_FX
         DELTA_MINUS = Half_Interval__C1_CP_DWP_PCOR_FX
END_VARIABLE    = Time__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Half_Interval__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Half interval for data accumulation"
               UNITS = "s"
       SI_CONVERSION = "1>s"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 7
             FILLVAL = -1.0
            FIELDNAM = "Half interval"
            LABLAXIS = "Delta Time"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE    = Half_Interval__C1_CP_DWP_PCOR_FX
!
!
! ================================================================
! L o o k  D i r e c t i o n
! ================================================================
!
```

```
START_VARIABLE = Look_Angle_Azimuth__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Instrument"
            PROPERTY = "Direction"
             CATDESC = "PEACE azimuthal look direction for which ACF has been calculated "
               UNITS = "degree"
       SI_CONVERSION = "0.01745329>rad"
   COORDINATE_SYSTEM = "SR2>Despun spacecraft (spin-reference) frame"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 7
             QUALITY = 3
             FILLVAL = -1.0
            FIELDNAM = "PEACE aimuthal look direction for which ACF has been calculated "
            SCALEMIN = 0
            SCALEMAX = 360
            SCALETYP = "Linear"
            LABLAXIS = "Azimuth Angle"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
         DELTA_PLUS = Half_Azimuth__C1_CP_DWP_PCOR_FX
        DELTA_MINUS = Half_Azimuth__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Look_Angle_Azimuth__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Half_Azimuth__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Instrument"
            PROPERTY = "Direction"
             CATDESC = "Half azimuth angle over which ACF accumulated"
               UNITS = "degree"
       SI_CONVERSION = "0.01745329>rad"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 7
             FILLVAL = -1.0
            FIELDNAM = "Half azimuth angle over which ACF accumulated"
            LABLAXIS = "Delta Azimuth"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Half_Azimuth__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Look_Angle_Polar__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Instrument"
            PROPERTY = "Direction"
             CATDESC = "PEACE polar look direction for which ACF has been calculated"
               UNITS = "degree"
       SI_CONVERSION = "0.01745329>rad"
   COORDINATE_SYSTEM = "SR2>Despun spacecraft (spin-reference) frame"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 7
             QUALITY = 3
             FILLVAL = -99.9
            FIELDNAM = "PEACE polar look direction for which ACF has been calculated"
```

```
            SCALEMIN = -90
            SCALEMAX = 90
            SCALETYP = "Linear"
            LABLAXIS = "Polar Angle"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
          DELTA_PLUS = 7.5
         DELTA_MINUS = 7.5
END_VARIABLE   = Look_Angle_Polar__C1_CP_DWP_PCOR_FX
!
!
! ============================================================
! P E A C E   e n e r g y
! ============================================================
!
START_VARIABLE = EnergyBinNumber__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Instrument"
            CATDESC = "Energy band (number) in which the electrons are correlated"
              UNITS = "unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 2
            FILLVAL = -1
            QUALITY = 3
           FIELDNAM = "Energy band number"
           SCALEMIN = 1
           SCALEMAX = 15
           SCALETYP = "Linear"
           LABLAXIS = "Energy bin #"
           DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = EnergyBinNumber__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Energy__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Instrument"
            PROPERTY = "Energy"
             CATDESC = "PEACE energy for which ACF has been calculated"
               UNITS = "eV"
       SI_CONVERSION = "1.609E-19>J"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 7
            QUALITY = 3
            FILLVAL = -1.0
           FIELDNAM = "PEACE energy for which ACF has been calculated"
           SCALEMIN = 0.03
           SCALEMAX = 30
           SCALETYP = "Log"
           LABLAXIS = "E"
           DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Energy__C1_CP_DWP_PCOR_FX
!
!
```

```
START_VARIABLE = MCP_level__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "The PEACE HEEA MCP high voltage level setting"
               UNITS = "unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 2
             FILLVAL = -1
             QUALITY = 3
            FIELDNAM = "MCP level"
            SCALEMIN = 1
            SCALEMAX = 32
            SCALETYP = "Linear"
            LABLAXIS = "MCP level #"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = MCP_level__C1_CP_DWP_PCOR_FX
!
!
! ============================================================
! A C F
! ============================================================
!
START_VARIABLE = NumberACFsummed__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Raw_Particle_Count_Rate"
             CATDESC = "Number of PEACE sweeps summed in this accummulation"
               UNITS = "unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 3
             FILLVAL = -1
             QUALITY = 3
            FIELDNAM = "Number of ACFs summed over"
            SCALEMIN = 0
            SCALEMAX = 196
            SCALETYP = "Linear"
            LABLAXIS = "# summed"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = NumberACFsummed__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Lag_Time__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "ACF lag times"
               UNITS = "us"
       SI_CONVERSION = "1.0e-6>s"
               SIZES = 32
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 3
             QUALITY = 3
             FILLVAL = -1
```

```
            FIELDNAM = "ACF lag times"
            LABLAXIS = "lag time"
          DELTA_PLUS = 6
         DELTA_MINUS = 6
                DATA = 0, 12, 24, 36, 48, 60, 72, 84,
                       96, 108, 120, 132, 144, 156, 168, 180,
                       192, 204, 216, 228, 240, 252, 264, 276,
                       288, 300, 312, 324, 336, 348, 360, 372
END_VARIABLE   = Lag_Time__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = ACF__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Data"
              ENTITY = "Electron"
            PROPERTY = "Raw_Particle_Counts"
        FLUCTUATIONS = "Correlation"
             CATDESC = "Electron count auto-correlation function"
               UNITS = "counts^2"
       SI_CONVERSION = "8.33e4>(counts squared) s^-1"
               SIZES = 32
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1.0
             QUALITY = 3
            FIELDNAM = "Auto-correlation function (32 lags) of electron counts"
            SCALEMIN = 0
            SCALEMAX = 30
            SCALETYP = "Linear"
            LABLAXIS = "ACF"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
            DEPEND_1 = Lag_Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = ACF__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = CntRateEst__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Raw_Particle_Count_Rate"
             CATDESC = "Estimated electron count rate"
               UNITS = "counts s^-1"
       SI_CONVERSION = "1>(electron counts squared) s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 10
             FILLVAL = -1.0
             QUALITY = 3
            FIELDNAM = "estimated electron count rate"
            SCALEMIN = 0
            SCALEMAX = 1.e6
            SCALETYP = "Log"
            LABLAXIS = "counts"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = CntRateEst__C1_CP_DWP_PCOR_FX
```

```
!
!
! ============================================================
! P i t c h  a n g l e  l i m i t s
! ============================================================
!
START_VARIABLE = MinPitchAngle__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Direction"
   COORDINATE_SYSTEM = "MFA"
               SIZES = 1
             CATDESC = "minimum pitch angle"
               UNITS = "degree"
       SI_CONVERSION = "0.01745329>rad"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 3
             FILLVAL = -1
             QUALITY = 3
            FIELDNAM = "min pitch angle"
            SCALEMIN = 0
            SCALEMAX = 180
            SCALETYP = "Linear"
            LABLAXIS = "min pitch angle"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = MinPitchAngle__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = MaxPitchAngle__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Direction"
   COORDINATE_SYSTEM = "MFA"
               SIZES = 1
             CATDESC = "maximum pitch angle"
               UNITS = "degree"
       SI_CONVERSION = "0.01745329>rad"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 3
             FILLVAL = -1
             QUALITY = 3
            FIELDNAM = "max pitch angle"
            SCALEMIN = 0
            SCALEMAX = 180
            SCALETYP = "Linear"
            LABLAXIS = "max pitch angle"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = MaxPitchAngle__C1_CP_DWP_PCOR_FX
!
!
! ============================================================
! F i s h e r  p a r a m e t e r s
```

```
! ============================================================
!
START_VARIABLE = Correl_Fisher_T__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Raw_Particle_Counts"
        FLUCTUATIONS = "Correlation"
             CATDESC = "Fisher T statistic - max(power)/sum(power)"
               UNITS = "unitless"
       SI_CONVERSION = "1.0>unitless"
               SIZES = 1
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1.0
             QUALITY = 2
            FIELDNAM = "Fisher T"
            LABLAXIS = "Fisher T"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Correl_Fisher_T__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Correl_Frequency__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Magnitude"
        FLUCTUATIONS = "Correlation"
             CATDESC = "Frequency of maximum power"
               UNITS = "Hz"
       SI_CONVERSION = "1.0>Hz"
               SIZES = 1
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 9
             FILLVAL = -1.0
             QUALITY = 2
            FIELDNAM = "Frequency"
            LABLAXIS = "Frequency"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Correl_Frequency__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Correl_Fisher_Significance__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Magnitude"
        FLUCTUATIONS = "Correlation"
             CATDESC = "Fisher significance of spectral peak"
               UNITS = "(%)"
       SI_CONVERSION = "1.0e-2>(fraction) unitless"
               SIZES = 1
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1.0
```

```
             QUALITY = 2
            FIELDNAM = "Significance"
            LABLAXIS = "Signif"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Correl_Fisher_Significance__C1_CP_DWP_PCOR_FX
!
!
START_VARIABLE = Correl_IVar__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Electron"
            PROPERTY = "Raw_Particle_Counts"
        FLUCTUATIONS = "Correlation"
             CATDESC = "Index of variation - (ZL-<NZL>)/count rate estimate "
               UNITS = "unitless"
       SI_CONVERSION = "1.0>unitless"
               SIZES = 1
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1.0
             QUALITY = 2
            FIELDNAM = "Index of Variation"
            LABLAXIS = "IVar"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Correl_IVar__C1_CP_DWP_PCOR_FX
!
! ============================================================
! P E A C E   m o d e
! ============================================================
!
START_VARIABLE = Peace_mode__C1_CP_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
              ENTITY = "Instrument"
             CATDESC = "PEACE Mode 0 - FIX, 1 - LAR, 2 - MAR, 3 - HAR"
               UNITS = "unitless"
       SI_CONVERSION = "1.0>unitless"
               SIZES = 1
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 5
             FILLVAL = -1
             QUALITY = 2
            FIELDNAM = "PEACE mode"
            LABLAXIS = "PEACE mode"
            DEPEND_0 = Time__C1_CP_DWP_PCOR_FX
END_VARIABLE   = Peace_mode__C1_CP_DWP_PCOR_FX
!
```

6.2 Time correction files

6.2.1 Formats

The time correlation data sets CP_DWP_TCOR will be formatted as CEF files.

6.2.2 Standards

The CEF files will conform to the standards defined in "Cluster Exchange File syntax" (DS-QMW-TN-0010) and the "CAA metadata dictionary" (CAA-MDD-0001).

6.2.3 Production procedures

The time correction data will be produced by the DWP team using information supplied by ESOC and data from WBD. Full documentation of the production and validation methods, together with yearly reports of its production may be downloaded from CAA.

Each file will cover the period of validity of one ESOC time correlation (usually of the order of one month). The file name will be the logical file ID as specified in Section 6.2.7.2, with the extension .cef.

6.2.4 Quality control procedures

The time correction procedure will include checks for anomalous data. Plots of the resulting CEF files will be visually inspected by the DWP team, and file caveats added if necessary.

6.2.5 Delivery procedures

The TCOR files, together with their accompanying LISTING file will be delivered to CAA using SCP

6.2.6 Product specification

The WEC time correction files allow the standard 2ms accuracy of the RDM timestamps to be improved to about 10 μs. The correction consist of two terms, the "offset" which specifies difference in microseconds between the reference time (VC0 reset pulse) for the packet and the onboard time stamp for that packet, and the "diff" which specifies the difference between the onboard time and UTC. The parameters contained in the data set are shown in Table 2.

Table 2: Contents of the DWP TCOR datasets.

Parameter	Description
Time	Interval centred time tag
Offset	The "Offset" is the difference in microseconds between the reference time for the packet and the onboard time stamp for that packet. It is only applicable to data recorded via the Solid State Recorder, and is zero during real time data acquisition. The "Offset" is not applicable to WBD data acquired via DSN.
Diff	The "Diff" is the difference in microseconds between the onboard time and UTC. For all data except WBD DSN data, the Offset and Diff should be added to the UTC packet times to get the accurate reference time of the packet. For WBD DSN data only the Diff should be used.

Note:
The time corrections are provided at the start and end times of each period of the same telemetry mode (acquisition interval).

The "*Offset*" is constant throughout each period, and the same value will be written in the records at the start and end of the period. If the "*Offset*" values before and after the required time are different, or either has the fill value of -1e31, then "*Offset*" is not available for that period.

The "*Diff*" at any time may be obtained by linear interpolation of the "*Diff*" values before and after the required time. If either "*Diff*" has the fill value of -1e31, then "*Diff*" is not available for that period.

6.2.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.2.7.1 Dataset

```
!
! ============================================================
! Include file .. C1_CH_DWP_TCOR_V1.ceh
!    Created .... 2024-05-02 19:59:37
!    Code ....... make_headers V1.0
!    Src file ... tcor_cp_header.txt (2022-04-26 13:24:17)
! ============================================================
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CP_DWP_TCOR"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CP>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "Time Correction information for Spacecraft C1"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "The DWP TCOR data provides time correction information "
     ENTRY = "that can be used to enhance the accuracy of the standard "
     ENTRY = "packet times. The Cluster standard data packet headers "
     ENTRY = "contain a time tag that is accurate to 2ms. This level of "
     ENTRY = "accuracy is not high enough for the comparison of "
     ENTRY = "multispacecraft waveform data sets. The TCOR data set "
     ENTRY = "provides a set of corrections that may be applied to the "
     ENTRY = "standard time tags to provide an accuracy of up to 20us. "
     ENTRY = "This is achieved using two parameters that may be found "
     ENTRY = "within the TCOR data sets. These parameters are"
     ENTRY = "1) The offset due to delays in time tagging packets on board"
     ENTRY = "2) The drift of the satellite clock with respect to Universal Time (UT)."
     ENTRY = "For further details, the user is referred to the CAA DWP "
     ENTRY = "User Manual which contains a complete description of these "
     ENTRY = "parameters and their production, examples of their usage, "
     ENTRY = "and lists the general caveats that apply to this data set."
END_META   = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
END_META   = CONTACT_COORDINATES
```

```
!
START_META = TIME_RESOLUTION
     ENTRY = 1000
END_META   = TIME_RESOLUTION
!
START_META = MIN_TIME_RESOLUTION
     ENTRY = 1e6
END_META   = MIN_TIME_RESOLUTION
!
START_META = MAX_TIME_RESOLUTION
     ENTRY = 5
END_META   = MAX_TIME_RESOLUTION
!
START_META = PROCESSING_LEVEL
     ENTRY = "Calibrated"
END_META   = PROCESSING_LEVEL
!
START_META = DATASET_CAVEATS
     ENTRY = "*C1_CQ_DWP_TCOR"
END_META   = DATASET_CAVEATS
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = ACKNOWLEDGEMENT
!
START_META = DATASET_VERSION
     ENTRY = "1"
END_META   = DATASET_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Calibration_Data"
END_META   = DATASET_TYPE
!
START_META = FILE_TYPE
     ENTRY = "cef"
END_META   = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META   = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META   = METADATA_VERSION
!
```

6.2.7.2 File

```
START_META = FILE_TYPE
```

```
   ENTRY = "cef"
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
   ENTRY = "CAA"
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
   ENTRY = "2.0"
END_META    = METADATA_VERSION
```

6.2.7.3 Parameters

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
! ============================================================
!
START_VARIABLE = Time__C1_CP_DWP_TCOR
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Interval centred time tag"
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
          VALUE_TYPE = ISO_TIME
  SIGNIFICANT_DIGITS = 27
             FILLVAL = 9999-12-31T23:59:59Z
            FIELDNAM = "Universal Time"
            LABLAXIS = "UT"
          DELTA_PLUS = 0
         DELTA_MINUS = 0
END_VARIABLE   = Time__C1_CP_DWP_TCOR
!
!
START_VARIABLE = Offset__C1_CP_DWP_TCOR
      PARAMETER_TYPE = "Data"
              ENTITY = "Observatory"
            PROPERTY = "Time_Offset"
             CATDESC = "Offset between the onboard time and the reference time of the data packet"
               UNITS = "us"
       SI_CONVERSION = "1e-6>s"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 5
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Offset between the onboard time and the reference time of the data packet"
            SCALEMIN = -500
```

```
            SCALEMAX = 500
            SCALETYP = "Linear"
            LABLAXIS = "Offset Time"
            DEPEND_0 = Time__C1_CP_DWP_TCOR
END_VARIABLE   = Offset__C1_CP_DWP_TCOR
!
!
START_VARIABLE = Diff__C1_CP_DWP_TCOR
      PARAMETER_TYPE = "Data"
              ENTITY = "Observatory"
            PROPERTY = "Time_Offset"
             CATDESC = "Difference between the onboard time and UTC"
               UNITS = "us"
       SI_CONVERSION = "1e-6>s"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 5
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Difference between the onboard time and UTC"
            SCALEMIN = -5000
            SCALEMAX = 5000
            SCALETYP = "Linear"
            LABLAXIS = "Diff Time"
            DEPEND_0 = Time__C1_CP_DWP_TCOR
END_VARIABLE   = Diff__C1_CP_DWP_TCOR
!
```

6.3 WEC status log

6.3.1 Formats

The WEC Status Log data sets CP_DWP_LOG will be formatted as CEF files.

6.3.2 Standards

The CEF files will conform to the standards defined in "Cluster Exchange File syntax" (DS-QMW-TN-0010) and the "CAA metadata dictionary" (CAA-MDD-0001).

6.3.3 Production procedures

This dataset is prepared automatically by analysis of telemetry. Caveats will be added manually during the validation process.

The data set is typically processed on a monthly basis.

There will be one data file per satellite per calendar month. The file name will be the logical file ID as specified in section 6.3.7.2, with the extension CEF.

6.3.4 Quality control procedures

Plots and listings of the parameters in the CEF files will be inspected by the DWP team.

6.3.5 Delivery procedures

The monthly CEF files will be combined into a TAR archive, compressed using GZIP, and delivered to CAA via SCP.

6.3.6 Product specification

Dataset indicating overall WEC mode, main instrument parameters, anomalies (watch dogs, latchups, power cycles etc.). The parameters contained in the data set are shown in Table 3.

Table 3: Parameters contained in the DWP LOG data sets

Parameter	Description
	Time tags
Time	Time interval of data acquisition
	DWP Configuration
Format_Count	Number of formats (data frames) in interval
Clock_Freq	WEC Master Clock Frequency.
DWP_MODEL_TAG	DWP instrument model number
LOG_EVENT	Event causing this log entry.
DWP_CONFIG_0 DWP_CONFIG_1 DWP_CONFIG_2	Configuration of the individual transputers processors. The transputers may be powered "OFF", or run at "HALF" or "FULL" speed.
DWP_SEU_count	Number of DWP single event upsets. SEU's are detected by looking for changes in the memory check sums between successive data formats.
DWP_Chk_Sum	Checksum of DWP memory at the end of the interval. This value is calculated from the DWP memory dumps that occur during execution of the macro.
	Errors detected by the WEC instruments
STAFF_SA_Zero_Count	Average number of STAFF SA zeros.
DWP_error_count	Number of DWP errors reported. This counts the number of times any of the WEC parameters listed below are non-zero, indicating an error.
STA_SA_error_count	Number of STAFF SA errors reported. This is a count of the number of times the WEC parameter EW1EWORD was non-zero.
STA_SC_error_count	Number of STAFF SC errors reported. This is a count of the number of times the WEC parameter EW2EWORD was non-zero.
WHI_error_count	Number of WHISPER errors reported. This is a count of the number of times the WEC parameter EW3IFST was non-zero.
TM_Overflow	Number of Telemetry Overflows detected.
AP_Overflow	Number of Application Overflows detected.
	WEC Operational Modes
TM_Mode_Name	Telemetry mode name indicates the satellite operational mode eg NM - normal science mode, BM1 - Burst science mode, BM2 - Burst science mode with WBD data routed through DWP, BM3 - Burst mode 3 operations.
Mode_Name	WEC mode name. This is the name of the WEC mode that was in operation
Mode_Desc	WEC mode Description. A more descriptive mode name. Full descriptions of the operational modes may be found in the WEC User Manual chapter 6.
	WEC Instrument Configuration
STA_SA_Mode_Passive	STAFF SA mode in passive part of mode cycle

STA_SA_Mode_Active	STAFF SA mode in active part of mode cycle
WHI_Mode_Passive	WHISPER mode is passive part of mode cycle
WHI_Mode_Active	WHISPER mode in active part of mode cycle
WBD_Mode_1	Wideband mode in first part of mode cycle
WBD_Mode_2	Wideband mode in second part of mode cycle
WBD_Mode_3	Wideband mode in third part of mode cycle
COR_OUTPUT_MODE	Correlator output mode.
COR_SWEEP_MODE	Correlator sweep mode.
COR_FIX_LEVEL	Correlator fixed energy level.
Instrumental Voltages and their Standard Deviations	
These analogue measurements contain the average value of the parameter measured during the acquisition interval together with its standard deviation as an indication of the variation of the parameter during this period. The expected nominal values and their calibrations may be found in the WEC Instrument Manual (chapter 2).	
WEC_Current_Average	Average WEC current
WEC_Current_Std_Dev	Standard deviation of WEC current
DWP_5V_Average	Average DWP voltage (5V)
DWP_5V_Std_Dev	Standard deviation of DWP voltage (5V)
STA_SA_6V_Average	Average STAFF SA voltage (6V)
STA_SA_6V_Std_Dev	Standard deviation of STAFF SA voltage (6V)
STA_SA_M6V_Average	Average STAFF SA voltage (-6V)
STA_SA_M6V_Std_Dev	Standard deviation of STAFF SA voltage (-6V)
STA_SA_5V_Average	Average STAFF SA voltage (5V)
STA_SA_5V_Std_Dev	Standard deviation of STAFF SA voltage (5V)
STA_SC_M9V_Average	Average STAFF SC voltage (-9V)
STA_SC_M9V_Std_Dev	Standard deviation of STAFF SC voltage (-9V)
STA_SC_M6V_Average	Average STAFF SC voltage (-6V)
STA_SC_M6V_Std_Dev	Standard deviation of STAFF SC voltage (-6V)
STA_SC_9V_Average	Average STAFF SC voltage (9V)
STA_SC_9V_Std_Dev	Standard deviation of STAFF SC voltage (9V)
STA_SC_6V_Average	Average STAFF SC voltage (6V)
STA_SC_6V_Std_Dev	Standard deviation of STAFF SC voltage (6V)
WBD_6V_Average	Average Wideband voltage (6V)
WBD_6V_Std_Dev	Standard deviation of Wideband voltage (6V)

6.3.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.3.7.1 Dataset

```
!
! ============================================================
! Include file .. C1_CH_DWP_LOG_V1.ceh
!    Created .... 2024-05-02 20:01:40
!    Code ....... make_headers V1.0
!    Src file ... log_cp_header.txt (2022-03-07 14:30:48)
! ============================================================
!
! ============================================================
! Dataset level metadata
```

```
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CP_DWP_LOG"
END_META   = DATASET_ID
!
START_META = DATASET_VERSION
     ENTRY = "1"
END_META   = DATASET_VERSION
!
START_META = DATASET_TITLE
     ENTRY = "WEC Log information"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "The DWP LOG data set provides a summary of the operations "
     ENTRY = "of WEC, as recorded in the WEC HK RDM files. There is one "
     ENTRY = "record per telemetry acquisition interval, which "
     ENTRY = "corresponds to the operation of one particular WEC mode. "
     ENTRY = "This data set provides information regarding instrument "
     ENTRY = "configuration commands, analogue HK data (temperatures, "
     ENTRY = "voltages, and currents), details of WEC interrupts, "
     ENTRY = "instrument error flags, and telemetry allocations. For "
     ENTRY = "further details, the user is referred to the DWP User "
     ENTRY = "Manual, available from CSA, which contains a complete "
     ENTRY = "description of all parameters within the data set as well "
     ENTRY = "as a list of the general caveats that apply to this data set."
END_META   = DATASET_DESCRIPTION
!
START_META = DATASET_CAVEATS
     ENTRY = "See User Guide for general caveat information."
     ENTRY = "*C1_CQ_DWP_LOG"
END_META   = DATASET_CAVEATS
!
START_META = DATA_TYPE
     ENTRY = "CP>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = TIME_RESOLUTION
     ENTRY = 10000
END_META   = TIME_RESOLUTION
!
START_META = MIN_TIME_RESOLUTION
     ENTRY = 1e6
END_META   = MIN_TIME_RESOLUTION
!
START_META = MAX_TIME_RESOLUTION
```

```
     ENTRY = 10
END_META    = MAX_TIME_RESOLUTION
!
START_META = PROCESSING_LEVEL
     ENTRY = "Calibrated"
END_META    = PROCESSING_LEVEL
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META    = ACKNOWLEDGEMENT
!
```

6.3.7.2 File

```
!
START_META = FILE_TYPE
     ENTRY = "cef"
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META    = METADATA_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Instrument_Status"
END_META    = DATASET_TYPE
!
```

6.3.7.3 Parameter

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
! ============================================================
!
START_VARIABLE = Time_Interval__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Time Interval"
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
```

```
          VALUE_TYPE = ISO_TIME_RANGE
  SIGNIFICANT_DIGITS = 27
             FILLVAL = 9999-12-31T23:59:59/9999-12-31T23:59:59.999
            FIELDNAM = "Universal Time"
            LABLAXIS = "UT"
END_VARIABLE   = Time_Interval__C1_CP_DWP_LOG
!
!
START_VARIABLE = Format_Count__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Number of formats in interval "
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = 0
             QUALITY = 0
            FIELDNAM = "Number of formats in interval "
            SCALEMIN = 0
            SCALEMAX = 100000
            SCALETYP = "Linear"
            LABLAXIS = "Number of Formats"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = Format_Count__C1_CP_DWP_LOG
!
!
START_VARIABLE = Mode_Name__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WEC mode name"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "WEC mode name"
            LABLAXIS = "Mode Name"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = Mode_Name__C1_CP_DWP_LOG
!
!
START_VARIABLE = Mode_Desc__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WEC mode Description"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
```

```
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "WEC mode Description"
            LABLAXIS = "Mode Desc"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = Mode_Desc__C1_CP_DWP_LOG
!
!
START_VARIABLE = Clock_Freq__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WEC Master Clock Frequency"
               UNITS = "Hz"
       SI_CONVERSION = "1>Hz"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "WEC Master Clock Frequency"
            SCALEMIN = 900.00
            SCALEMAX = 900.03
            SCALETYP = "Linear"
            LABLAXIS = "Master Clock"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = Clock_Freq__C1_CP_DWP_LOG
!
!
START_VARIABLE = TM_Mode_Name__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Telemetry mode name"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Telemetry mode name"
            LABLAXIS = "TM Mode Name"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = TM_Mode_Name__C1_CP_DWP_LOG
!
!
START_VARIABLE = TM_Overflow__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WEC Telemetry Overflow"
```

```
                UNITS = "unitless"
         SI_CONVERSION = "1>unitless"
            VALUE_TYPE = FLOAT
    SIGNIFICANT_DIGITS = 8
               FILLVAL = -1e31
               QUALITY = 0
              FIELDNAM = "WEC Telemetry Overflow "
              SCALEMIN = 0.0
              SCALEMAX = 1.0e5
              SCALETYP = "Linear"
              LABLAXIS = "TM Overflow"
              DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = TM_Overflow__C1_CP_DWP_LOG
!
!
START_VARIABLE = AP_Overflow__C1_CP_DWP_LOG
        PARAMETER_TYPE = "Data"
                ENTITY = "Instrument"
              PROPERTY = "Status"
               CATDESC = "WEC Application Overflow"
                 UNITS = "unitless"
         SI_CONVERSION = "1>unitless"
            VALUE_TYPE = FLOAT
    SIGNIFICANT_DIGITS = 8
               FILLVAL = -1e31
               QUALITY = 0
              FIELDNAM = "WEC Application Overflow "
              SCALEMIN = 0.0
              SCALEMAX = 1.0e5
              SCALETYP = "Linear"
              LABLAXIS = "AP Overflow"
              DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = AP_Overflow__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_MODEL_TAG__C1_CP_DWP_LOG
        PARAMETER_TYPE = "Data"
                ENTITY = "Instrument"
              PROPERTY = "Status"
               CATDESC = "DWP Model Tag"
            VALUE_TYPE = CHAR
    SIGNIFICANT_DIGITS = 10
               FILLVAL = "****"
               QUALITY = 0
                 UNITS = "unitless"
         SI_CONVERSION = "1>unitless"
              FIELDNAM = "DWP Model Tag "
              LABLAXIS = "Model Tag"
              DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = DWP_MODEL_TAG__C1_CP_DWP_LOG
!
!
```

```
START_VARIABLE = LOG_EVENT__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Event causing this log entry"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Event causing this log entry "
            LABLAXIS = "Event"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = LOG_EVENT__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_CONFIG_0__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "DWP configuration, processor 0"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "DWP configuration, processor 0"
            LABLAXIS = "Config"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_CONFIG_0__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_CONFIG_1__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "DWP configuration, processor 1"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "DWP configuration, processor 1"
            LABLAXIS = "Config"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_CONFIG_1__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_CONFIG_2__C1_CP_DWP_LOG
```

```
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "DWP configuration, processor 2"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "DWP configuration, processor 2"
            LABLAXIS = "Config"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_CONFIG_2__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_SEU_count__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Number of DWP single event upsets"
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = 0
             QUALITY = 0
            FIELDNAM = "Number of DWP single event upsets"
            SCALEMIN = 0
            SCALEMAX = 100000
            SCALETYP = "Linear"
            LABLAXIS = "Number of upsets"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_SEU_count__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_Chk_Sum__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Checksum of DWP memory at the end of interval"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 6
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Checksum of DWP memory at the end of interval"
            LABLAXIS = "DWP Check Sum"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_Chk_Sum__C1_CP_DWP_LOG
!
```

```
!
START_VARIABLE = STA_SA_Zero_Count__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average number of STAFF SA zeros"
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = 0
             QUALITY = 0
            FIELDNAM = "Average number of STAFF SA zeros"
            SCALEMIN = 0
            SCALEMAX = 1000
            SCALETYP = "Linear"
            LABLAXIS = "Number of Zeros"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_Zero_Count__C1_CP_DWP_LOG
!
!
START_VARIABLE = COR_OUTPUT_MODE__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Correlator output mode"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Correlator output mode"
            LABLAXIS = "Output Mode"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = COR_OUTPUT_MODE__C1_CP_DWP_LOG
!
!
START_VARIABLE = COR_SWEEP_MODE__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Correlator sweep mode"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Correlator sweep mode"
            LABLAXIS = "Output Mode"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
```

```
END_VARIABLE    = COR_SWEEP_MODE__C1_CP_DWP_LOG
!
!
START_VARIABLE = COR_FIX_LEVEL__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
             PROPERTY = "Status"
              CATDESC = "Correlator fixed energy level"
                UNITS = "unitless"
        SI_CONVERSION = "1>unitless"
           VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 2
              FILLVAL = 0
              QUALITY = 0
             FIELDNAM = "Correlator fixed energy level"
             SCALEMIN = 0
             SCALEMAX = 15
             SCALETYP = "Linear"
             LABLAXIS = "Fixed Level"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = COR_FIX_LEVEL__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_error_count__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
             PROPERTY = "Status"
              CATDESC = "Number of DWP errors reported "
                UNITS = "unitless"
        SI_CONVERSION = "1>unitless"
           VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 6
              FILLVAL = 0
              QUALITY = 0
             FIELDNAM = "Number of DWP errors reported "
             SCALEMIN = 0
             SCALEMAX = 100000
             SCALETYP = "Linear"
             LABLAXIS = "Number of Errors"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = DWP_error_count__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_error_count__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
               ENTITY = "Instrument"
             PROPERTY = "Status"
              CATDESC = "Number of STA_SA errors reported "
                UNITS = "unitless"
        SI_CONVERSION = "1>unitless"
           VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 6
```

```
              FILLVAL = 0
              QUALITY = 0
             FIELDNAM = "Number of STA_SA errors reported "
             SCALEMIN = 0
             SCALEMAX = 100000
             SCALETYP = "Linear"
             LABLAXIS = "Number of Errors"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_error_count__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_error_count__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Number of STA_SC errors reported "
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 6
              FILLVAL = 0
              QUALITY = 0
             FIELDNAM = "Number of STA_SC errors reported "
             SCALEMIN = 0
             SCALEMAX = 100000
             SCALETYP = "Linear"
             LABLAXIS = "Number of Errors"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_error_count__C1_CP_DWP_LOG
!
!
START_VARIABLE = WHI_error_count__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Number of WHI errors reported "
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
          VALUE_TYPE = INT
  SIGNIFICANT_DIGITS = 6
              FILLVAL = 0
              QUALITY = 0
             FIELDNAM = "Number of WHI errors reported "
             SCALEMIN = 0
             SCALEMAX = 100000
             SCALETYP = "Linear"
             LABLAXIS = "Number of Errors"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WHI_error_count__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_Mode_Passive__C1_CP_DWP_LOG
```

```
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "STAFF SA mode in passive part of cycle"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "STAFF SA mode in passive part of cycle"
            LABLAXIS = "SA mode passive"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_Mode_Passive__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_Mode_Active__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "STAFF SA mode in Active part of cycle"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "STAFF SA mode in Active part of cycle"
            LABLAXIS = "SA mode active"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_Mode_Active__C1_CP_DWP_LOG
!
!
START_VARIABLE = WHI_Mode_Passive__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Whisper mode in passive part of cycle"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Whisper mode in passive part of cycle"
            LABLAXIS = "WHI mode passive"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WHI_Mode_Passive__C1_CP_DWP_LOG
!
!
START_VARIABLE = WHI_Mode_Active__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
```

```
                ENTITY = "Instrument"
              PROPERTY = "Status"
               CATDESC = "Whisper mode in Active part of cycle"
            VALUE_TYPE = CHAR
    SIGNIFICANT_DIGITS = 10
               FILLVAL = "****"
               QUALITY = 0
                 UNITS = "unitless"
         SI_CONVERSION = "1>unitless"
              FIELDNAM = "Whisper mode in Active part of cycle"
              LABLAXIS = "WHI mode active"
              DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = WHI_Mode_Active__C1_CP_DWP_LOG
!
!
START_VARIABLE = WBD_Mode_1__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
                ENTITY = "Instrument"
              PROPERTY = "Status"
               CATDESC = "Wideband mode in first part of cycle"
            VALUE_TYPE = CHAR
    SIGNIFICANT_DIGITS = 10
               FILLVAL = "****"
               QUALITY = 0
                 UNITS = "unitless"
         SI_CONVERSION = "1>unitless"
              FIELDNAM = "Wideband mode in first part of cycle"
              LABLAXIS = "WBD mode 1"
              DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = WBD_Mode_1__C1_CP_DWP_LOG
!
!
START_VARIABLE = WBD_Mode_2__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
                ENTITY = "Instrument"
              PROPERTY = "Status"
               CATDESC = "Wideband mode in second part of cycle"
            VALUE_TYPE = CHAR
    SIGNIFICANT_DIGITS = 10
               FILLVAL = "****"
               QUALITY = 0
                 UNITS = "unitless"
         SI_CONVERSION = "1>unitless"
              FIELDNAM = "Wideband mode in second part of cycle"
              LABLAXIS = "WBD mode 2"
              DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE    = WBD_Mode_2__C1_CP_DWP_LOG
!
!
START_VARIABLE = WBD_Mode_3__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
                ENTITY = "Instrument"
```

```
            PROPERTY = "Status"
             CATDESC = "Wideband mode in third part of cycle"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 10
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Wideband mode in third part of cycle"
            LABLAXIS = "WBD mode 3"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WBD_Mode_3__C1_CP_DWP_LOG
!
!
START_VARIABLE = WEC_Current_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average WEC current"
               UNITS = "mA"
       SI_CONVERSION = "0.001>A"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average WEC current "
            SCALEMIN = 0.0
            SCALEMAX = 720.0
            SCALETYP = "Linear"
            LABLAXIS = "WEC current"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WEC_Current_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = WEC_Current_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation of WEC current"
               UNITS = "mA"
       SI_CONVERSION = "0.001>A"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation of WEC current"
            SCALEMIN = 0.0
            SCALEMAX = 100.0
            SCALETYP = "Linear"
            LABLAXIS = "WEC current (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WEC_Current_Std_Dev__C1_CP_DWP_LOG
```

```
!
!
START_VARIABLE = DWP_5V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average DWP Voltage (5V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average DWP Voltage (5V)"
            SCALEMIN = 4.5
            SCALEMAX = 5.5
            SCALETYP = "Linear"
            LABLAXIS = "DWP 5V"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_5V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_5V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation DWP Voltage (5V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation DWP Voltage (5V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
            SCALETYP = "Linear"
            LABLAXIS = "DWP 5V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_5V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_6V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SA Voltage (6V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
```

```
             QUALITY = 0
            FIELDNAM = "Average STA_SA Voltage (6V)"
            SCALEMIN = 5.5
            SCALEMAX = 6.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SA 6V"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_6V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_6V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation STA_SA Voltage (6V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation STA_SA Voltage (6V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SA 6V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_6V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_M6V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SA Voltage (-6V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average STA_SA Voltage (-6V)"
            SCALEMIN = -6.5
            SCALEMAX = -5.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SA -6V"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_M6V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_M6V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
```

```
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation STA_SA Voltage (-6V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation STA_SA Voltage (-6V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SA -6V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_M6V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_5V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SA Voltage (5.5V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average STA_SA Voltage (5.5V)"
            SCALEMIN = 5.0
            SCALEMAX = 6.0
            SCALETYP = "Linear"
            LABLAXIS = "STA_SA 5V"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_5V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_5V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation STA_SA Voltage (5.5V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation STA_SA Voltage (5.5V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
```

```
            SCALETYP = "Linear"
            LABLAXIS = "STA_SA 5V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_5V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_M9V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SC Voltage (-9V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average STA_SC Voltage (-9V)"
            SCALEMIN = -9.5
            SCALEMAX = -8.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SC M9V"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_M9V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_M9V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation STA_SC Voltage (-9V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation STA_SC Voltage (-9V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SC M9V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_M9V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_M6V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SC Voltage (-5.75V)"
               UNITS = "V"
```

```
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
              FILLVAL = -1e31
              QUALITY = 0
             FIELDNAM = "Average STA_SC Voltage (-5.75V)"
             SCALEMIN = -6.25
             SCALEMAX = -5.25
             SCALETYP = "Linear"
             LABLAXIS = "STA_SC M6V"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_M6V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_M6V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation STA_SC Voltage (-5.75V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
              FILLVAL = -1e31
              QUALITY = 0
             FIELDNAM = "Standard Deviation STA_SC Voltage (-5.75V)"
             SCALEMIN = 0.0
             SCALEMAX = 0.5
             SCALETYP = "Linear"
             LABLAXIS = "STA_SC M6V (std. dev.)"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_M6V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_9V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SC Voltage (9V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
              QUALITY = 0
              FILLVAL = -1e31
             FIELDNAM = "Average STA_SC Voltage (9V)"
             SCALEMIN = 8.5
             SCALEMAX = 9.5
             SCALETYP = "Linear"
             LABLAXIS = "STA_SC 9V"
             DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_9V_Average__C1_CP_DWP_LOG
```

```
!
!
START_VARIABLE = STA_SC_9V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation STA_SC Voltage (9V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation STA_SC Voltage (9V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SC 9V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_9V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_6V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SC Voltage (5.75V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average STA_SC Voltage (5.75V)"
            SCALEMIN = 5.25
            SCALEMAX = 6.25
            SCALETYP = "Linear"
            LABLAXIS = "STA_SC 6V"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_6V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_6V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation STA_SC Voltage (5.75V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
```

```
             QUALITY = 0
            FIELDNAM = "Standard Deviation STA_SC Voltage (5.75V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
            SCALETYP = "Linear"
            LABLAXIS = "STA_SC 6V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_6V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = WBD_6V_Average__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average WBD Voltage (6V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average WBD Voltage (6V)"
            SCALEMIN = 5.5
            SCALEMAX = 6.5
            SCALETYP = "Linear"
            LABLAXIS = "WBD 6V"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WBD_6V_Average__C1_CP_DWP_LOG
!
!
START_VARIABLE = WBD_6V_Std_Dev__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Standard Deviation WBD Voltage (6V)"
               UNITS = "V"
       SI_CONVERSION = "1>V"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Standard Deviation WBD Voltage (6V)"
            SCALEMIN = 0.0
            SCALEMAX = 0.5
            SCALETYP = "Linear"
            LABLAXIS = "WBD 6V (std. dev.)"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WBD_6V_Std_Dev__C1_CP_DWP_LOG
!
!
START_VARIABLE = DWP_Temperature__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
```

```
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average DWP Temperature"
               UNITS = "deg C"
       SI_CONVERSION = "1>Celsius"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average DWP Temperature "
            SCALEMIN = -20
            SCALEMAX = 50
            SCALETYP = "Linear"
            LABLAXIS = "DWP Temperature"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = DWP_Temperature__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_Temperature__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SA Temperature"
               UNITS = "deg C"
       SI_CONVERSION = "1>Celsius"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average STA_SA Temperature "
            SCALEMIN = -20
            SCALEMAX = 50
            SCALETYP = "Linear"
            LABLAXIS = "STA_SA Temperature"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_Temperature__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SC_Temperature__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average STA_SC Temperature"
               UNITS = "deg C"
       SI_CONVERSION = "1>Celsius"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average STA_SC Temperature "
            SCALEMIN = -20
            SCALEMAX = 50
```

```
            SCALETYP = "Linear"
            LABLAXIS = "STA_SC Temperature"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_Temperature__C1_CP_DWP_LOG
!
!
START_VARIABLE = WHI_Temperature__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average WHI Temperature"
               UNITS = "deg C"
       SI_CONVERSION = "1>Celsius"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average WHI Temperature "
            SCALEMIN = -20
            SCALEMAX = 50
            SCALETYP = "Linear"
            LABLAXIS = "WHI Temperature"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WHI_Temperature__C1_CP_DWP_LOG
!
!
START_VARIABLE = WBD_Temperature__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Average WBD Temperature"
               UNITS = "deg C"
       SI_CONVERSION = "1>Celsius"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 6
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Average WBD Temperature"
            SCALEMIN = -20
            SCALEMAX = 50
            SCALETYP = "Linear"
            LABLAXIS = "WBD Temperature"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WBD_Temperature__C1_CP_DWP_LOG
!
!
START_VARIABLE = WEC_TM_Rate__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WEC Telemetry Rate"
               UNITS = "bps"
```

```
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "WEC Telemetry Rate "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "WEC TM Rate"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WEC_TM_Rate__C1_CP_DWP_LOG
!
!
START_VARIABLE = EFW_TM_Rate__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "EFW Telemetry Rate"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "EFW Telemetry Rate "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "EFW TM Rate"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = EFW_TM_Rate__C1_CP_DWP_LOG
!
!
START_VARIABLE = STA_SA_TM_Rate__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "STA_SA Telemetry Rate"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "STA_SA Telemetry Rate "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "SA TM Rate"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SA_TM_Rate__C1_CP_DWP_LOG
```

```
!
!
START_VARIABLE = STA_SC_TM_Rate__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "STA_SC Telemetry Rate"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "STA_SC Telemetry Rate "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "SC TM Rate"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = STA_SC_TM_Rate__C1_CP_DWP_LOG
!
!
START_VARIABLE = WHI_TM_Rate__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WHI Telemetry Rate"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "WHI Telemetry Rate "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "WHI TM Rate"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WHI_TM_Rate__C1_CP_DWP_LOG
!
!
START_VARIABLE = WBD_TM_Rate__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WBD Telemetry Rate (BM2)"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
```

```
             QUALITY = 0
            FIELDNAM = "WBD Telemetry Rate (BM2)"
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "WBD TM Rate"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = WBD_TM_Rate__C1_CP_DWP_LOG
!
!
START_VARIABLE = COR_TM_Rate__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Correlator Telemetry Rate"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "Correlator Telemetry Rate "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "COR TM Rate"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = COR_TM_Rate__C1_CP_DWP_LOG
!
!
START_VARIABLE = TM_Unused__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WEC Telemetry Unused"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "WEC Telemetry Unused "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "TM Unused"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = TM_Unused__C1_CP_DWP_LOG
!
!
START_VARIABLE = TM_Overhead__C1_CP_DWP_LOG
      PARAMETER_TYPE = "Data"
```

```
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "WEC Telemetry Overhead"
               UNITS = "bps"
       SI_CONVERSION = "1>s^-1"
          VALUE_TYPE = FLOAT
  SIGNIFICANT_DIGITS = 8
             FILLVAL = -1e31
             QUALITY = 0
            FIELDNAM = "WEC Telemetry Overhead "
            SCALEMIN = 0.0
            SCALEMAX = 1.0e5
            SCALETYP = "Linear"
            LABLAXIS = "TM Overhead"
            DEPEND_0 = Time_Interval__C1_CP_DWP_LOG
END_VARIABLE   = TM_Overhead__C1_CP_DWP_LOG
!
```

6.4 UT time tagged PIOR files

6.4.1 Formats

The PIOR files CM_CP_DWP_UT_PIOR will be formatted as CEF files.

6.4.2 Standards

The CEF files will conform to the standards defined in "Cluster Exchange File syntax" (DS-QMW-TN-0010) and the "CAA metadata dictionary" (CAA-MDD-0001).

6.4.3 Production procedures

During the preparation of the WEC commanding, the PIOR files released by JSOC are routinely reformatted as a set of time-tagged commands. A software tool has been written to scan these files in order to determine the time span and then copy the data to files named CL_CP_DWP_UT_PIOR__yyyymmdd_Vnn.cef where yyyymmdd is the start date of the planning period (taken from the time tag of the AA_ event), and nn is the version number of the import to the archive (not the original PIOR version number). The same tool also writes the CEF metadata header to the file. There is one file per planning period, containing the planning information for all satellites.

6.4.4 Quality control procedures

The commands in the existing files have already been verified by EFW, Whisper, Wideband and DWP teams during PIOR revision. The file naming tool will include simple checks that the files processed have the expected format and are complete.

6.4.5 Delivery procedures

The data files will be written to a TAR archive file, compressed using GZIP, nad delivered to CAA using SCP.

6.4.6 Product specification

This data set is created from the WEC PIOR commanding files reformatted sucg that each record contains a UT timetag. Each file covers one planning period (approximately one week). The UT PIOR

files contain the series of UT time tagged commands that were used to control and operate WEC during the specified planning period. The parameters contained in the UT_PIOR data sets are listed in Table 4.

Table 4: Parameters contained in the UT_PIOR data set.

Parameter	Description
Time	Time tag for event/command
Tag	Type of entry
Mask	Spacecraft number to which the entry applies
Label	Acquisition interval tag
Content	Command macro/event/comment etc

6.4.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.4.7.1 Dataset

```
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "CM_CP_DWP_UT_PIOR"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CP>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "UT time-stamped PIOR"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "The DWP UT_PIOR data set contains listings of the command "
     ENTRY = "sequences and parameters sent to the Cluster satellites in "
     ENTRY = "order to configure and operate the WEC instruments. These "
     ENTRY = "data files are derived from the actual commanding request "
     ENTRY = "sent to JSOC/ESOC. In addition, the spacecraft events such "
     ENTRY = "as magnetopause/bow shock crossings, perigee/apogee, etc "
     ENTRY = "used within the planning cycle."
     ENTRY = "Each record consists of,"
     ENTRY = " - time - Time tag for event/command"
     ENTRY = " - tag - Type of entry"
     ENTRY = "         EVT - event eg boundary crossing etc."
     ENTRY = "         ORS - Start of acquisition interval"
     ENTRY = "         ORE - End of acquisition interval"
     ENTRY = "         REM - COmment added during revision"
```

```
      ENTRY = "         SEQ - Operational command sequence used"
      ENTRY = " - spacecraft mask - spacecraft number to which entry applies"
      ENTRY = " - label - Acquisition interval tag "
      ENTRY = " - content - Command macro/event/comment etc."
      ENTRY = "For further details, the user is referred to the DWP "
      ENTRY = "User Manual which contains a complete description of these "
      ENTRY = "parameters lists the general caveats that apply to this "
      ENTRY = "data set."
END_META    = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
      ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
      ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
END_META    = CONTACT_COORDINATES
!
START_META = TIME_RESOLUTION
      ENTRY = 480
END_META    = TIME_RESOLUTION
!
START_META = MIN_TIME_RESOLUTION
      ENTRY = 108000
END_META    = MIN_TIME_RESOLUTION
!
START_META = MAX_TIME_RESOLUTION
      ENTRY = 0
END_META    = MAX_TIME_RESOLUTION
!
START_META = PROCESSING_LEVEL
      ENTRY = "Calibrated"
END_META    = PROCESSING_LEVEL
!
START_META = DATASET_CAVEATS
      ENTRY = "See User Guide for general caveat information."
      ENTRY = "*CM_CQ_DWP_UT_PIOR"
END_META    = DATASET_CAVEATS
!
START_META = ACKNOWLEDGEMENT
      ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
      ENTRY = "publication based upon use of this data."
      ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META    = ACKNOWLEDGEMENT
!
START_META = DATASET_VERSION
      ENTRY = "1"
END_META    = DATASET_VERSION
!
START_META = FILE_TYPE
      ENTRY = "cef"
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
      ENTRY = "CAA"
```

```
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META    = METADATA_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Instrument_Status"
END_META    = DATASET_TYPE
!
```

6.4.7.2 File

```
START_META = LOGICAL_FILE_ID
 ENTRY = CM_CP_DWP_UT_PIOR__20081228_V80
END_META    = LOGICAL_FILE_ID

START_META = VERSION_NUMBER
 ENTRY = "1"
END_META    = VERSION_NUMBER

START_META = FILE_TIME_SPAN
 VALUE_TYPE = ISO_TIME_RANGE
 ENTRY = 2008-12-28T07:13:00Z/2009-01-04T10:30:00Z
END_META    = FILE_TIME_SPAN

START_META = GENERATION_DATE
 VALUE_TYPE = ISO_TIME
 ENTRY = 2008-12-18T13:27:00Z
END_META    = GENERATION_DATE

START_META = FILE_CAVEATS
 ENTRY = "CEF written by PROCESS_PIOR V1.2 (based on PIORDEV V1.0 KHY, process_pior V1.1 IB)"
 ENTRY = "Source file wec_450_03_03.txt"
 ENTRY = "Source generated with 450_03.pet"
 ENTRY = "Source generated with wec_450_03_03.pior"
 ENTRY = "Source generated with pea_450_03_02.pior"
END_META    = FILE_CAVEATS
```

6.4.7.3 Parameter

The UT PIOR files contain the following paramaters:

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
! ============================================================
```

```
!
START_VARIABLE = Time__CM_CP_DWP_UT_PIOR
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Interval centred time tag"
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
          VALUE_TYPE = ISO_TIME
  SIGNIFICANT_DIGITS = 27
             FILLVAL = 9999-12-31T23:59:59Z
            FIELDNAM = "Universal Time"
            LABLAXIS = "UT"
          DELTA_PLUS = 0
         DELTA_MINUS = 0
END_VARIABLE   = Time__CM_CP_DWP_UT_PIOR
!
!
START_VARIABLE = Tag__CM_CP_DWP_UT_PIOR
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Tag"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 3
             FILLVAL = "***"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Tag"
            LABLAXIS = "Tag"
            DEPEND_0 = Time__CM_CP_DWP_UT_PIOR
END_VARIABLE   = Tag__CM_CP_DWP_UT_PIOR
!
!
START_VARIABLE = Mask__CM_CP_DWP_UT_PIOR
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Spacecraft Mask"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 4
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Spacecraft Mask"
            LABLAXIS = "Mask"
            DEPEND_0 = Time__CM_CP_DWP_UT_PIOR
END_VARIABLE   = Mask__CM_CP_DWP_UT_PIOR
!
!
START_VARIABLE = Label__CM_CP_DWP_UT_PIOR
```

```
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Label"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 12
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Label"
            LABLAXIS = "Label"
            DEPEND_0 = Time__CM_CP_DWP_UT_PIOR
END_VARIABLE   = Label__CM_CP_DWP_UT_PIOR
!
!
START_VARIABLE = Content__CM_CP_DWP_UT_PIOR
      PARAMETER_TYPE = "Data"
              ENTITY = "Instrument"
            PROPERTY = "Status"
             CATDESC = "Content"
          VALUE_TYPE = CHAR
  SIGNIFICANT_DIGITS = 256
             FILLVAL = "****"
             QUALITY = 0
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            FIELDNAM = "Content"
            LABLAXIS = "Content"
            DEPEND_0 = Time__CM_CP_DWP_UT_PIOR
END_VARIABLE   = Content__CM_CP_DWP_UT_PIOR
!
```

6.5 CSDS Prime Parameter

6.5.1 Formats

The CAA CSDS prime parameter files Cn_PP_DWP are extracted from the CSDS prime parameter stored at the UK Cluster Data Centre in CDF format.

6.5.2 Standards

The CSDS summary parameter files conform to the standard adopted by the Cluster mission. The CEF files will conform to the standards defined in “Cluster Exchange File syntax” (DS-QMW-TN-0010) and the “CAA metadata dictionary” (CAA-MDD-0001).

6.5.3 Production procedures

The CSDS prime parameter data sets are generated automatically by UK-CDC using software supplied by the PI group.

6.5.4 Quality control procedures

Before December 1st, 2008 the contents of each CDF file were inspected and validated by the DWP PI group prior to ingestion into the Cluster Data System. After this date, files are no longer validated by the DWP team.

6.5.5 Delivery procedures

The CDF files are downloaded and archived by CAA.

6.5.6 Product specification

The parameters Status_DWP, Status_Acf, Status_Heea, and Status_B contain one value per data word. The parameters status_wec and status_wbd should be interpreted in a bitwise fashion. Their interpretation is outlined in the DWP Users Guide.

Table 5: Contents of the DWP Prime parameter data files.

Parameter	Description
Time_tags	Centre time of data interval
Half_interval	Half of interval averaging length
Status_DWP	DWP status – 5 data words
	Status_DWP[0]– Reserved for CSDS use
	Status_DWP[1]– Indicates whether correlator is on or off
	Status_DWP[2] – Amplitude count from zero lag
	Status_DWP[3] – Significance test used
	Status_DWP[4] – Whisper sounding mode (if known)
Status_Acf	Correlator status – 4 data words
	Status_Acf[0] – Use of preselected of stepped energy bin
	Status_Acf[1] – Correlator bit rate
	Status_Acf[2] – Number of ACFs summed
	Status_Acf[3] – Amplitude of zero lag
Status_Heea	Status of PEACE HEEA sensor – 4 data words
	Status_Heea[0] – Availability of calibration
	Status_Heea[1] – Energy sweeps per spin
	Status_Heea[2] – PEACE HEEA preset energy level
	Status_Heea[3] – Total PEACE HEEA electron counts
Status_Heea	Status of PEACE HEEA sensor – 4 data words
	Status_Heea[0] – Availability of calibration
	Status_Heea[1] – Energy sweeps per spin
	Status_Heea[2] – PEACE HEEA preset energy level
	Status_Heea[3] – Total PEACE HEEA electron counts
Status_B	Magnetic field direction – 4 data words
	Status_B[0] – HEEA polar zone from which correlator data is taken
	Status_B[1] – HEEA polar zone containing magnetic field
	Status_B[2]– Azimuthal offset of magnetic field
	Status_B[3] – Source of magnetic field data
State_wec	Status of WEC instruments (from WEC housekeeping data) – 5 data words
	State_wec[0] – EFW parameters
	State_wec[1] – STAFF parameters
	State_wec[2] – WHISPER parameters
	State_wec[3] – DWP parameters
	State_wec[4] – WBD parameters

Status_wbd	Details regarding the setup of the WEC WBD instrument – 4 data words **Status_wbd[0]** – For CSDS use **Status_wbd[1]** – WBD parameters **Status_wbd[2]** – WBD parameters **Status_wbd [3]** – WBD parameters
Correl_signif	Percentage significance of any sinusoidal oscillation measured on ACF
Correl_freq	Frequency of sinusoidal oscillation
Correl_P	Energy of particles
CorrelCrEst	Estimation of count rate from zero lag values
Correl_Ivar	Index of variation in the electron count rate

Note: The parameters Correl_signif, Correl_freq, Correl_P, CorrelCrEst, and Correl_Ivar may refer to either the FX or ST data set (see the parameter **Status_Acf[0]**).

6.5.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.5.7.1 Dataset

```
START_META = DATASET_TITLE
 ENTRY = "Electron Plasma Parameters, spin resolution"
END_META   = DATASET_TITLE
START_META = DATASET_DESCRIPTION
 ENTRY = "This dataset contains preliminary spin resolution measurements of electron"
 ENTRY = "plasma parameters from the DWP experiment on the Cluster C1 spacecraft."
 ENTRY = "These data have been converted into Cluster Exchange Format from the original"
 ENTRY = "Cluster Science Data System Common Data Format (CDF) Prime Parameter files"
 ENTRY = "that were made available through the Cluster Science Data System."
 ENTRY = "The metadata has been updated from the CSDS/CDF standard to the CAA to aid"
 ENTRY = "compatibility with tools developed for the Cluster Active Archive."
 ENTRY = " "
 ENTRY = "Version 01 of this dataset is the initial translation prepared for the "
 ENTRY = "launch of the CAA during the second half of 2005."
END_META   = DATASET_DESCRIPTION

START_META = CONTACT_COORDINATES
 ENTRY = â€œM. Balikhin>PI>m.balikhin@sheffield.ac.uk"
END_META   = CONTACT_COORDINATES

START_META = TIME_RESOLUTION
 ENTRY = 4
END_META   = TIME_RESOLUTION

START_META = MIN_TIME_RESOLUTION
 ENTRY = 4.412
END_META   = MIN_TIME_RESOLUTION

START_META = MAX_TIME_RESOLUTION
 ENTRY = 3.636
END_META   = MAX_TIME_RESOLUTION
```

```
START_META = PROCESSING_LEVEL
 ENTRY = "Calibrated"
END_META   = PROCESSING_LEVEL

START_META = ACKNOWLEDGEMENT
 ENTRY = "Please acknowledge the DWP team and ESA Cluster Active Archive in any publication based up
END_META   = ACKNOWLEDGEMENT

START_META = DATASET_CAVEATS
 ENTRY = "*C1_CQ_DWP_CAVF"
END_META   = DATASET_CAVEATS

START_META = DATASET_VERSION
 ENTRY = "01"
END_META   = DATASET_VERSION

START_META = FILE_TYPE
 ENTRY = "cef"
END_META   = FILE_TYPE

START_META = METADATA_TYPE
 ENTRY = "CAA"
END_META   = METADATA_TYPE

START_META = METADATA_VERSION
 ENTRY = "2.0"
END_META   = METADATA_VERSION
```

6.5.7.2 File

```
START_META = LOGICAL_FILE_ID
  ENTRY      = "C3_PP_DWP__20020101_000000_20020102_000000_V061215"
END_META   = LOGICAL_FILE_ID

START_META = VERSION_NUMBER
  ENTRY      = 061215
END_META   = VERSION_NUMBER

START_META = DATASET_VERSION
 ENTRY = "Merged file, the dataset version for each segment follows:"
 ENTRY = "2002-01-01T00:00:01Z/2002-01-01T23:59:57Z,
C3_PP_DWP_20020101_V01"
 ENTRY = "  01"
END_META = DATASET_VERSION

START_META = FILE_CAVEATS
 ENTRY = "CAA Merged File - $Id: cefmerge.c,v 1.23 2008/08/06 14:56:43 cperry Exp cperry $"
 ENTRY = "The file caveats for each segment follows:-"
 ENTRY = "2002-01-01T00:00:01Z/2002-01-01T23:59:57Z ,
C3_PP_DWP_20020101_V01"
```

```
 ENTRY = "  PROJECT: STSP Cluster>Solar Terrestrial Science Programme, Cluster"
 ENTRY = "  DISCIPLINE: Space Physics>Magnetospheric Science"
 ENTRY = "  VALIDITY: Validated - minor caveats"
 ENTRY = "  VALIDATOR: Simon Walker>University of
Sheffield>simon.walker@sheffield.ac.uk"
 ENTRY = "  CAVEATS: See CSDS User's Guide, DS-MPA-TN-0015, for post
processing caveats"
 ENTRY = "  CAVEATS: Refer to the PI or NDC for access to ongoing caveat information"
 ENTRY = "  CAVEATS: Use correlator data with caution"
 ENTRY = "  STATUS_KEY: Status[0]= 0 = Bad data "
 ENTRY = "  STATUS_KEY: Status[0]= 1 = Use with caution "
 ENTRY = "  STATUS_KEY: Status[0]= 2 = OK "
 ENTRY = "  STATUS_KEY: Status[0]= 255 = Not Supplied "
 ENTRY = "  SOURCE_NAME: C3>Cluster spacecraft 3"
 ENTRY = "  DATA_TYPE: PP>Prime Parameter"
 ENTRY = "  DESCRIPTOR: DWP>Digital Wave Processor"
 ENTRY = "  DATA_VERSION: 01"
 ENTRY = "  TITLE: Electron modulation significance>spin scan interval"
 ENTRY = "  TEXT: L. J. C. Woolliscroft et al, The Digital Wave-Processing
Experiment on Cluster"
 ENTRY = "  TEXT: Space Sci. Rev., 79,  pp 209 - 231, 1997)"
 ENTRY = "  MODS: Produced in accordance with CSDS file specification"
 ENTRY = "  MODS: Reference Document for CSDS CDF File Design,
DS-QMW-TN-0003"
 ENTRY = "  MODS: Operational version of UKCDHF Pipeline software"
 ENTRY = "  ADID_REF: ECLUDWP3"
 ENTRY = "  LOGICAL_FILE_ID: C3_PP_DWP_20020101_V01"
 ENTRY = "  LOGICAL_SOURCE: C3_PP_DWP"
 ENTRY = "  LOGICAL_SOURCE_DESCRIPTION: Cluster Spacecraft 3, DWP Prime
Parameters"
 ENTRY = "  MISSION_GROUP: Cluster"
 ENTRY = "  PI_NAME: H. Alleyne"
 ENTRY = "  PI_AFFILIATION: Univ-Sheff"
 ENTRY = "  ACKNOWLEDGEMENT: Refer to CSDS for rules of acknowledgement"
 ENTRY = "  GENERATED_BY: Generated by UK CDHF"
 ENTRY = "  GENERATION_DATE: 2002-01-22T14:08:21.000Z"
 ENTRY = "  INST_MODE:
C3>DWP>8806>2002-01-01T09:48:55.298000Z>DWP_WEC_BM3>Wec EFW dump"
 ENTRY = "  INST_MODE:
C3>DWP>8928>2002-01-01T09:57:04.656000Z>DWP_WEC_NBR_GEN_0>Wec general NBR"
 ENTRY = "  INST_MODE:
C3>DWP>21161>2002-01-01T23:35:04.842000Z>DWP_WEC_NBR_LR_0>Wec low recurrance"
 ENTRY = "  PARENTS: RDM>0112311A"
 ENTRY = "  PARENTS: RDM>0201011A"
 ENTRY = "  PARENTS: RDM>0201021A"
 ENTRY = "  RULES_OF_USE: Refer to CSDS for rules of use"
 ENTRY = "  SKELETON_VERSION: CSDS_CDF_V2.1"
 ENTRY = "  INST_SETTINGS: TO BE OVERWRITTEN"
 ENTRY = "  SOFTWARE_VERSION: QMW CDF-writing software, QIFF,  V1.28 [ 04/27/00 ]"
 ENTRY = "  SOFTWARE_VERSION: CDF version 2.6.6"
 ENTRY = "  SOFTWARE_VERSION: $Id: pm,v 0.3 1995/04/26 12:28:19 cdcdist Exp cdcdist $ "
 ENTRY = "  SOFTWARE_VERSION: $Id: pm_env.config,v 0.1 1995/01/18 12:30:49 cdcdist Exp $ "
```

```
 ENTRY = "  SOFTWARE_VERSION: $Id: pm_op.config,v 0.1 1995/01/18 12:31:39 cdcdist Exp cdcdist $ "
 ENTRY = "  SOFTWARE_VERSION: $Id: rda_merge.c,v 1.1 2000/09/21 13:14:39 ukdcops Exp ukdcops $"
 ENTRY = "  SOFTWARE_VERSION: $Id: rda_tlist.c,v 0.7 1995/05/11 16:24:37 cdcdist Exp $"
 ENTRY = "  SOFTWARE_VERSION: $Id: rda_slist.c,v 0.3 1995/01/18 13:51:28 cdcdist Exp $"
 ENTRY = "  SOFTWARE_VERSION: TED Package Version 2.4 Patch 3 Using TED Library Version 4.4 Patch 3
 ENTRY = "  VALIDATE: Compatible with the ISTP CDF Standards"
 ENTRY = "  SC_ENG_ID: FM7>?"
 ENTRY = "  Calib_software: drdwp3.3_20010110_StWec2.4"
 ENTRY = "  Calib_input: Macroslot-1995-01-01"
END_META = FILE_CAVEATS

START_META = FILE_TIME_SPAN
 VALUE_TYPE = ISO_TIME_RANGE
  ENTRY      = 2002-01-01T00:00:00.000Z/2002-01-02T00:00:00.000Z
END_META   = FILE_TIME_SPAN

START_META = GENERATION_DATE
 VALUE_TYPE = ISO_TIME
  ENTRY      = 2009-03-04T11:59:46Z
END_META   = GENERATION_DATE
```

6.5.7.3 Parameter

```
START_VARIABLE  =  time_tags__C1_PP_DWP
    PARAMETER_TYPE      = "Support_Data"
    CATDESC             = "Interval centred time tag"
    UNITS               = "s"
    SI_CONVERSION       = "1.0>s"
    SIZES               = 1
    VALUE_TYPE          = ISO_TIME
    SIGNIFICANT_DIGITS  = 24
    FILLVAL             = 9999-12-31T23:59:59Z
    FIELDNAM            = "Universal Time"
    LABLAXIS            = "UT"
    DELTA_PLUS          = half_interval__C1_PP_DWP
    DELTA_MINUS         = half_interval__C1_PP_DWP
END_VARIABLE    =  time_tags__C1_PP_DWP

START_VARIABLE  =  half_interval__C1_PP_DWP
    PARAMETER_TYPE      = "Support_Data"
    CATDESC             = "Half averaging interval length"
    UNITS               = "s"
    SI_CONVERSION       = "1.0>s"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = -1.0e28
    FIELDNAM            = "Half width of averaging interval"
    LABLAXIS            = "s"
END_VARIABLE    =  half_interval__C1_PP_DWP
```

```
START_VARIABLE = status_DWP__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, DWP Status"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 5
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, DWP Status"
    LABLAXIS            = "DWP Status"
    DEPEND_0            = time_tags__C1_PP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]", "Status[4]"
END_VARIABLE   = status_DWP__C1_PP_DWP

START_VARIABLE = status_Acf__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, DWP Status Acf"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, DWP Status Acf"
    LABLAXIS            = "ACF Status"
    DEPEND_0            = time_tags__C1_PP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
END_VARIABLE   = status_Acf__C1_PP_DWP

START_VARIABLE = status_Heea__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, DWP Status HEEA"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, DWP Status HEEA"
    LABLAXIS            = "HEEA Status"
    DEPEND_0            = time_tags__C1_PP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
```

```
END_VARIABLE    = status_Heea__C1_PP_DWP

START_VARIABLE = status_B__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, DWP Status B"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, DWP Status B"
    LABLAXIS            = "B Status"
    DEPEND_0            = time_tags__C1_PP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
END_VARIABLE    = status_B__C1_PP_DWP

START_VARIABLE = status_wec__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, WEC Status"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 5
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, WEC Status"
    LABLAXIS            = "WEC Status"
    DEPEND_0            = time_tags__C1_PP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]", "Status[4]"
END_VARIABLE    = status_wec__C1_PP_DWP

START_VARIABLE = status_wbd__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, WBD Status"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, WBD Status"
    LABLAXIS            = "WBD Status"
```

```
    DEPEND_0            = time_tags__C1_PP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
END_VARIABLE   = status_wbd__C1_PP_DWP

START_VARIABLE = Correl_signif__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Particles"
    PROPERTY            = "Magnitude"
    FLUCTUATIONS        = "Correlation"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Significance, spin
    UNITS               = "%"
    SI_CONVERSION       = "1.0>(%)"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 4
    FILLVAL             = -1.0e31
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Significance, spin
    LABLAXIS            = "Signif."
    DEPEND_0            = time_tags__C1_PP_DWP
END_VARIABLE   = Correl_signif__C1_PP_DWP

START_VARIABLE = Correl_P__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Particles"
    PROPERTY            = "Magnitude"
    FLUCTUATIONS        = "Correlation"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Energy Band, spin r
    UNITS               = "eV"
    SI_CONVERSION       = "1.602E-19>J"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 3
    FILLVAL             = -1.0e31
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Energy Band, spin r
    LABLAXIS            = "Energy"
    DEPEND_0            = time_tags__C1_PP_DWP
END_VARIABLE   = Correl_P__C1_PP_DWP

START_VARIABLE = Correl_freq__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Particles"
    PROPERTY            = "Magnitude"
    FLUCTUATIONS        = "Correlation"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Frequency Band, spi
    UNITS               = "kHz"
    SI_CONVERSION       = "1.0E3>Hz"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 3
    FILLVAL             = -1.0e31
```

```
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Frequency Band, spi
    LABLAXIS            = "Frequency"
    DEPEND_0            = time_tags__C1_PP_DWP
END_VARIABLE   = Correl_freq__C1_PP_DWP

START_VARIABLE = Correl_CRest__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Particles"
    PROPERTY            = "Magnitude"
    FLUCTUATIONS        = "Correlation"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Frequency Band, spi
    UNITS               = "counts"
    SI_CONVERSION       = "1>counts"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 4
    FILLVAL             = -1.0e31
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Frequency Band, spi
    LABLAXIS            = "CR est"
    DEPEND_0            = time_tags__C1_PP_DWP
END_VARIABLE   = Correl_CRest__C1_PP_DWP

START_VARIABLE = Correl_Ivar__C1_PP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Particles"
    PROPERTY            = "Magnitude"
    FLUCTUATIONS        = "Correlation"
    CATDESC             = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Frequency Band, spi
    UNITS               = "counts"
    SI_CONVERSION       = "1>counts"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 4
    FILLVAL             = -1.0e31
    QUALITY             = 2
    FIELDNAM            = "Preliminary (CSDS PP) Cluster C1, Particle Correlator Frequency Band, spi
    LABLAXIS            = "Ivar"
    DEPEND_0            = time_tags__C1_PP_DWP
END_VARIABLE   = Correl_freq__C1_PP_DWP
```

6.6 CSDS summary parameter

6.6.1 Formats

The CAA CSDS summary parameter files are extracted from the CSDS summary parameter data files stored at the UK Cluster Data Centre in CDF format.

6.6.2 Standards

The CSDS summary parameter files conform to the standard adopted by the Cluster mission. The CEF files will conform to the standards defined in “Cluster Exchange File syntax” (DS-QMW-TN-0010) and

the "CAA metadata dictionary" (CAA-MDD-0001).

6.6.3 Production procedures

The CSDS summary parameter data sets are generated automatically by UK-CDC using software supplied by the PI group.

6.6.4 Quality control procedures

Before December 1st, 2008 the contents of each CDF file were inspected and validated by the DWP PI group prior to ingestion into the Cluster Data System. After this date, files are no longer validated by the DWP team.

6.6.5 Delivery procedures

The CDF files are downloaded and archived by CAA.

6.6.6 Product specification

The contents of the CSDS summary parameter data set are shown in Table 6 The parameters Status_DWP, Status_Acf, Status_Heea, and Status_B contain one value per data word. The parameters status_wec and status_wbd should be interpreted in a bitwise fashion. Their interpretation is outlined in the DWP Users Guide.

Table 6: Data parameters contained in the CSDS summary parameter data set.

Parameter	Description
Time_tags	Centre time of data interval
Half_interval	Half of interval averaging length
Status_DWP	DWP status
Status_Acf	Correlator status
Status_Heea	Status of PEACE HEEA sensor
Status_B	Magnetic field direction
State_wec	Status of WEC instruments as recorded in the WEC housekeeping data files
Status_wbd	More details regarding the setup of the WEC WBD instrument
Correl_signif	Percentage significance of any sinusoidal oscillation measured on ACF

6.6.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.6.7.1 Dataset

```
START_META = DATASET_ID
 ENTRY = "CL_SP_DWP"
END_META   = DATASET_ID

START_META = DATA_TYPE
 ENTRY = "SP>CSDS_Summary_Parameter"
END_META   = DATA_TYPE

START_META = DATASET_TITLE
 ENTRY = "Electron Plasma Parameters, spin resolution"
```

```
END_META    = DATASET_TITLE

START_META = DATASET_DESCRIPTION
 ENTRY = "This dataset contains 1 minute averaged measurements of electron"
 ENTRY = "plasma parameters from the DWP experiment on the Cluster C1 spacecraft."
 ENTRY = "These data have been converted into Cluster Exchange Format from the orignal"
 ENTRY = "Cluster Science Data System Common Data Format (CDF) Prime Parameter files"
 ENTRY = "that were made available through the Cluster Science Data System."
 ENTRY = "The metadata has been updated from the CSDS/CDF standard to the CAA to aid"
 ENTRY = "compatibility with tools developed for the Cluster Active Archive."
 ENTRY = " "
 ENTRY = "Version 01 of this dataset is the initial translation prepared for the "
 ENTRY = "launch of the CAA during the second half of 2005."
END_META    = DATASET_DESCRIPTION

START_META = CONTACT_COORDINATES
 ENTRY = "M. Balikhin>PI>m.balikhin@sheffield.ac.uk"
END_META    = CONTACT_COORDINATES

START_META = TIME_RESOLUTION
 ENTRY = 60
END_META    = TIME_RESOLUTION

START_META = MIN_TIME_RESOLUTION
 ENTRY = 60.0
END_META    = MIN_TIME_RESOLUTION

START_META = MAX_TIME_RESOLUTION
 ENTRY = 60.0
END_META    = MAX_TIME_RESOLUTION

START_META = PROCESSING_LEVEL
 ENTRY = "Calibrated"
END_META    = PROCESSING_LEVEL

START_META = ACKNOWLEDGEMENT
 ENTRY = "Please acknowledge the DWP team and ESA Cluster Active Archive in any publication based up
END_META    = ACKNOWLEDGEMENT


START_META = DATASET_CAVEATS
 ENTRY = "*C3_CQ_DWP_CAVF"
END_META    = DATASET_CAVEATS
```

6.6.7.2 File

```
START_META = DATASET_VERSION
 ENTRY = "01"
END_META    = DATASET_VERSION
```

```
START_META = FILE_TYPE
 ENTRY = "cef"
END_META   = FILE_TYPE

START_META = METADATA_TYPE
 ENTRY = "CAA"
END_META   = METADATA_TYPE

START_META = METADATA_VERSION
 ENTRY = "2.0"
END_META   = METADATA_VERSION
```

6.6.7.3 Parameter

```
START_VARIABLE  =  time_tags__CL_SP_DWP
    PARAMETER_TYPE      = "Support_Data"
    CATDESC             = "Interval centred time tag"
    UNITS               = "s"
    SI_CONVERSION       = "1.0>s"
    SIZES               = 1
    VALUE_TYPE          = ISO_TIME
    SIGNIFICANT_DIGITS  = 24
    FILLVAL             = 9999-12-31T23:59:59Z
    FIELDNAM            = "Universal Time"
    LABLAXIS            = "UT"
    DELTA_PLUS          = half_interval__CL_SP_DWP
    DELTA_MINUS         = half_interval__CL_SP_DWP
END_VARIABLE    =  time_tags__CL_SP_DWP

START_VARIABLE  =  half_interval__CL_SP_DWP
    PARAMETER_TYPE      = "Support_Data"
    CATDESC             = "Half averaging interval length"
    UNITS               = "s"
    SI_CONVERSION       = "1.0>s"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = -1.0e28
    FIELDNAM            = "Half width of averaging interval"
    LABLAXIS            = "s"
    DATA                = 30.0
END_VARIABLE    =  half_interval__CL_SP_DWP

START_VARIABLE = status_DWP__CL_SP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Summary (CSDS SP) Cluster C1, DWP Status"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 5
```

```
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Summary (CSDS SP) Cluster C1, DWP Status"
    LABLAXIS            = "DWP Status"
    DEPEND_0            = time_tags__CL_SP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]", "Status[4]"
END_VARIABLE   = status_DWP__CL_SP_DWP

START_VARIABLE = status_Acf__CL_SP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Summary (CSDS SP) Cluster C1, DWP Status Acf"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Summary (CSDS SP) Cluster C1, DWP Status Acf"
    LABLAXIS            = "ACF Status"
    DEPEND_0            = time_tags__CL_SP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
END_VARIABLE   = status_Acf__CL_SP_DWP

START_VARIABLE = status_Heea__CL_SP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Summary (CSDS SP) Cluster C1, DWP Status HEEA"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Summary (CSDS SP) Cluster C1, DWP Status HEEA"
    LABLAXIS            = "HEEA Status"
    DEPEND_0            = time_tags__CL_SP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
END_VARIABLE   = status_Heea__CL_SP_DWP

START_VARIABLE = status_B__CL_SP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Summary (CSDS SP) Cluster C1, DWP Status B"
    UNITS               = "unitless"
```

```
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Summary (CSDS SP) Cluster C1, DWP Status B"
    LABLAXIS            = "B Status"
    DEPEND_0            = time_tags__CL_SP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
END_VARIABLE   = status_B__CL_SP_DWP

START_VARIABLE = status_wec__CL_SP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Summary (CSDS SP) Cluster C1, WEC Status"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 5
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Summary (CSDS SP) Cluster C1, WEC Status"
    LABLAXIS            = "WEC Status"
    DEPEND_0            = time_tags__CL_SP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]", "Status[4]"
END_VARIABLE   = status_wec__CL_SP_DWP

START_VARIABLE = status_wbd__CL_SP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Instrument"
    PROPERTY            = "Status"
    CATDESC             = "Summary (CSDS SP) Cluster C1, WBD Status"
    UNITS               = "unitless"
    SI_CONVERSION       = "1>unitless"
    SIZES               = 4
    VALUE_TYPE          = INT
    SIGNIFICANT_DIGITS  = 6
    FILLVAL             = 255
    QUALITY             = 2
    FIELDNAM            = "Summary (CSDS SP) Cluster C1, WBD Status"
    LABLAXIS            = "WBD Status"
    DEPEND_0            = time_tags__CL_SP_DWP
    LABEL_1             = "Status[0]", "Status[1]", "Status[2]", "Status[3]"
END_VARIABLE   = status_wbd__CL_SP_DWP

START_VARIABLE = Correl_signif__CL_SP_DWP
    PARAMETER_TYPE      = "Data"
    ENTITY              = "Particles"
    PROPERTY            = "Magnitude"
```

```
    FLUCTUATIONS        = "Correlation"
    CATDESC             = "Summary (CSDS SP) Cluster C1, Particle Correlator Significance, 1 minute
    UNITS               = "%"
    SI_CONVERSION       = "1.0>(%)"
    SIZES               = 1
    VALUE_TYPE          = FLOAT
    SIGNIFICANT_DIGITS  = 4
    FILLVAL             = -1.0e31
    QUALITY             = 2
    FIELDNAM            = "Summary (CSDS SP) Cluster C1, Particle Correlator Significance, 1 minute
    LABLAXIS            = "Signif."
    DEPEND_0            = time_tags__CL_SP_DWP
END_VARIABLE   = Correl_signif__CL_SP_DWP
```

6.7 PCOR_OVERVIEW_PS

6.7.1 Formats

The PCOR_OVERVIEW_PS graphical products will be formatted as PS files.

6.7.2 Standards

Postscript, C

6.7.3 Production procedures

The files are produced as part of the standard data processing and validation procedures for the PCOR data sets carried out by the DWP team. The final plot that is delivered corresponds to the validated PCOR data file.

Files for import to the archive will be named CM_CG_DWP_PCOR_OVERVIEW_PS__yyyymmdd_Vnn.ps where yyyymmdd is the date and nn the version number.

6.7.4 Quality control procedures

Plots are inspected by members of the DWP team as part of the validation activities for the PCOR data sets.

6.7.5 Delivery procedures

Plot files are collected into a TAR file, compressed using GZIP and delivered using SCP.

6.7.6 Product specification

This multi-satellite data set provides an overview of the data available from the particle correlator. For each satellite, the panels show the FFTs of the stepped/fixed energy ACFs, the ACFs, and the electron count distribution as functions of particle energy, polar, and azimuthal look directions. More detail regarding this plots may be found in the DWP User Guide.

6.7.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.7.7.1 Dataset

```
!
START_META = DATASET_ID
     ENTRY = "CM_CG_DWP_PCOR_OVERVIEW_PS"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CG>CAA_Graphic"
END_META   = DATA_TYPE
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = ACKNOWLEDGEMENT
!
START_META = DATASET_TITLE
     ENTRY = "DWP PCOR overview plots"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "These plots show a summary of the data obtained by the particle "
     ENTRY = "correlator onboard the Cluster satellites."
     ENTRY = "The data displayed in the various panels represent 1 minute averages "
     ENTRY = "of the electron counts by the PEACE HEEA sensor."
     ENTRY = "The upper three panels show (from top to bottom) the frequency spectra "
     ENTRY = "of the autocorrelation functions for the stepped and fixed energies "
     ENTRY = "and the actual autocorrelation functions. "
     ENTRY = "The lower three panels show (from top to bottom) the averaged count "
     ENTRY = "rate of the electrons as function of energy, polar zone (HEEA polar "
     ENTRY = "sensor) and sensor azimuth. When operating in normal mode, the "
     ENTRY = "individual ACF's are averaged over a spin and so any azimuthal "
     ENTRY = "information is lost. "
     ENTRY = "For a more detailed description, see the DWP User Guide."
END_META   = DATASET_DESCRIPTION
!
START_META = PROCESSING_LEVEL
     ENTRY = "Calibrated"
END_META   = PROCESSING_LEVEL
!
START_META = TIME_RESOLUTION
     ENTRY = 86400
END_META   = TIME_RESOLUTION
!
START_META = MIN_TIME_RESOLUTION
     ENTRY = 86400
```

```
END_META    = MIN_TIME_RESOLUTION
!
START_META = MAX_TIME_RESOLUTION
     ENTRY = 86400
END_META    = MAX_TIME_RESOLUTION
!
START_META = FILE_TYPE
     ENTRY = "ps"
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META    = METADATA_VERSION
!
START_META = DATASET_VERSION
     ENTRY = 1
END_META    = DATASET_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Particle_Distribution"
END_META    = DATASET_TYPE
```

6.8 DWP ACF summary plots

6.8.1 Formats

Plots of the ACF Fisher parameters (see Table Table 1) are available as png files. There is one plot per satellite per day. The files are named Cn_CG_DWP_FX_OVERVIEW2__yyyymmdd_Vmm.png where n is the satellite number, yyyymmdd is hte date, and mm is the version number.

6.8.2 Standards

PNG

6.8.3 Production procedures

The files are produced as part of the standard data processing procedures carried out by the DWP team.

6.8.4 Quality control procedures

Plots are inspected by members of the DWP team as part of the validation activities for the PCOR data sets.

6.8.5 Delivery procedures

The plot files are delivered as a GNU zipped TAR archive containing files for one month and accompanied by the .lis file to enable auto-ingestion.

6.8.6 Product specification

This data set provides a plot of the set of PCOR parameters that can be used to characterise the individual ACF's computed from the HEEA particle count rate. These parameters are

- Particle count rate estimation
- The Fisher T statistic
- The frequency of the maximum power in the ACF
- The percentage significance of this measurement
- The index of variation

These parameters are discussed further in Section 6.1.6 and also in the DWP instrument Uses Guide (CAA-EST-UG-DWP).

6.8.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.8.7.1 Dataset

```
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CG_DWP_PCOR_FX_OVERVIEW2"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CG>CAA_Graphic"
END_META   = DATA_TYPE
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = ACKNOWLEDGEMENT
!
START_META = DATASET_TITLE
     ENTRY = "DWP PCOR overview plots"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "These plots show a summary of the data derived from the particle "
     ENTRY = "correlator onboard the Cluster satellites."
```

```
     ENTRY = "The PCOR data set provides the autocorrelation (ACF) of the counts "
     ENTRY = "from the PEACE HEEA sensor. The parameters plotted here are derived "
     ENTRY = "from the ACF."
     ENTRY = "The top panel displays the estimated count rate, based on the "
     ENTRY = "non-zero lag values (equation 1 in the user manual)."
     ENTRY = "The next three panels provide further information regarding the  "
     ENTRY = "significance of periodicities in the electron count rate.  "
     ENTRY = "These panels show the Fisher T statistic which is the maximum power "
     ENTRY = "Spectral Density (PSD) divided by the total PSD (not including the "
     ENTRY = "DC component), the frequency at which the T statistic relates to, "
     ENTRY = "and the percentage significance of this peak. "
     ENTRY = "The bottom panel records the variance of the count rate. This "
     ENTRY = "value is unity if the count rate is purely poissonian. "
     ENTRY = "For a more detailed description, see the DWP User Guide."
END_META    = DATASET_DESCRIPTION
!
START_META = PROCESSING_LEVEL
     ENTRY = "Calibrated"
END_META    = PROCESSING_LEVEL
!
START_META = TIME_RESOLUTION
     ENTRY = 86400
END_META    = TIME_RESOLUTION
!
START_META = MIN_TIME_RESOLUTION
     ENTRY = 86400
END_META    = MIN_TIME_RESOLUTION
!
START_META = MAX_TIME_RESOLUTION
     ENTRY = 86400
END_META    = MAX_TIME_RESOLUTION
!
START_META = FILE_TYPE
     ENTRY = "png"
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META    = METADATA_VERSION
!
START_META = DATASET_VERSION
     ENTRY = 1
END_META    = DATASET_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Particle_Distribution"
END_META    = DATASET_TYPE
```

6.9 DWP LOG overview plots

6.9.1 Formats

Graphical representations of the data contained in the DWP_LOG data files are provided as a series of png files.

6.9.2 Standards

PNG

6.9.3 Production procedures

These graphical products are created from the DWP_LOG files that have been delivered to CAA/CSA. The original CEF files are converted to CSV (this stage is part of the normal DWP_LOG processing chain) and then processed using a set of MATLAB functions and scripts to generate the individual plot pages.

There are a total of 8 plots per satellite per calendar month. The files are named e.g. Cn_CG_DWP_LOG_OVERVIEW_m__y where n is the satellite number, m is the plot number, yyyymmdd_hhmmss_yyyymmdd_hhmmss is the plot start and end time and vv is the version number.

6.9.4 Quality control procedures

The plots are inspected by the DWP team prior to delivery to CAA.

6.9.5 Delivery procedures

The plot pages are processed into a tar archive file, gzipped, and delivered to CAA via SCP.

6.9.6 Product specification

This data set provides an overview of the operations of DWP and WEC. Each plot shows a subset of parameters contained in the DWP_LOG files, covering a period of 1 month for each satellite. There are a total of 8 plot pages that are used to group similar parameters as described in the table below. The top panel in each plot shows the DWP model tag of the instrument that produced the data. Values outside the range 0xcd01 – 0xcd10 indicate that DWP is working incorrectly and that all other WEC parameters are invalid. For parameter descriptions, see Table 7.

6.9.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

6.9.7.1 Dataset

```
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CG_DWP_LOG_OVERVIEW_1"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
```

Table 7: Contents of WEC LOG plots.

Page 1 Error flags	DWP_MODEL_TAG, Clock_Freq, TM_Overflow, AP_Overflow, DWP_SEU_count, DWP_Chk_Sum, DWP_error_count, STAFF_SA_Zero_Count, STA_SA_error_count, STA_SC_error_count, WHI_error_count
Page 2 Analog parameters	DWP_MODEL_TAG, WEC_Current_Average, DWP_5V_Average, STA_SA_6V_Average, STA_SA_M6V_Average, STA_SA_5V_Average, STA_SC_M9V_Average, STA_SC_M6V_Average, STA_SC_9V_Average, STA_SC_6V_Average, WBD_6V_Average, DWP_Temperature, STA_SA_Temperature, STA_SC_Temperature, WHI_Temperature, WBD_Temperature
Page 3 Telemetry rates	DWP_MODEL_TAG, WEC_TM_Rate, EFW_TM_Rate, STA_SA_TM_Rate, STA_SC_TM_Rate, WHI_TM_Rate, WBD_TM_Rate, COR_TM_Rate, TM_Unused, TM_Overhead
Page 4 Modes – Correlator	DWP_MODEL_TAG, TM_Mode_Name, LOG_EVENT, COR_OUTPUT_MODE, COR_SWEEP_MODE, COR_FIX_LEVEL
Page 5 Mode – STAFF	DWP_MODEL_TAG, STA_SA_Mode_Passive, STA_SA_Mode_Active
Page 6 Mode – WBD	DWP_MODEL_TAG, WBD_Mode_1, WBD_Mode_2, WBD_Mode_3 (each containing flags for Antenna, Bandwidth, Conv freq, gain sel) **Note:** Depending upon mode, either WBD_Mode_1, WBD_Mode_2 or WBD_Mode_1, WBD_Mode_2, WBD_Mode_3 are available.
Page 7 Mode – WHISPER (1)	DWP_MODEL_TAG, WHI_Mode_Active (containg flags for Mode, FFT-size, repfac, smode aver, processing, TX pulse, TX level, gain, Antenna, Threshold, fst)
Page 8 Mode – WHISPER (2)	DWP_MODEL_TAG, WHI_Mode_Passive (containing flags for Mode, FFTsize, repfac, smode aver, processing, TX pulse, TX level, gain, Antenna, Threshold)

```
     ENTRY = "CG>CAA_Graphic"
END_META    = DATA_TYPE
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
END_META    = CONTACT_COORDINATES
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META    = ACKNOWLEDGEMENT
!
START_META = DATASET_TITLE
     ENTRY = "DWP Operations Log: Error flags"
END_META    = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "The DWP_LOG plots give a summary of the operations"
     ENTRY = "of DWP and WEC. These overview plots show the values"
     ENTRY = "of various operational parameters for a period of 1"
```

```
     ENTRY = "month. The data points represent the value of a particular"
     ENTRY = "parameter during one acquisition interval. Note that"
     ENTRY = "analog measurements such as temperatures, voltage and"
     ENTRY = "currents represent average values during each acquisition"
     ENTRY = "interval. There are more than one plot per spacecraft"
     ENTRY = "per month. Each plot contains a set of related parameters,"
     ENTRY = "e.g. "
     ENTRY = " - error indicators, "
     ENTRY = " - analog values, "
     ENTRY = " - telemetry allocations. "
     ENTRY = "The top panel in each plot shows the instrument model"
     ENTRY = "number. This parameters is used to assess the validity"
     ENTRY = "of the data. Valid model tag numbers for Cluster II"
     ENTRY = "should be in the range FM6-FM9."
     ENTRY = " - Cluster II satellite 1 - FM 9 HK value 0xCD09"
     ENTRY = " - Cluster II satellite 2 - FM 6 HK value 0xCD06"
     ENTRY = " - Cluster II satellite 3 - FM 7 HK value 0xCD07"
     ENTRY = " - Cluster II satellite 4 - FM 8 HK value 0xCD08"
END_META    = DATASET_DESCRIPTION
!
START_META = PROCESSING_LEVEL
     ENTRY = "Calibrated"
END_META    = PROCESSING_LEVEL
!
START_META = TIME_RESOLUTION
     ENTRY = 2678400
END_META    = TIME_RESOLUTION
!
START_META = MIN_TIME_RESOLUTION
     ENTRY = 2678400
END_META    = MIN_TIME_RESOLUTION
!
START_META = MAX_TIME_RESOLUTION
     ENTRY = 2419200
END_META    = MAX_TIME_RESOLUTION
!
START_META = FILE_TYPE
     ENTRY = "png"
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META    = METADATA_VERSION
!
START_META = DATASET_VERSION
     ENTRY = "1"
END_META    = DATASET_VERSION
```

7 Caveats

7.1 Instrument Caveats

7.1.1 Formats

Caveats relating to the individual instruments (DWP-1, DWP-2, DWP-3, DWP-4) will be formatted as CEF files and conform to the standards defined in "Cluster Exchange File syntax" (DS-QMW-TN-0010) and the "CAA metadata dictionary" (CAA-MDD-0001).

7.1.2 Standards

CEF Version 2.0.

7.1.3 Production procedures

The DWP team will generate one caveat file per satellite for each of the DWP experiments that will contain all caveats pertaining to the data set for the whole of the mission.

7.1.4 Quality control procedures

The contents of the caveat files will be reviewed by the DWP team.

7.1.5 Delivery procedures

The instrument caveat dataset will be delivered as a CEF file named Cx_CQ_INST_Vnn.cef, where x is the satellite number and nn is the version number of the caveat dataset.

7.1.6 Product specification

The parameters in the files are shown in Table 8.

Table 8: Data fields contained in the instrument caveat files.

Parameter	Description
Time_range	Time range over which the caveats are valid
Caveat_text	Caveat description

7.1.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

7.1.7.1 Dataset

```
!
! ============================================================
! Include file .. C1_CQ_DWP_INST_V01.ceh
!    Created .... 2024-05-02 20:29:03
!    Code ....... make_headers V1.0
!    Src file ... inst_cp_header.txt (2022-03-07 15:04:30)
! ============================================================
!
! ============================================================
! Instrument level metadata
```

```
! ============================================================
!
START_META = INSTRUMENT_NAME
     ENTRY = "DWP1"
END_META   = INSTRUMENT_NAME
!
START_META = INSTRUMENT_DESCRIPTION
     ENTRY = "DWP of Cluster spacecraft C1"
     ENTRY = "The Cluster DWP instrument is responsible for the "
     ENTRY = "coordination of WEC operations. In particular DWP "
     ENTRY = "coordinates the configuration and sampling modes of the "
     ENTRY = "WEC instruments enabling the execution of complex sampling "
     ENTRY = "strategies to maximise use of spacecraft resources, "
     ENTRY = "provides signals to synchronise the sampling of WEC "
     ENTRY = "instruments, and collects, processes and packages the WEC "
     ENTRY = "data before placing it into the telemetry stream. In "
     ENTRY = "addition, the DWP instrument runs a software application - "
     ENTRY = "a particle correlator - that calculates the "
     ENTRY = "autocorrelation function of the electron count rate from "
     ENTRY = "the PEACE HEEA sensor. "
     ENTRY = "A fuller description of DWP may be found in the "
     ENTRY = "references listed below."
END_META   = INSTRUMENT_DESCRIPTION
!
START_META = INSTRUMENT_TYPE
     ENTRY = "Particle_Correlator"
     ENTRY = "Data_Processing_Unit"
END_META   = INSTRUMENT_TYPE
!
START_META = MEASUREMENT_TYPE
     ENTRY = "Particle_Correlator"
     ENTRY = "Thermal_Plasma"
END_META   = MEASUREMENT_TYPE
!
START_META = INSTRUMENT_CAVEATS
     ENTRY = "*C1_CQ_DWP_INST"
END_META   = INSTRUMENT_CAVEATS
```

7.1.7.2 File

```
!
! ============================================================
! Include file .. C1_CQ_DWP_INST_V01.ceh
!    Created .... 2024-05-02 20:31:53
!    Code ....... make_headers V1.0
!    Src file ... inst_cq_header.txt (2024-05-02 20:22:44)
! ============================================================
!
! ============================================================
! Dataset level metadata
! ============================================================
```

```
!
START_META = DATASET_ID
     ENTRY = "C1_CQ_DWP_INST"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CQ>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "Caveats for the DWP instrument"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "This dataset provides caveats for the DWP instrument."
END_META   = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
     ENTRY = "A M Buckley>DWP correlator scientist>A.M.Buckley@sussex.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = PROCESSING_LEVEL
     ENTRY = "Auxiliary"
END_META   = PROCESSING_LEVEL
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
END_META   = ACKNOWLEDGEMENT
!
START_META = DATASET_VERSION
     ENTRY = "8"
END_META   = DATASET_VERSION
!
START_META = FILE_TYPE
     ENTRY = "cef"
END_META   = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META   = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META   = METADATA_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Caveats"
END_META   = DATASET_TYPE
!
```

7.1.7.3 Parameter

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
! ============================================================
!
START_VARIABLE = Time_range__C1_CQ_DWP_INST
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Validity time range of a specified caveat"
          VALUE_TYPE = ISO_TIME_RANGE
             FILLVAL = 9999-12-31T23:59:59Z/9999-12-31T23:59:59Z
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
  SIGNIFICANT_DIGITS = 49
           FIELDNAM = "Universal Time Range"
END_VARIABLE   = Time_range__C1_CQ_DWP_INST
!
!
! ============================================================
! C a v e a t  T e x t
! ============================================================
!
START_VARIABLE = Caveat_text__C1_CQ_DWP_INST
      PARAMETER_TYPE = "Data"
             CATDESC = "Caveats"
              ENTITY = "Instrument"
  SIGNIFICANT_DIGITS = 80
          VALUE_TYPE = CHAR
             FILLVAL = "NA"
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            PROPERTY = "Status"
            FIELDNAM = "Caveats"
            DEPEND_0 = Time_range__C1_CQ_DWP_INST
             QUALITY = 0
END_VARIABLE   = Caveat_text__C1_CQ_DWP_INST
!
```

7.2 Correlator dataset caveats

7.2.1 Formats

Caveats relating to the correlator data set (PCOR_FX, PCOR_ST) will be formatted as CEF files and conform to the standards defined in “Cluster Exchange File syntax” (DS-QMW-TN-0010) and the “CAA metadata dictionary” (CAA-MDD-0001).

7.2.2 Standards

CEF Version 2.0.

7.2.3 Production procedures

The DWP team will generate one caveat file per satellite for each of the DWP experiments that will contain all caveats pertaining to the data set for the whole of the mission. New revisions will be released periodically.

7.2.4 Quality control procedures

The contents of the caveat files will be reviewed by the DWP team.

7.2.5 Delivery procedures

The correlator dataset caveat dataset will be delivered as a CEF file named Cx_CQ_DWP_PCOR_FX_Vnn.cef and Cx_CQ_DWP_PCOR_ST_Vnn.cef, where x is the satellite number and nn is the version number of the caveat dataset.

7.2.6 Product specification

Cn_CQ_DWP_PCOR_FX_Vnn.cef contains caveats the fixed energy data set, Cn_CQ_DWP_PCOR_ST_Vnn.cef contains caveats the stepped energy data set. The parameters in the files are shown in Table 9.

Table 9: Data fields contained in the PCOR_FX and PCOR_ST caveat files.

Parameter	Description
Time_range	Time range over which the caveats are valid
Caveat_text	Caveat description

7.2.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

This metadata refers to the FX data set. The metadata for the ST data sets is virtually the same.

7.2.7.1 Dataset

```
!
! ============================================================
! Include file .. C1_CQ_DWP_PCOR_FX_V01.ceh
!    Created .... 2024-05-02 20:33:42
!    Code ....... make_headers V1.0
!    Src file ... pcor_cq_header.txt (2022-03-07 14:30:48)
! ============================================================
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CQ_DWP_PCOR_FX"
END_META   = DATASET_ID
```

```
!
START_META = DATA_TYPE
     ENTRY = "CQ>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "Caveats for the DWP PCOR fixed energy band data set"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "This dataset provides caveats for the Correlator ACF "
     ENTRY = "of the fixed energy electron counts."
END_META   = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
     ENTRY = "A M Buckley>DWP correlator scientist>A.M.Buckley@sussex.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = PROCESSING_LEVEL
     ENTRY = "Auxiliary"
END_META   = PROCESSING_LEVEL
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = ACKNOWLEDGEMENT
!
START_META = DATASET_VERSION
     ENTRY = "1"
END_META   = DATASET_VERSION
!
START_META = FILE_TYPE
     ENTRY = "cef"
END_META   = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META   = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META   = METADATA_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Caveats"
END_META   = DATASET_TYPE
!
```

7.2.7.2 File

```
START_META = LOGICAL_FILE_ID
 ENTRY = C1_CQ_DWP_PCOR_FX_V02
END_META   = LOGICAL_FILE_ID

START_META = VERSION_NUMBER
 ENTRY = "2"
END_META   = VERSION_NUMBER

START_META = FILE_TIME_SPAN
 VALUE_TYPE = ISO_TIME_RANGE
 ENTRY = 2001-02-01T00:00:00Z/2011-12-31T23:59:59Z
END_META   = FILE_TIME_SPAN

START_META = GENERATION_DATE
 VALUE_TYPE = ISO_TIME
 ENTRY = 2010-03-18T14:38:16Z
END_META   = GENERATION_DATE

START_META = FILE_CAVEATS
 ENTRY = "CEF/CEH written by proc_cav 1.3"
 ENTRY = "CEF Template Cx_CQ_DWP_PCOR_FX_V1.ceft"
 ENTRY = "CEH Template Cx_CQ_DWP_PCOR_FX_V1.ceht"
 ENTRY = "Source file CAV_PCOR_FX.txt"
END_META   = FILE_CAVEATS
```

7.2.7.3 Parameter

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
! ============================================================
!
START_VARIABLE = Time_range__C1_CQ_DWP_PCOR_FX
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Validity time range of a specified caveat"
          VALUE_TYPE = ISO_TIME_RANGE
             FILLVAL = 9999-12-31T23:59:59Z/9999-12-31T23:59:59Z
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
  SIGNIFICANT_DIGITS = 49
           FIELDNAM = "Universal Time Range"
END_VARIABLE   = Time_range__C1_CQ_DWP_PCOR_FX
!
!
```

```
! ============================================================
! C a v e a t  T e x t
! ============================================================
!
START_VARIABLE = Caveat_text__C1_CQ_DWP_PCOR_FX
      PARAMETER_TYPE = "Data"
             CATDESC = "Caveats"
              ENTITY = "Instrument"
  SIGNIFICANT_DIGITS = 80
          VALUE_TYPE = CHAR
             FILLVAL = "NA"
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            PROPERTY = "Status"
            FIELDNAM = "Caveats"
            DEPEND_0 = Time_range__C1_CQ_DWP_PCOR_FX
             QUALITY = 0
END_VARIABLE   = Caveat_text__C1_CQ_DWP_PCOR_FX
!
```

7.3 Time correction dataset caveats

7.3.1 Formats

Caveats relating to the time correction (TCOR) data set will be formatted as CEF files and conform to the standards defined in “Cluster Exchange File syntax” (DS-QMW-TN-0010) and the “CAA metadata dictionary” (CAA-MDD-0001).

7.3.2 Standards

CEF Version 2.0.

7.3.3 Production procedures

The DWP team will generate one caveat file per satellite for the TCOR data set which will contain all caveats pertaining to the data set for the whole of the mission. New revisions will be released periodically.

7.3.4 Quality control procedures

The contents of the caveat files will be reviewed by the DWP team.

7.3.5 Delivery procedures

The time correction dataset caveat dataset will be delivered as a CEF file named Cx_CQ_DWP_TCOR_Vnn.txt, where x is the satellite number and nn is the version number of the caveat dataset.

7.3.6 Product specification

The parameters in the files are shown in Table 10.

7.3.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

Table 10: Data fields contained in the TCOR caveat files.

Parameter	Description
Time_range	Time range over which the caveats are valid
Caveat_text	Caveat description

7.3.7.1 Dataset

```
!
! ============================================================
! Include file .. C1_CQ_DWP_TCOR_V01.ceh
!    Created .... 2024-05-02 20:35:13
!    Code ....... make_headers V1.0
!    Src file ... tcor_cq_header.txt (2022-04-26 12:25:23)
! ============================================================
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CQ_DWP_TCOR"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CQ>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "Caveats for the DWP TCOR data set"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "This dataset provides caveat information for the "
     ENTRY = "DWP TCOR data set"
END_META   = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = PROCESSING_LEVEL
     ENTRY = "Auxiliary"
END_META   = PROCESSING_LEVEL
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = ACKNOWLEDGEMENT
```

```
!
START_META = DATASET_VERSION
     ENTRY = "7"
END_META   = DATASET_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Caveats"
END_META   = DATASET_TYPE
!
START_META = FILE_TYPE
     ENTRY = "cef"
END_META   = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META   = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META   = METADATA_VERSION
!
```

7.3.7.2 File

```
START_META = LOGICAL_FILE_ID
 ENTRY = C1_CQ_DWP_TCOR_V02
END_META   = LOGICAL_FILE_ID
!
START_META = VERSION_NUMBER
 ENTRY = "2"
END_META   = VERSION_NUMBER
!
START_META = FILE_TIME_SPAN
 VALUE_TYPE = ISO_TIME_RANGE
 ENTRY = 2001-02-01T00:00:00Z/2011-12-31T23:59:59Z
END_META   = FILE_TIME_SPAN
!
START_META = GENERATION_DATE
 VALUE_TYPE = ISO_TIME
 ENTRY = 2010-03-18T14:38:19Z
END_META   = GENERATION_DATE
!
START_META = FILE_CAVEATS
 ENTRY = "CEF/CEH written by proc_cav 1.3"
 ENTRY = "CEF Template Cx_CQ_DWP_TCOR_V1.ceft"
 ENTRY = "CEH Template Cx_CQ_DWP_TCOR_V1.ceht"
 ENTRY = "Source file CAV_TCOR.txt"
END_META   = FILE_CAVEATS
!
```

7.3.7.3 Parameter

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
! ============================================================
!
START_VARIABLE = Time_range__C1_CQ_DWP_TCOR
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Validity time range of a specified caveat"
          VALUE_TYPE = ISO_TIME_RANGE
             FILLVAL = 9999-12-31T23:59:59.999Z/9999-12-31T23:59:59.999Z
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
  SIGNIFICANT_DIGITS = 49
           FIELDNAM = "Universal Time Range"
END_VARIABLE   = Time_range__C1_CQ_DWP_TCOR
!
!
! ============================================================
! C a v e a t  T e x t
! ============================================================
!
START_VARIABLE = Caveat_text__C1_CQ_DWP_TCOR
      PARAMETER_TYPE = "Data"
             CATDESC = "Caveats"
              ENTITY = "Instrument"
  SIGNIFICANT_DIGITS = 80
          VALUE_TYPE = CHAR
             FILLVAL = "NA"
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            PROPERTY = "Status"
            FIELDNAM = "Caveats"
            DEPEND_0 = Time_range__C1_CQ_DWP_TCOR
             QUALITY = 0
END_VARIABLE   = Caveat_text__C1_CQ_DWP_TCOR
!
```

7.4 WEC status LOG caveats

7.4.1 Formats

Caveats relating to the WEC status log data set (DWP_LOG) will be formated as CEF files and conform to the standards defined in “Cluster Exchange File syntax” (DS-QMW-TN-0010) and the “CAA metadata dictionary” (CAA-MDD-0001).

7.4.2 Standards

CEF Version 2.0.

7.4.3 Production procedures

The DWP team will generate one caveat file per satellite for the DWP_LOG data sets which will contain all caveats pertaining to the data set for the whole of the mission. New revisions will be released periodically.

7.4.4 Quality control procedures

The contents of the caveat files will be reviewed by the DWP team.

7.4.5 Delivery procedures

The correlator dataset caveat dataset will be delivered as a CEF file named Cx_CQ_DWP_LOG_Vnn.cef where x is the satellite number and nn is the version number of the caveat dataset.

7.4.6 Product specification

The parameters in the files are shown in Table 11.

Table 11: Data fields contained in the DWP_LOG caveat files.

Parameter	Description
Time_range	Time range over which the caveats are valid
Caveat_text	Caveat description

7.4.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

7.4.7.1 Dataset

```
!
! ============================================================
! Include file .. C1_CQ_DWP_LOG_V01.ceh
!    Created .... 2024-05-02 20:36:53
!    Code ....... make_headers V1.0
!    Src file ... log_cq_header.txt (2022-03-07 14:30:48)
! ============================================================
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "C1_CQ_DWP_LOG"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CQ>CAA_Parameter"
```

```
END_META    = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "Caveats for the DWP LOG data set"
END_META    = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "This dataset provides caveats for the DWP LOG dataset."
END_META    = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
     ENTRY = "A M Buckley>DWP correlator scientist>A.M.Buckley@sussex.ac.uk"
END_META    = CONTACT_COORDINATES
!
START_META = PROCESSING_LEVEL
     ENTRY = "Auxiliary"
END_META    = PROCESSING_LEVEL
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META    = ACKNOWLEDGEMENT
!
START_META = DATASET_VERSION
     ENTRY = "4"
END_META    = DATASET_VERSION
!
START_META = FILE_TYPE
     ENTRY = "cef"
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META    = METADATA_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Caveats"
END_META    = DATASET_TYPE
!
```

7.4.7.2 File

```
START_META = LOGICAL_FILE_ID
 ENTRY = C1_CQ_DWP_LOG_V02
```

```
END_META    = LOGICAL_FILE_ID
!
START_META = VERSION_NUMBER
 ENTRY = "2"
END_META    = VERSION_NUMBER
!
START_META = FILE_TIME_SPAN
 VALUE_TYPE = ISO_TIME_RANGE
 ENTRY = 2001-02-01T00:00:00Z/2011-12-31T23:59:59Z
END_META    = FILE_TIME_SPAN
!
START_META = GENERATION_DATE
 VALUE_TYPE = ISO_TIME
 ENTRY = 2010-03-18T14:38:18Z
END_META    = GENERATION_DATE
!
START_META = FILE_CAVEATS
 ENTRY = "CEF/CEH written by proc_cav 1.3"
 ENTRY = "CEF Template Cx_CQ_DWP_LOG_V1.ceft"
 ENTRY = "CEH Template Cx_CQ_DWP_LOG_V1.ceht"
 ENTRY = "Source file CAV_LOG.txt"
END_META    = FILE_CAVEATS
```

7.4.7.3 Parameter

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
! ============================================================
!
START_VARIABLE = Time_range__C1_CQ_DWP_LOG
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Validity time range of a specified caveat"
          VALUE_TYPE = ISO_TIME_RANGE
             FILLVAL = 9999-12-31T23:59:59Z/9999-12-31T23:59:59Z
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
  SIGNIFICANT_DIGITS = 49
           FIELDNAM = "Universal Time Range"
END_VARIABLE    = Time_range__C1_CQ_DWP_LOG
!
!
! ============================================================
! C a v e a t  T e x t
! ============================================================
!
```

```
START_VARIABLE = Caveat_text__C1_CQ_DWP_LOG
      PARAMETER_TYPE = "Data"
             CATDESC = "Caveats"
              ENTITY = "Instrument"
  SIGNIFICANT_DIGITS = 80
          VALUE_TYPE = CHAR
             FILLVAL = "NA"
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            PROPERTY = "Status"
            FIELDNAM = "Caveats"
            DEPEND_0 = Time_range__C1_CQ_DWP_LOG
             QUALITY = 0
END_VARIABLE   = Caveat_text__C1_CQ_DWP_LOG
!
```

7.5 DWP UT PIOR caveats

7.5.1 Formats

Caveats relating to the UT PIOR data set will be formatted as CEF files and conform to the standards defined in "Cluster Exchange File syntax" (DS-QMW-TN-0010) and the "CAA metadata dictionary" (CAA-MDD-0001).

7.5.2 Standards

CEF Version 2.0.

7.5.3 Production procedures

The DWP team will generate one caveat file per satellite for the DWP_UT_PIOR data sets which will contain all caveats pertaining to the data set for the whole of the mission. New revisions will be released periodically.

7.5.4 Quality control procedures

The contents of the caveat files will be reviewed by the DWP team.

7.5.5 Delivery procedures

The contents of the caveat files will be reviewed by the DWP team.

7.5.6 Product specification

The parameters in the files are shown in Table 12.

Table 12: Data fields contained in the DWP_UTPIOR caveat files.

Parameter	Description
Time_range	Time range over which the caveat is valid
Caveat_text	Caveat description

7.5.7 Metadata specification

For mission, observatory, experiment and instrument metadata please see Section 5.6.

7.5.7.1 Dataset

```
!
! ============================================================
! Include file .. CM_CQ_DWP_UT_PIOR_V01.ceh
!    Created .... 2024-05-02 20:38:16
!    Code ....... make_headers V1.0
!    Src file ... utpior_cq_header.txt (2022-03-07 14:30:48)
! ============================================================
!
! ============================================================
! Dataset level metadata
! ============================================================
!
START_META = DATASET_ID
     ENTRY = "CM_CQ_DWP_UT_PIOR"
END_META   = DATASET_ID
!
START_META = DATA_TYPE
     ENTRY = "CQ>CAA_Parameter"
END_META   = DATA_TYPE
!
START_META = DATASET_TITLE
     ENTRY = "Caveats for the DWP UT PIOR dataset"
END_META   = DATASET_TITLE
!
START_META = DATASET_DESCRIPTION
     ENTRY = "This dataset provides caveats for the DWP UT PIOR dataset."
END_META   = DATASET_DESCRIPTION
!
START_META = CONTACT_COORDINATES
     ENTRY = "K Yearby>Instrument Manager>K.H.Yearby@sheffield.ac.uk"
     ENTRY = "S Walker>Data Manager>Simon.Walker@sheffield.ac.uk"
     ENTRY = "A M Buckley>DWP correlator scientist>A.M.Buckley@sussex.ac.uk"
END_META   = CONTACT_COORDINATES
!
START_META = PROCESSING_LEVEL
     ENTRY = "Auxiliary"
END_META   = PROCESSING_LEVEL
!
START_META = ACKNOWLEDGEMENT
     ENTRY = "Please acknowledge the instrument team and ESA Cluster Science Archive in any "
     ENTRY = "publication based upon use of this data."
     ENTRY = "The DWP instrument DOI is https://doi.org/10.5270/esa-ftdfdba."
END_META   = ACKNOWLEDGEMENT
!
START_META = DATASET_VERSION
     ENTRY = "1"
END_META   = DATASET_VERSION
!
START_META = FILE_TYPE
     ENTRY = "cef"
```

```
END_META    = FILE_TYPE
!
START_META = METADATA_TYPE
     ENTRY = "CAA"
END_META    = METADATA_TYPE
!
START_META = METADATA_VERSION
     ENTRY = "2.0"
END_META    = METADATA_VERSION
!
START_META = DATASET_TYPE
     ENTRY = "Caveats"
END_META    = DATASET_TYPE
!
```

7.5.7.2 File

```
START_META = LOGICAL_FILE_ID
 ENTRY = CM_CQ_DWP_UT_PIOR_V02
END_META    = LOGICAL_FILE_ID
!
START_META = VERSION_NUMBER
 ENTRY = "2"
END_META    = VERSION_NUMBER
!
START_META = FILE_TIME_SPAN
 VALUE_TYPE = ISO_TIME_RANGE
 ENTRY = 2001-02-01T00:00:00Z/2011-12-31T23:59:59Z
END_META    = FILE_TIME_SPAN
!
START_META = GENERATION_DATE
 VALUE_TYPE = ISO_TIME
 ENTRY = 2010-03-18T14:38:20Z
END_META    = GENERATION_DATE
!
START_META = FILE_CAVEATS
 ENTRY = "CEF/CEH written by proc_cav 1.3"
 ENTRY = "CEF Template Cx_CQ_DWP_UT_PIOR_V1.ceft"
 ENTRY = "CEH Template Cx_CQ_DWP_UT_PIOR_V1.ceht"
 ENTRY = "Source file CAV_UT_PIOR.txt"
END_META    = FILE_CAVEATS
```

7.5.7.3 Parameter

```
!
! ============================================================
! V a r i a b l e s
! ============================================================
!
! ============================================================
! T i m e  R a n g e
```

```
! ============================================================
!
START_VARIABLE = Time_range__CM_CQ_DWP_UT_PIOR
      PARAMETER_TYPE = "Support_Data"
             CATDESC = "Validity time range of a specified caveat"
          VALUE_TYPE = ISO_TIME_RANGE
             FILLVAL = 9999-12-31T23:59:59Z/9999-12-31T23:59:59Z
               UNITS = "s"
       SI_CONVERSION = "1>s"
               SIZES = 1
  SIGNIFICANT_DIGITS = 49
           FIELDNAM = "Universal Time Range"
END_VARIABLE   = Time_range__CM_CQ_DWP_UT_PIOR
!
!
! ============================================================
! C a v e a t  T e x t
! ============================================================
!
START_VARIABLE = Caveat_text__CM_CQ_DWP_UT_PIOR
      PARAMETER_TYPE = "Data"
             CATDESC = "Caveats"
              ENTITY = "Instrument"
  SIGNIFICANT_DIGITS = 80
         VALUE_TYPE = CHAR
             FILLVAL = "NA"
               UNITS = "unitless"
       SI_CONVERSION = "1>unitless"
            PROPERTY = "Status"
            FIELDNAM = "Caveats"
            DEPEND_0 = Time_range__CM_CQ_DWP_UT_PIOR
             QUALITY = 0
END_VARIABLE   = Caveat_text__CM_CQ_DWP_UT_PIOR
!
```

8 WEC Code and User Manual

8.1 WEC Telemetry Extraction and Decommutation Software (TED)

8.1.1 Formats

The software will be delivered as ASCII program source code.

8.1.2 Standards

C/C++ – compiles with a standard C compiler.

8.1.3 Production procedures

Product already exists in the WEC archive.

8.1.4 Quality control procedures

Tested and routinely used by all WEC instrument teams.

8.1.5 Delivery procedures

Product will be delivered as a 'tar' archive. File name CL_CD_DWP_TED_Vnn.tar.

8.1.6 Product specification

This is the software package used to decommutate the WEC raw telemetry into files containing raw data for a single WEC instrument. It is included in the archive for reference purposes only. No DWP software will run in the archive.

8.1.7 Metadata specification

n/a

8.2 WEC user manual

8.2.1 Formats

The WEC User Manual will be delivered as a series of 8 PDF files, one for each chapter.

8.2.2 Standards

PDF

8.2.3 Production procedures

This document was written during the development and testing phase of WEC to document the housekeeping parameters and operations. It has ben updated as the mission has progressed.

8.2.4 Quality control procedures

Initially the WEC User Manual was written during the Cluster build phase using information from the WEC instrument teams. It is kept up to date by the WEC Operations Team.

8.2.5 Delivery procedures

Product will be delivered as eight PDF files, one for each chapter. File names CL_CD_DWP_WEC_UM_CHn_Vnn.pdf, where n is the chapter number and nn is the version number of that chapter. The chapter 1 file will contain the revision history and contents listing for the whole document.

8.2.6 Product specification

This document provides a complete reference to the operations of WEC. It contains descriptions of the WEC instruments and onboard software, the contents and layout of the WEC housekeeping telemetry, the commanding of WEC, the nominal operations procedures, and details about critical, contingency and commissioning phase operations,

8.2.7 Metadata specification

n/a