

Guide to the *Suzaku* archive

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Chapter 1

Archive

This guide describes the contents and organization of the Suzaku archive.

1.1 Overview of the Suzaku archive

The Suzaku archive contains all the information, data and software which are needed to analyze Suzaku data.

The Suzaku data are transferred from ISAS in its First FITS Files (FFF) format (e.g. telemetry converted into FITS standard format). The FFF are created by `mk1stfits` (FITS telemeter converter) using the Raw Packet Telemetry (RPT) as input. One observation can be made by one or more RPT. These files are the input to the processing pipeline which converts the FFF into calibrated event files (SFF Second FITS Format). These files are the Level 1 or unfiltered files. The pipeline also applies data screening generating the Level 2 or cleaned files, and if appropriate extracts the Level 3 or data products such as spectra light curves and others. It also creates the so-called 'make filter file'. All data files are in FITS format and the software and calibration data used in the pipeline are included in the standard Suzaku software package and the Suzaku CALDB distributed to the science community. The data files archived include the Level 1, 2 and 3 corresponding to the unfiltered, cleaned and products files, the housekeeping data, orbit and attitude and the make filter file. The FFF are not archived at the HEASARC. There is not loss of information between the FFF and SFF. The difference is that the FFFs have empty columns which are filled by software in the SFF. These columns in the SFF can be repopulated if necessary with the distributed software. The Suzaku archive is divided into three main areas which are populated on a routine basis.

1.1.1 Observation data

The Suzaku science data are organized in observations to which a specific sequence number is assigned. Each observation includes science, housekeeping, and orbit data from the HXD and XIS instruments on-board Suzaku taken during the time interval corresponding to the PI requested exposure. The content of an observation is produced within the processing pipeline. The data for an observation include the telemetry converted into FITS format with minimum processing (Level

I), the calibrated and filtered data (Level II), and the results from the standard analysis carried out on the Level II data (Level III). The latter category provides a quick overview for the observed source. This includes: XIS light curves, images and spectra and HXD spectra. The products are not background subtracted. All data are in FITS format and follow the OGIP standards for high-energy astronomy data. In addition to the FITS files, each observation includes GIF plots which preview the FITS products, and an HTML file which records the processing history. The observation data populate the archive soon after the data are processed (see the section on the Suzaku data proprietary period).

1.1.2 Trend and Monitoring data

This data set is created as part of the reformatting process of the telemetry into FITS or generated during the pipeline processing. These data are mainly useful to the instrument teams for monitoring the instruments or to create high level calibration products.

The trend files are organized in directories, each dedicated to a specific trend type. Generally the trend files are not included with the sequence associated with an observation but there are few exceptions (see Chapter 4). All the trend data files are in FITS format.

Data taken during the slews will be archived in the trend area. The slew data are grouped in directories with a special sequence number and within divided in directories for each instrument. The slew data will be partially processed.

1.1.3 Archival calibration data

The calibration data necessary for data analysis are available in the calibration database (CALDB). The Suzaku instrument teams have the responsibility of providing the results of their calibration efforts to the Guest Observer Facility at GSFC, accompanied by the proper documentation. The files are delivered in FITS format, and follow the recommended CALDB standards. The GOF delivers the calibration data to the HEASARC in a form suitable for inclusion in the CALDB area. CALDB is populated one per month or in conjunction with the software releases if the files impact the software.

1.2 Database tables

Database tables recording high level information on the observation are used to browse the data. Suzaku has two database table: one table (suzamaster) gives general information on each observation and the other (suzaxislog) is specific for the XIS instrument describing the specific modes used during each observation.

1.3 Proprietary Data Rights

Data taken during the calibration and verification phase (about the first 9 months of the mission) are only available to the Suzaku Science Team. The proprietary period for all these data ends by the end of May 2007. Data taken in the normal Guest Investigator (GI) program have one year of

proprietary period. These data are first distributed only to the Principal Investigator (PI) of the observation. After the proprietary period the data are part of the public archive. Calibration data taken during the mission and Target of Opportunity, outside of the Guest Observer program, are made public immediately.

Chapter 2

Observation General

2.1 Sequence number assignment

A pointed observation within Suzaku is identified by a contiguous view on a specific sky position. The start and end of an observation are defined when the source is entering or exiting the Field of View of the HXD. Each observation is identified by a sequence number. Beside the normal observation there are other data defined as *non pointing data* or *not normal pointing* that also are identified with a sequence number. The sequence is a 9 digit number whose form is defined belows

2.1.1 Sequence Number: normal observations

For normal observation the sequence number is defined as follows:

CAAxxxxyyz

where :

- C is the category code defined as :
 - 1 for calibration observations
 - 4 for Galactic Compact sources (stars, CVs, X-ray binaries, and isolated neutron stars)
 - 5 for Galactic Diffuse emission
 - 7 for Extragalactic Compact object
 - 8 for Extragalactic Diffuse object
 - 9 for Gamma-ray Bursts and other non-proposal TOOs

Note : proposed TOO will not have C=9 but rather have the appropriate scientific category (C=4 or C=7).

- AA: is a two digits to identify the AO. 00 is for the SWG time, 01 for the A01 and so on.

- xxx: is the target number unique for a given C and AA. Multiple targets within the same proposal will have a different target number. The start value is 001.
- yy: multiple pointing number (planned multiple observations either specified within the proposal or due to operational needs). The start value is 01.
- z is used to divide long pointing into multiple sequence for processing purposes. Usually set to 0.

Please note: The sequence number is not related to the proposal number that get assigned at proposal submission. The proposal number is defined as a 6 digits string in the form of CCNzzz where the single digits are assigned accordingly with the following scheme:

- CC is the cycle number. This is set to 00 for the SWG time and to 01 for AO1 cycle proposal, 02 for the AO2 and so on.
- N defines the nationality of the proposal. This is set as :
 - N=0 Proposal from Japan
 - N=1 Proposal from USA
 - N=2 Proposal from Europe
 - N=3 Proposal merged with Japanese PI
 - N=4 Proposal merged with US PI
 - N=5 calibration proposal
- zzz is a sequential number set-up by each individual sites accepting proposals.

2.1.2 Sequence Number: Non pointing data

For non pointing data the sequence number is defined as follows :

0Syyymmddz

where :

- S is a code that specifies why this is not a normal pointing. The possible values are:
 - 0 for safe hold
 - 1 for accidental pointing
 - 2 for maneuver (slew)
 - 3 for step pointing
 - 7 for ground calibration
- yymmdd is the start date (last two digit year, month and day)
- z is used to distinguish multiple of such sequences for that day (e.g. multiple slews).

2.2 Data distribution

Data taken in response of Announcement Opportunity are distributed to the PI electronically. After the data arrive in the archive (about 7-10 days after the observation is concluded), a notification is sent to the PI together with the decryption key. These data remain encrypted in the archive until the proprietary period ends. If during the proprietary period data are re-processed with an upgraded pipeline, the PI will be notified that new version of the data are available. Data that are made public immediately are placed after processing non encrypted in the archive.

2.3 Keyword in the FITS file to ID an observation

All files that enter the archive have a number of keywords that identify the observation, the processing version, software and calibration files used in the pipeline. They are:

- OBS_ID contains the sequence number.
- PROCVER contains a string that identified the processing version. This is coded as MM.XX.YY.NN, where MM, XX, YY, and NN are set as follows:
 - MM.XX identify pipeline version changes. MM major changes, XX small changes.
 - YY identifies the version of Suzaku software used in the processing.
 - NN identifies the version of the calibration databases (CALDB) used in the processing.
- SEQPNUM gives the number of times a sequence has been processed across all processing versions.
- DATE gives the file creation date.
- SOFTVER is a string identifying the version of the Heasoft and Suzaku specific software used during the processing. This is defined as follows:

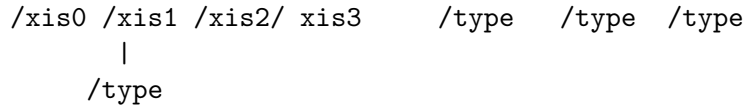
```
Hea_DDMMMYYYY_Vxxxxx_Suzaku_DDMMMYYYY_Vyyy
```

where DD is the day, MMM is the first 3 characters of the month name, YYYY the year and xxxxx and yyy are the version number as advertised in the software distribution for the Heasoft and Suzaku software.

- CALDBVER contains a strings which identifies the CALDB version used in the processing of a given observation. This is a string defined as follows:

```
hxdYYYYMMDD_xisYYYYMMDD_xrtYYYYMMDD_xrsYYYYMMDD
```

where the YYYYMMDD referenced to the latest CALDB version for that instrument.



3.2 The 'obs' data directory structure

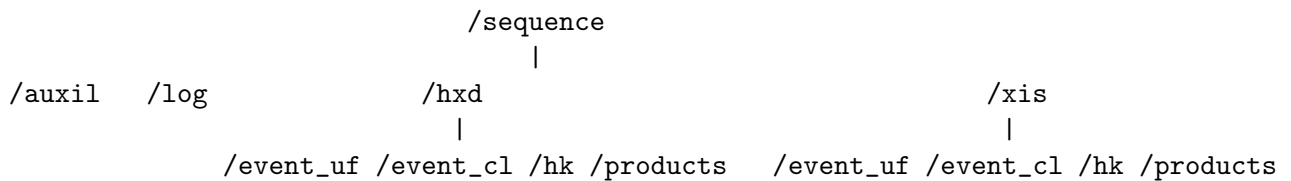
The science data are located under the **/obs** main directory. Each sequence is divided into the following subdirectories :

- **/auxil**: contains files common to all instruments such as attitude and orbit as well as a catalog listing all the files present in the sequence.
- **/log**: contains html files reporting logs on the data processing.
- **/hxd** : contains all the science and HK files related to the HXD instrument. The data within are further sub-divided into directories related to the file types.
- **/xis**: contains all the science and HK files related to the XIS instrument. The data within are further sub-divided into directories related to the file types.

Each of the instrument directory is subdivided in subdirectories.

- **/event_uf**: contains the unfiltered event files for all data modes and sensors (HXD: WELL and WAM, XIS: XIS0, XIS1, XIS2, XIS3). There are also present support files as GTI.
- **/event_cl**: contains the cleaned event files.
- **/hk**: contains housekeeping files related to the specific instrument.
- **/products**: contains all the high-level products derived from the science files. These are lightcurves and spectra of the targetted source, and images of the entire FOV. They are provided as FITS files with their plots as a GIF.

The overall directory structure for a sequence is therefore the following :



3.3 The 'trend' directory structure

The data under the **/trend** main directories are not subdivided into directories and therefore data files are directly stored under each **/trend** type.

Chapter 4

Data files

This chapter lists the file naming convention and give a brief description of the files that are included within an observation for the HXD and XIS, as well as the files common to all instruments. The different trend data type are also listed.

4.1 Filename convention

There are three different conventions for the Suzaku filename depending if the files contains science, auxiliary or log data. The Suzaku FITS science files are named according to the following convention:

```
aeXXXXXXXXXiii_N_mmmmmmmm_ll.ext.gz
```

where :

- **ae** is short for Astro-E2;
- **XXXXXXXXX** is the observation identifier (sequence number). This is a 9 digit number used in the filename name or in the directory conatining the data;
- **iii** is a 3 digit number identifying the instrument. This string is as set follows: hxd=HXD xrs=XRS xi0=XIS-0 xi1=XIS-1 xi2=XIS-2 xi3=XIS-3. Files that contains information common to all XIS units have the **iii** string set to xis.
- **N** The original telemetry is divided in RPT (Raw Packet Telemetry) files and more than one RPT can contribute to one observation. N ranges from 0-9 where values from 1-9 identify the RPT file number; the value of 0 is used when the science file contains data from different RPT or if there is only one RPT file that contributes to that sequence. Therefore the cleaned event files will always have consistent N value either if they are the merged of several RPT or derived from a single RPT.
- **mmmmmmmm** is the file identifier. This string can contain up to 8 characters and allows to specify diversities between files from the same instrument. The string does not contain underscore or mathematical symbols.

- 11: is the file level. This is a two character string for FITS and GIF files.
- ext : is the file extension.

The filename for the auxiliary files uses the following convention:

```
aeXXXXXXXXX.ext.gz
```

where XXXXXXXXX is the sequence number. These files are located in the /auxil directory. The filename for the log files uses the following conventions:

```
aeXXXXXXXXX_mmmmmmmm.ext.gz
or
aeXXXXXXXXXiii_N.ext.gz
or
aeXXXXXXXXX.ext.gz
```

where XXXXXXXXX is the sequence number, mmmmmmmm is the file identifier, iii is the instrument identifier and N is the RPT number (set to 0 if no RPT distinction is necessary). 'ext' is the file extension.

4.2 Data content within an observation

This section lists the science data files included within the sequences that are archived. The file listing is given below, broken down by directory, together with the specific filenames. This is valid for processing version greater than 1.2. Within this description the [obs-id] is the 9 digit number XXXXXXXXX.

4.2.1 /auxil

The files in this directory are all FITS files.

- File containing the attitude information.
ae[obs-id].att
- File containing the orbit information.
ae[obs-id].orb
- File containing the housekeeping parameters.
ae[obs-id].hk
- File containing extended (additional) housekeeping parameters.
ae[obs-id].ehk
- Make filter file where the attitude and the instrument housekeeping (HK) parameters are collected for use during screening.
ae[obs-id].mkf

- File containing information on the time packet used to make time correction.
ae[obs-id].tim
- Catalog file listing all the files within the observation.
ae[obs-id].cat

4.2.2 /log

The files in this directory are all in HTML and ASCII formats.

- File containing a basic description of the observation and links to other information pages.
ae[obs-id]_hdpage.html
- File containing a list of all files used and created for the observation. Temporary files are not in distribution.
ae[obs-id]_flinfo.html
- File containing an index to the major processing steps that occur in the processing of the observation.
ae[obs-id]_index.html
- File containing the errors that occur during the processing.
ae[obs-id]_errlog.html
- File containing the entire log of the processing.
ae[obs-id]_joblog.html
- File containing the parameter file for the initial processing (ASCII).
ae[obs-id]_lv0.par
- File containing the parameter file for the main processing (ASCII).
ae[obs-id]_lv1.par
- File containing the parameter file for the entire processing (ASCII).
ae[obs-id]_job.par
- Files containing the logs produced when running the `mk1stfits` that translate the telemetry into FITS (ASCII).
ae[obs-id].log
ae[obs-id]hxd_0.log for the HXD
ae[obs-id]xi0_0.log for the XIS0
ae[obs-id]xi1_0.log for the XIS1
ae[obs-id]xi2_0.log for the XIS2
ae[obs-id]xi3_0.log for the XIS3
- Files containing the commands used to run `mk1stfits` (ASCII).
ae[obs-id].com
ae[obs-id]hxd_0.com for the HXD

ae[obs-id]xi0_0.com for the XIS0
 ae[obs-id]xi1_0.com for the XIS1
 ae[obs-id]xi2_0.com for the XIS2
 ae[obs-id]xi3_0.com for the XIS3

4.2.3 /hxd

The HXD data are divided into four subdirectories, each containing the following files:

/event_uf

- Event files containing data from the WELL. At this stage the GSO and PIN data are within the same file, as well as data taken with different clock rate in the time interval covered by the file. There is one WELL event file for each RPT that comprise the observation. These files are named as

ae[obs-id]hxd_N_wel_uf.evt

where N is the RPT number.

- Event files containing data from the WAM. The number of WAM event files depends on the number of RPT that comprise the observation. These files are named as

ae[obs-id]hxd_N_wam_uf.evt where N is the RPT number.

- GTI files for the WELL. The WELL data can be collected with different clock rate. The WELL GTI file contains the times when the different clock modes are in use. The file contains as many extensions as many clock rates are within an observation up to three (COARSE 122 microsec , NORMAL 61 microsec, and FINE 31microsec). These files are named as

ae[obs-id]hxd_N_wel_uf.gti where N is the RPT number.

- GTI files contain the HXD saturated frames. These files are named as

ae[obs-id]hxd_N_tel_uf.gti where N is the RPT number.

- Event files containing the Burst data from the WAM_ANTI detector

ae[obs-id]hxd_N_bstZZ_uf.evt where N is the RPT number and ZZ is a number (from 00-99) that identifies the burst within a single RPT.

/event_cl

- Cleaned event files containing data from the PIN WELL. If data are taken with different clock mode, the archive contains one PIN file for different clock rate. At this stage all the events from different RPT with the same clock rate are merged into a single file.

ae[obs-id]hxd_0_pinXX_cl.evt for clock rate NORMAL (122 microsec)
 ae[obs-id]hxd_0_pinXX_cl.evt for clock rate CORSE (61 microsec)
 ae[obs-id]hxd_0_pinXX_cl.evt for clock rate FINE (31 microsec)

- Cleaned event files containing data from the GSO WELL. If data are taken with different clock mode, the archive contains one GSO file for different clock rate. At this stage all the events from different RPT with the same clock rate are merged into a single file.

ae[obs-id]hxd_0_gsoXX_cl.evt for clock rate NORMAL (122 microsec)
 ae[obs-id]hxd_0_gsoXX_cl.evt for clock rate CORSE (61 microsec)
 ae[obs-id]hxd_0_gsoXX_cl.evt for clock rate FINE (31 microsec)

- Cleaned pseudo event file. This is obtained merging all the RPTs.

ae[obs-id]hxd_0_pse_cl.evt

/hk

- A file containing specific housekeeping (HK) data for the HXD. The HK data coming from different RPT are all merged in a single file.

ae[obs-id]hxd_0.hk

- Gain files one for each of the GSO, PIN and WAM detector units. These files are generated during the processing.

ae[obs-id]hxd_0_pin.ghf for the PIN
 ae[obs-id]hxd_0_gso.ghf for the GSO
 ae[obs-id]hxd_0_wam.ghf for the WAM.

/products

- Two source spectra, one for the PIN and one for the GSO. The spectra are not background subtracted. These are collected using all the cleaned events.

ae[obs-id]hxd_0_pin_sr.pi for the PIN
 ae[obs-id]hxd_0_gso_sr.pi for the GSO

- Two lightcurves, one for the PIN and one for the GSO. The spectra are not background subtracted. These are collected using all the cleaned events therefore all the clockmodes are combined

ae[obs-id]hxd_0_pin_sr.lc for the PIN
 ae[obs-id]hxd_0_gso_sr.lc for the GSO

- One lightcurve from the WAM. All data from all RPTs are combined.

ae[obs-id]hxd_0_wam.lc for the WAM

- Lightcurve for each burst detected in the WAM_ANTI detector. The filename uses the following convention:

`ae[obs-id]hxd_N_bstZZ.lc`

where N is the RPT number and ZZ is a number (from 00-99) that identifies the burst within a single RPT.

- One GIF file containing a plot for the GSO and PIN lightcurves

`ae[obs-id]hxd_0_wel_lc.gif`

- One GIF file containing a plot for the GSO and PIN spectra

`ae[obs-id]hxd_0_wel_pi.gif`

4.2.4 /xis

The XIS data are divided into four subdirectories, each containing the following files:

/event_uf

- Unfiltered event files containing data from the 4 XIS units. There is one unfiltered event file per XIS unit, edit mode or timing and microcode type. The filename is encoded as follow :

`ae[obs-id]xi0_N_ZZZKKKKC_uf.evt` for the XIS0

`ae[obs-id]xi1_N_ZZZKKKKC_uf.evt` for the XIS1

`ae[obs-id]xi2_N_ZZZKKKKC_uf.evt` for the XIS2

`ae[obs-id]xi3_N_ZZZKKKKC_uf.evt` for the XIS3

where N is the RPT number, ZZZ is a string specifying the edit or timing modes (see below), KKKK identifies the microcode and C is reserved to discriminate between different threshold or discriminator. In the unfiltered files the latter is always set to **z** indicating that the file has not been splitted for the different discriminator or event threshold.

The strings (ZZZ) for the edit or timing modes are the following:

- **5x5** if the telemetry includes a 5x5 square pixel around each event
- **3x3** if the telemetry includes a 3x3 square pixel around each event
- **2x2** if the telemetry includes a 2x2 square pixel around each event
- **tim** for timing mode

The string for the microcode (KKKK) is set in the following way. The first characters depends on the edit or timing mode and the three remaining are numbers to identify a specific configuration. They are therefore set as follows :

- nMMM where n is for the normal window mode for any of the 5x5 or 3x3 or 2x2 edit mode
- bMMM where b is for burst window mode for any of the 5x5 or 3x3 or 2x2 edit mode
- pMMM where p is for psum for the timing mode.

MMM is the unique number associated to the microcode.

- GTI files for the XIS. The XIS data can be collected with different threshold and discriminators. The unfiltered files includes events taken in all configurations. These are separated when cleaned events are generated. There is one GTI file per XIS unit and each contains as many extensions as many different configuration are available. They can be used to separate the events. The naming convention used is the following :

- ae[obs-id]xi0_N_conf_uf.gti for the XIS0
- ae[obs-id]xi1_N_conf_uf.gti for the XIS1
- ae[obs-id]xi2_N_conf_uf.gti for the XIS2
- ae[obs-id]xi3_N_conf_uf.gti for the XIS3

where N is the RPT number.

/event_cl

- Cleaned event files containing data from the 4 XIS units. These file are separated for XIS unit, edit mode or timing, microcode type, discriminator and threshold. The filename is encoded as follow : ae[obs-id]xi0_N_ZZZKKKKC_cl.evt for the XIS0
ae[obs-id]xi1_N_ZZZKKKKC_cl.evt for the XIS1
ae[obs-id]xi2_N_ZZZKKKKC_cl.evt for the XIS2
ae[obs-id]xi3_N_ZZZKKKKC_cl.evt for the XIS3

where N is the RPT number, ZZZ is the edit or timing modes, KKKK identifies the microcode and C the instrument discriminator and threshold configurations. The latter uses an alphabetic character to distinguish between the different configurations (see Appendix for the parameter that define a configuration).

The strings (ZZZ) for the edit or timing modes are the following:

- 5x5 if the telemetry includes a 5x5 square pixel around each event

- 3x3 if the telemetry includes a 3x3 square pixel around each event
- 2x2 if the telemetry includes a 2x2 square pixel around each event
- `tim` for timing mode

The string for the microcode (KKKK) is set in the following way. The first characters depends on the edit or timing mode and the three remaining are numbers to identify a specific configuration. They are therefore set as follows :

- `nMMM` where n is for the normal window mode for any of the 5x5 or 3x3 or 2x2 edit mode
- `bMMM` where b is for burst window mode for any of the 5x5 or 3x3 or 2x2 edit mode
- `pMMM` where p is for psum for the timing mode.

MMM is the unique number associated to the microcode.

/hk

- XIS housekeeping files. For each detector units, the HK data coming from different RPTs are all merged in a single file.

`ae[obs-id]xi0_0.hk` for the XIS0
`ae[obs-id]xi1_0.hk` for the XIS1
`ae[obs-id]xi2_0.hk` for the XIS2
`ae[obs-id]xi3_0.hk` for the XIS3

/products

- Images in sky coordinate. There is one image per XIS sensor. If there is more than one cleaned event file because of the different instrument configuration, the images are generated using the longer exposures.

`ae[obs-id]xi0_0_ZZZKKKCC_sk.img` for the XIS0
`ae[obs-id]xi1_0_ZZZKKKCC_sk.img` for the XIS1
`ae[obs-id]xi2_0_ZZZKKKCC_sk.img` for the XIS2
`ae[obs-id]xi3_0_ZZZKKKCC_sk.img` for the XIS3

- Source spectra. There is one source spectrum per XIS sensor. If there is more than one cleaned event file because of the different instrument configuration, the source spectrum are

generated using the longer exposures. The spectra are in PI channel and the extraction region is three arcmins around the source position.

ae[obs-id]xi0_0_ZZZKKKCC_sr.pi for the XIS0
 ae[obs-id]xi1_0_ZZZKKKCC_sr.pi for the XIS1
 ae[obs-id]xi2_0_ZZZKKKCC_sr.pi for the XIS2
 ae[obs-id]xi3_0_ZZZKKKCC_sr.pi for the XIS3

- Background spectrum. There is one source spectrum per XIS sensor. The background spectrum is extracted from the event file used to extract the source spectrum. The spectra are in PI channel and the extraction region is an annulus around the source position.

ae[obs-id]xi0_0_ZZZKKKCC_bg.img for the XIS0
 ae[obs-id]xi1_0_ZZZKKKCC_bg.img for the XIS1
 ae[obs-id]xi2_0_ZZZKKKCC_bg.img for the XIS2
 ae[obs-id]xi3_0_ZZZKKKCC_bg.img for the XIS3

- Source lightcurve. There is one lightcurve per XIS sensor. If there is more than one cleaned event file because of the different instrument configuration, the lightcurve are generated using the longer exposures. The extraction region is of three arcmins around the source position and is not background subtracted.

ae[obs-id]xi0_0_ZZZKKKCC_sr.pi for the XIS0
 ae[obs-id]xi1_0_ZZZKKKCC_sr.pi for the XIS1
 ae[obs-id]xi2_0_ZZZKKKCC_sr.pi for the XIS2
 ae[obs-id]xi3_0_ZZZKKKCC_sr.pi for the XIS3

4.3 Trend data

4.3.1 Instrument trend

Each instrument produces data to archive as trend data. These are used to monitor various aspects of the instrument during the mission. The trend data are organized by time divided in a month interval, and within by instrument and organized by type. The following tables list the different trend by instrument, together with their filenames and the directory names where they are located. These data arrive together with the output of the processing of the observation therefore populate the archive soon after an observation have been processed. These files are not encrypted.

4.3.2 HXD

The list of the trend for the HXD are :

Trend Type description	Filename	Directory
HXD WELL gain history	ae[obs-id]hxd_0_gso.ghf ae[obs-id]hxd_0_pin.ghf	hxdwelgain
HXD WAM gain history	ae[obs-id]hxd_0_wam.ghf	hxdwamgain
HXD HK file	ae[obs-id]hxd_0.hk	hxdhk
HXD earth events	ae[obs-id]hxd_0_earth.evt	hxdearth
HXD Burst ID	ae[obs-id]hxd_0_bstidt.fits	hxdbstid

Table 4.1: List of HXD trend data

4.3.3 XIS

The XIS trend file are separated for each single units. The table reports the directories and filenames for the XIS0. The same trend type are also present for all the other units. The filenames listed here are just for the XIS0, there equivalent files for the XIS1, XIS2 and XIS3.

Trend Type description	Filename	Directory
XIS HK file	ae[obs-id]xi0_0.hk	xis0hk
XIS dark frame	ae[obs-id]xi0_N_dfiNN.fff	xis0dark
XIS frame mode normal	ae[obs-id]xi0_N_fnMMMiNN.fff	xis0framen
XIS frame mode burst	ae[obs-id]xi0_N_fbMMMiNN.fff	xis0frameb
XIS frame mode psum	ae[obs-id]xi0_N_fpMMMiNN.fff	xis0framep
XIS dark init normal	ae[obs-id]xi0_N_dinMMM.fff	xis0dinin
XIS dark init burst	ae[obs-id]xi0_N_dibMMM.fff	xis0dinitb
XIS dark init psum	ae[obs-id]xi0_N_dipMMM.fff	xis0dinitp
XIS dark update normal	ae[obs-id]xi0_N_dunMMM.fff	xis0dupn
XIS dark update burst	ae[obs-id]xi0_N_dubMMM.fff	xis0dupb
XIS event cal sources	ae[obs-id]xi0_0_ZZZK KKKK_fe.evt	xis0cal
XIS day events	ae[obs-id]xi0_0_ZZZK KKKK_de.evt	xis0day
XIS night events	ae[obs-id]xi0_0_ZZZK KKKK_ne.evt	xis0night

Table 4.2: List of XIS trend data

where MMM is the microcode and ranges between 0-255, NN is the frame number and ranges between 00-99, ZZZ and KKKK have the same meaning for the science files (see section on XIS event_uf). The calibration sources, night and day events are merged per RPT as well as the HK. The remaining files are instead kept per RPT.

4.3.4 XRS

The list of the trend for the XRS are :

Trend Type description	Filename	Directory
XRS HK file	ae[obs-id]xrs_0.hk	xrshk
XRS nonxray events	ae[obs-id]xrs_0.evt	xrshk
XRS log and command files	ae[obs-id]xrs_0.log ae[obs-id]xrs_0.com	xrshk

Table 4.3: List of XRS trend data

4.3.5 Others

In addition to the instrumental trend data, there are five other types of files non instrument specific in the trend data. These data are located in the directory `misc`. The table lists for each type filename and directory :

Trend Type description	Filename	Directory
General HK file	ae[obs-id].hk	aegenhk
Attitude	ae[obs-id].att	aeatt
Orbit	ae[obs-id].orb	aeorb
Timing correction	ae[obs-id].tim	aetim
Make filter file	ae[obs-id].mkf	aemkf

Table 4.4: List of geneal trend data

Appendix A

XIS configurations

The different XIS discriminators and thresholds are coded in the filename with a character. This is derived from values written in the HK file. These values are used to define a specific configuration, to which a single alphabetic character is assigned, and are written in header keywords of the cleaned event file. The following tables gives the relation between the filename character and the keywords written in the header of the cleaned event file.

Char	ADHST	ADHEND	ADVST	ADVEND	DSCINOUT
a	0 0 0 0	255 255 255 255	0 0 0 0	1023 1023 1023 1023	0 0 0 0
b	0 0 0 0	255 255 255 255	0 0 0 0	1023 1023 1023 1023	0 0 0 0
c	0 0 0 0	255 255 255 255	0 0 0 0	1023 1023 1023 1023	0 0 0 0
d	0 0 0 0	255 255 255 255	0 0 0 0	1023 1023 1023 1023	0 0 0 0
e	0 0 0 0	255 255 255 255	0 0 0 0	511 511 511 511	0 0 0 0
f	0 0 0 0	255 255 255 255	0 0 0 0	511 511 511 511	0 0 0 0
g	0 0 0 0	255 255 255 255	0 256 256 0	1023 767 767 1023	1 0 0 1
h	0 0 0 0	255 255 255 255	0 256 256 0	1023 767 767 1023	1 0 0 1
i	0 0 0 0	255 255 255 255	0 0 0 0	383 383 383 383	0 0 0 0
j	0 0 0 0	255 255 255 255	0 0 0 0	383 383 383 383	0 0 0 0
k	0 0 0 0	255 255 255 255	0 0 0 0	895 895 895 895	0 0 0 0
l	0 0 0 0	255 255 255 255	0 0 0 0	895 895 895 895	0 0 0 0
m	0 0 0 0	255 255 255 255	0 0 0 0	127 127 127 127	0 0 0 0
n	0 0 0 0	255 255 255 255	0 0 0 0	127 127 127 127	0 0 0 0
o	0 0 0 0	255 255 255 255	0 0 0 0	383 383 383 383	0 0 0 0
p	0 0 0 0	255 255 255 255	0 0 0 0	383 383 383 383	0 0 0 0
q	0 0 0 0	255 255 255 255	0 0 0 0	1023 1023 1023 1023	0 0 0 0
r	0 0 0 0	255 255 255 255	0 0 0 0	767 767 767 767	0 0 0 0
s	0 0 0 0	255 255 255 255	0 0 0 0	767 767 767 767	0 0 0 0
t	0 0 0 0	255 255 255 255	0 256 256 0	1023 767 767 1023	1 0 0 1
u	0 0 0 0	255 255 255 255	0 256 256 0	1023 767 767 1023	1 0 0 1
v	0 0 0 0	255 255 255 255	0 0 0 0	1023 1023 1023 1023	0 0 0 0
w	0 0 0 0	255 255 255 255	0 0 0 0	767 767 767 767	0 0 0 0
x	0 0 0 0	255 255 255 255	0 0 0 0	767 767 767 767	0 0 0 0

Table A.1: List of XIS window and threshold setting.(Part a)

where :

- ADHST and ADHEND are keywords which content give the horizontal start and end addresses of the area discrimination for each of the A, B, C, D segments of the CCD.
- ADVST and ADEND are keywords which content give the vertical start and end addresses of the area discrimination for each of the A, B, C, D segments of the CCD.
- DSCINOT is a flag to indicate if the area discriminator is in or out for each of the A, B, C, D segments of the CCD.

where :

- GDSC is a keyword which has four flags one for different grade type to indicate if they are disable or enable. The grade types are trail, lead, single or other.
- EVTLOW and EVTUP are keywords which content give the lower and upper event threshold for each of the A,B,C,D segments of the CCD.
- AREADISC is a flag to indicate if the area discriminator is disable or enable for each of the A, B, C, D segments of the CCD.

Char	GDSC	EVTLOW	EVTUP	AREADISC	GRADEDIS
a	1 1 1 1	100 100 100 100	3583 3583 3583 3583	0 0 0 0	0 0 0 0
b	1 1 1 1	20 20 20 20	3583 3583 3583 3583	0 0 0 0	0 0 0 0
c	1 1 1 1	50 50 50 50	3583 3583 3583 3583	0 0 0 0	0 0 0 0
d	1 1 1 1	60 60 60 60	3583 3583 3583 3583	0 0 0 0	0 0 0 0
e	1 1 1 1	100 100 100 100	3583 3583 3583 3583	0 0 0 0	0 0 0 0
f	1 1 1 1	100 100 100 100	3583 3583 3583 3583	1 1 1 1	0 0 0 0
g	1 1 1 1	50 50 50 50	3583 3583 3583 3583	1 1 1 1	0 0 0 0
h	1 1 1 1	50 50 50 50	3583 3583 3583 3583	0 0 0 0	0 0 0 0
i	1 1 1 1	20 20 20 20	3583 3583 3583 3583	0 0 0 0	0 0 0 0
j	1 1 1 1	20 20 20 20	3583 3583 3583 3583	1 1 1 1	0 0 0 0
k	1 1 1 1	20 20 20 20	3583 3583 3583 3583	1 1 1 1	0 0 0 0
l	1 1 1 1	20 20 20 20	3583 3583 3583 3583	0 0 0 0	0 0 0 0
m	1 1 1 1	100 100 100 100	3583 3583 3583 3583	0 0 0 0	0 0 0 0
n	1 1 1 1	100 100 100 100	3583 3583 3583 3583	1 1 1 1	0 0 0 0
o	1 1 1 1	100 100 100 100	3583 3583 3583 3583	0 0 0 0	0 0 0 0
p	1 1 1 1	100 100 100 100	3583 3583 3583 3583	1 1 1 1	0 0 0 0
q	1 1 1 1	128 128 128 128	256 256 256 256	0 0 0 0	0 0 0 0
r	1 1 1 1	20 20 20 20	3583 3583 3583 3583	1 1 1 1	0 0 0 0
s	1 1 1 1	20 20 20 20	3583 3583 3583 3583	0 0 0 0	0 0 0 0
t	1 1 1 1	100 100 100 100	3583 3583 3583 3583	1 1 1 1	0 0 0 0
u	1 1 1 1	100 100 100 100	3583 3583 3583 3583	0 0 0 0	0 0 0 0
v	1 1 1 1	50 50 50 50	3583 3583 3583 3583	1 1 1 1	0 0 0 0
w	1 1 1 1	100 100 100 100	3583 3583 3583 3583	0 0 0 0	0 0 0 0
x	1 1 1 1	100 100 100 100	3583 3583 3583 3583	1 1 1 1	0 0 0 0

Table A.2: List of XIS window and threshold setting. (Part b)

- GRADEDIS is a flag to indicate if the grade discriminator is disable or enable for each of the A, B, C, D segments of the CCD.