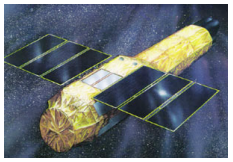
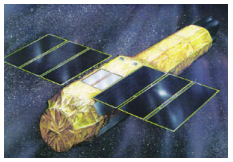


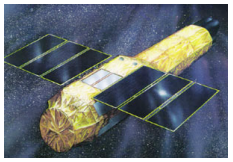
Suzaku processing and archive

Lorella Angelini/HEASARC



Highlights

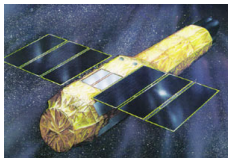
- Data Processing
  - Operations and Data flow
  - Pipeline products & versions & current issues
  - Upcoming version 2
- US Archive collocated with the HEASARC
  - Archive operations
  - Archive content and version 2
  - Public data
- Software and calibration distribution



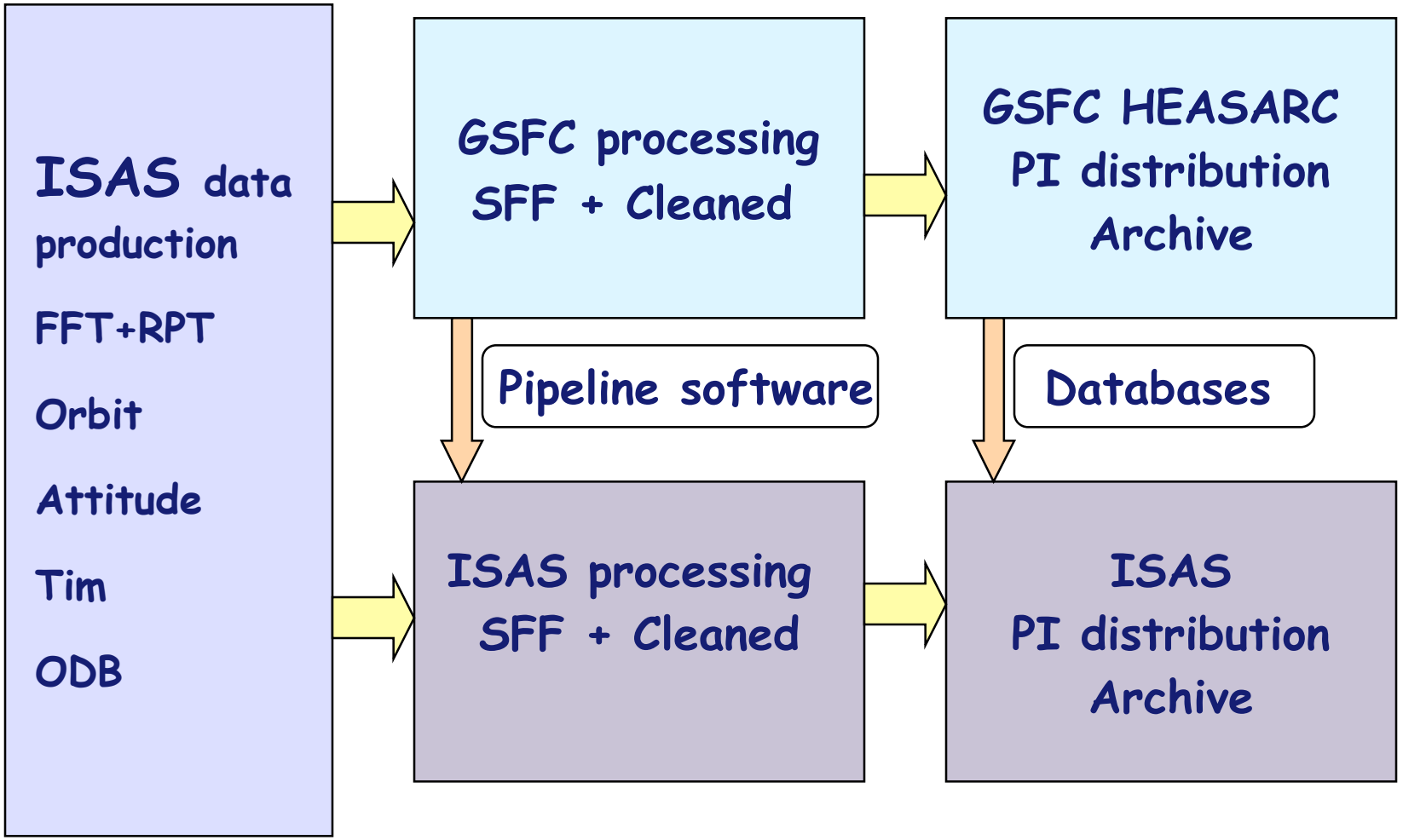
Basic Operations

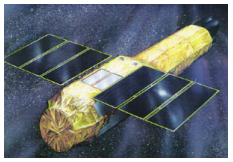
- At ISAS after an observation is performed :
  - Data are packed in Raw Packet telemetry (RPT)
  - RPT are transformed in First FITS Files (FFF) via mk1stfits

    These are uncalibrated FITS files
  - Orbit, Attitude and time correction (tim) files are generated
  - Observation database (ODB metadata) is updated
- GSFC implements the processing pipeline & installs it at ISAS
  - Two sides are running the same pipeline on all data
- RPT, FFF, orbit, attitude, tim files and ODB are transferred to the processing sites and used as input to the pipeline
  - Generate calibrated and cleaned event files, and average products
- After processing data are transferred to the archive encrypted
  - Archives notify the PI that data are ready to be picked-up
- Databases are made at GSFC (post processing) & grabbed by ISAS

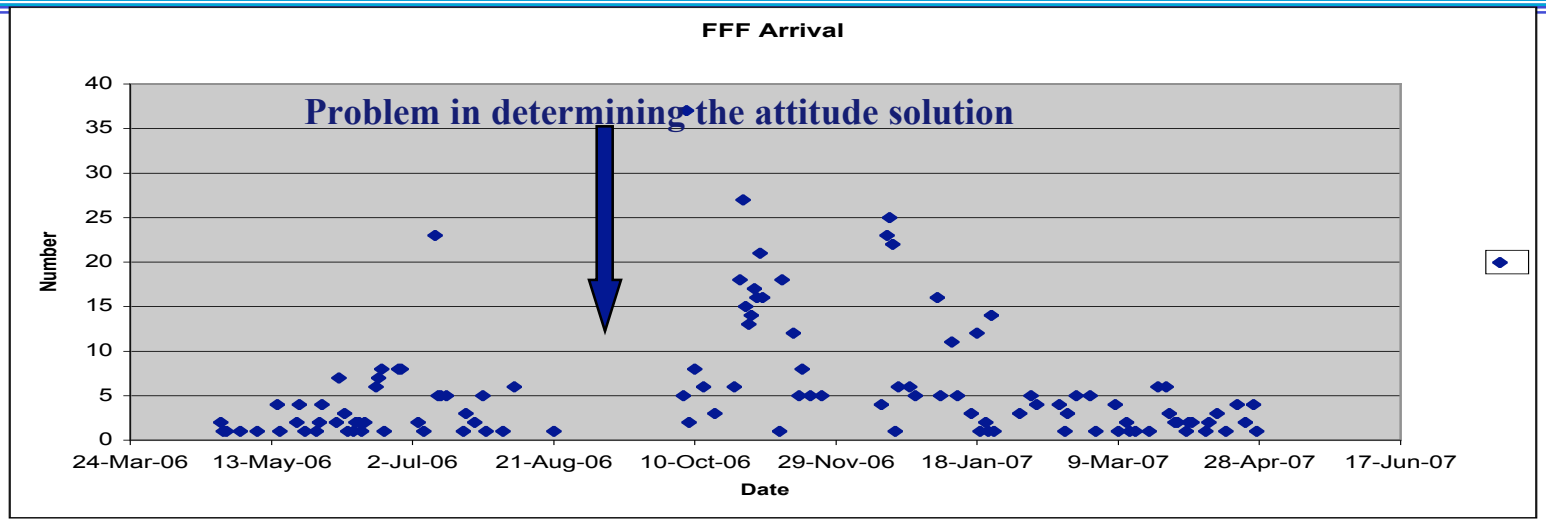


Data flow

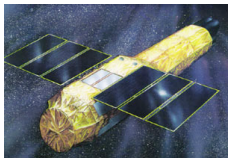

ISAS data production
FFT+RPT
Orbit
Attitude
Tim
ODB
GSFC processing
SFF + Cleaned
GSFC HEASARC
PI distribution
Archive
Pipeline software
Databases
ISAS processing
SFF + Cleaned
ISAS
PI distribution
Archive



Transfer rates, size, process time



- Transfer rate to GSFC is 250 kbytes/s
- Transfer occurs without hand-shake between sites.
  - More robust check soon in place for version 2
- Data Size at GSFC :
  - Processing : RPT 52 Gb , FFF+Additional files 92 Gb
  - Archive : 558 Gb (output from processing)
- Typical processing time
  - ~ 30 minutes small sequences
  - 5-7 days large sequences (3 Gb of FFF equivalent to 6.2 Gb after processing)



Pipeline products (1)

- **Starting from the FFF the pipeline produces**

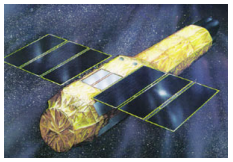
  Science & housekeeping : data organized by observation on specific target

  => Level 1 (unfiltered) , 2 (cleaned), 3 (products) for the HXD and XIS , their HK, supporting files and log

  - **HXD :**
    - Unfiltered events for the WELL, WAM (x RPT) and bursts
    - Cleaned event files . WELL RPTs are merged to create GSO and PIN files one for each clock rate.
    - Average spectra PIN & GSO; light curves PIN, GSO, WAM & bursts
  - **For each of the XIS units**
    - Unfiltered event files x RPT & edit modes. No sub-mode division
    - Cleaned event files. All RPTs for specific edit mode are merged and splitted x sub-mode
    - Average spectrum & light curve extracted for the XIS configuration with the longer exposure

  => These data are encrypted & distributed to the PI

  - TOO & CAL observations are public immediately



Pipeline products (2)

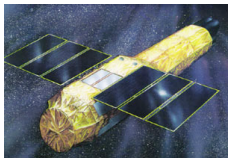
- **Starting from the FFF the pipeline also produces:**

  Trend data

  ⇒ Data containing specific HK parameters or calibration information extracted from the event data

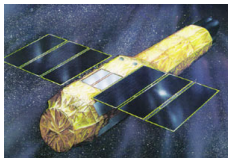
  - —These data are organized by instrument and data type
  - —These data are not encrypted and not distributed to the PI

- **Starting from the ODB the pipeline produces:**
  - Database tables ASCII (suzamaster and suzaxislog) updated when a new sequences is processed
    - —Used to select data via the Web based search facility (BROWSE)
- **File format:**
  - Science, HK & calibration data are provided in FITS (OGIP standard)
  - Preview of summary products (e.g. GIF)
  - HTML used to record processing



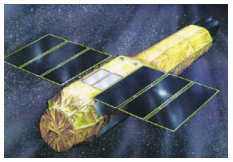
Pipeline versions

Processing version	Date	Description	Software release	Caldb release
V1.0.1.1	Pre-2006-06-12	Base version used to sync up/test pipeline	Hea_16May2006_V6.0.6_Suzaku_15May2006_V1.0	hxd20060321_xis20060407_xrt20060410_xrs20060419
V1.0.1.2	2006-06-12	First start up pipeline	Hea_16May2006_V6.0.6_Suzaku_15May2006_V1.0	hxd20060321_xis20060524_xrt20060410_xrs20060419
V1.1.1.2	2006-06-16	Many pipeline fixes. First data distribution to GO.	Hea_16May2006_V6.0.6_Suzaku_15May2006_V1.0	hxd20060321_xis20060524_xrt20060410_xrs20060419
V1.2.2.3	2006-10-06	New ftools/CALDB/additional functions/fixes. All data were reprocessed and redistributed	Hea_11Sep2006_V6.1.1_Suzaku_11Sep2006_V1.2	hxd20060829_xis20060913_xrt20060720_xrs20060410
V1.2.2.4	2006-11-13	New CALDB	Hea_11Sep2006_V6.1.1_Suzaku_11Sep2006_V1.2	hxd20060829_xis20061030_xrt20060720_xrs20060410
V1.2.2.5	2006-12-19	New CALDB	Hea_11Sep2006_V6.1.1_Suzaku_11Sep2006_V1.2	hxd20061031_xis20061114_xrt20060720_xrs20060410
V1.3.2.6	2007-02-01	New CALDB/fixes/additional functions	Hea_11Sep2006_V6.1.1_Suzaku_11Sep2006_V1.2	hxd20061226_xis20061226_xrt20060720_xrs20060410
V1.3.2.7	2007-02-16	New CALDB	Hea_11Sep2006_V6.1.1_Suzaku_11Sep2006_V1.2	hxd20070131_xis20070206_xrt20060720_xrs20060410
V1.3.2.8	2007-03-08	New CALDB	Hea_11Sep2006_V6.1.1_Suzaku_11Sep2006_V1.2	hxd20070302_xis20070302_xrt20060720_xrs20060410
V1.4.2.9	2007-04-13	New CALDB/xisconf.list upgrade	Hea_11Sep2006_V6.1.1_Suzaku_11Sep2006_V1.2	hxd20070302_xis20070302_xrt20060720_xrs20060410



Known Pipeline issues

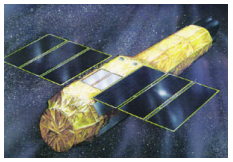
- XIS Charge Injection data are not processed with the appropriate calibration data
- XIS timing data (psum) are not processed or transferred to the archives
- XIS events are not screened for the Cut-off rigidity
- XIS extraction regions are always circles not check in place for modes where the circle is outside of the detector window.
- XIS minor modes added in the mkf file to allow event minor mode selection
- HXD gain is applied using two different methods :
  - (1) Gain from CALDB or (2) Gain calculated on the fly
  - If (2) users are recommended to reprocess the data soon after the gain CALDB file is available
- HXD background is not generated with the pipeline
- Not all sequences were processed with the same pipeline at ISAS & GSFC New verification will be in place with version 2 processing.



Version 2 reprocessing

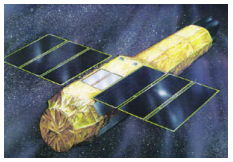
- Version 2 processing foreseen to start late June
  - All data will be reprocessed (almost 2 years of data)
    - —Data format will change (mk1stfits)
      - All data need to be re-transferred from ISAS to GSFC
    - —New release of the Suzaku software and calibration data
    - —New way to calculate the attitude (attitude files longer in time)
    - —Most of the Known issues will be addressed
      - but for the HXD background and the HXD gain
    - —HXD new products: pseudo event files and a burst ID file

- Not a good estimate to how long will take to reprocess all data
  - Mainly driven by the rate on how quickly ISAS can prepare the data
  - New data will have high priority
    - —Previous reprocessing uses 5 months to process 1.3 year

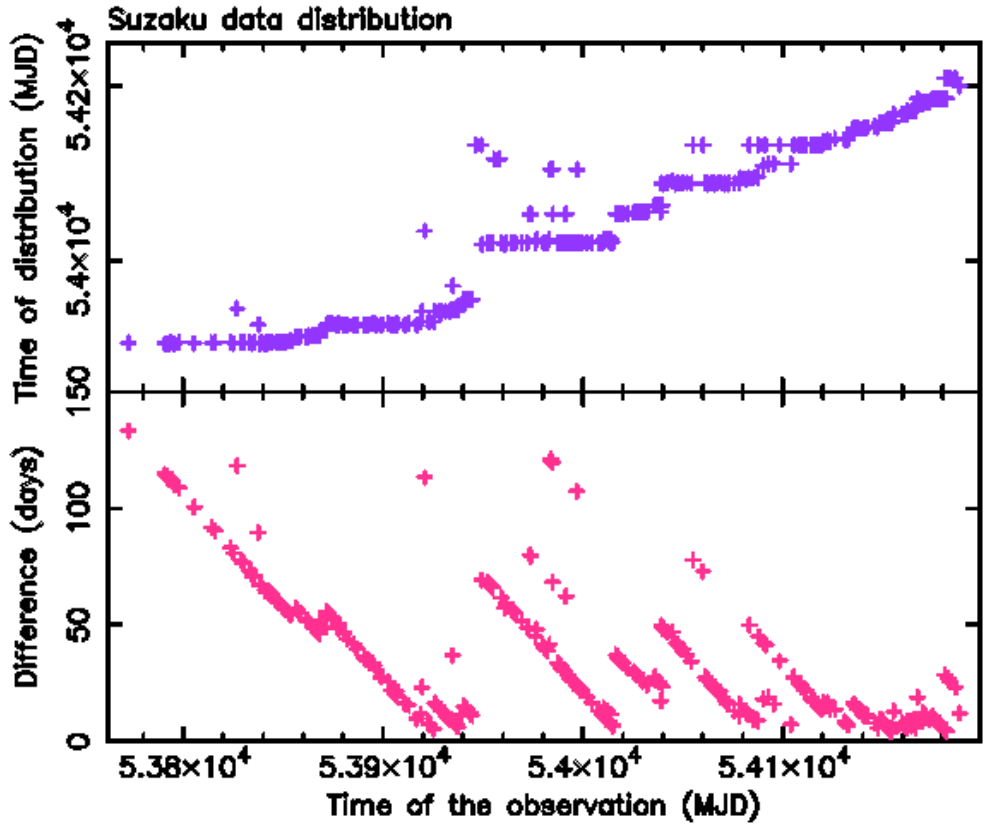


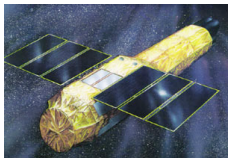
GSFC: Archive operations

- In US the Suzaku archive is collocate at the HEASARC
- The GSFC processing site transfer data to the HEASARC
  - All data (US & Japan) populate the archive
  - For US PI and Co-PI :
    - HEASARC notifies the PI via E-mail when data are in the archive
    - Same email is 'bcc' to ISAS.
    - PI are also notified if data are reprocessed within their propriety period with a new pipeline version.
  - The transfers and the archive population are automatized
    - Cron job running hourly retrieve data from the processing site via DTS (data transfer system)
    - Science & trend data are archived via DAS (data archive system)
      - Science data are kept encrypted in the archive
    - Databases are ingested in the W3Browse
      - Copies made available in the FTP area



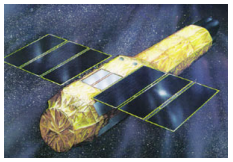
Data delay before distribution





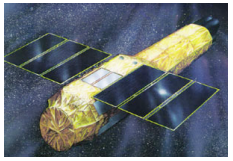
Archive content (1)

- There are 566 observations at the HEASARC
  - 216 are SWG
  - 317 are AO1 & 15 AO2
  - 5 real TOO (public immediately)
  - 9 are SWG-TOO, 3 AO1-TOO, 1 AO2-TOO
- There are 127 US observations (PI 112 & 15 Co-PI)
  - AO1 and AO2
- What is missing :
  - 8 observations not in the archive compared with the timeline
    - 5 problems in processing (none are PI data), 3 not yet here
  - 100 steps pointing (short observations)
  - Slew data
  - Background HXD



Archive content (2)

- Daily retrieval of the Suzaku timeline
  - Place on line in the HEASARC timeline Tools
- GSO and PIN background
  - Retrieved at HEASARC every month but currently not on-line
    - —Difficult to keep-up with changes that occur at ISAS
    - —There is a noticeable time delay between the data distribution and HXD background availability
- Version 2 processing will not produced the background
  - HXD team will still produce the background
  - A copy will be given to the archives
  - However timescale or the transfer mechanism are not clear



Archive access

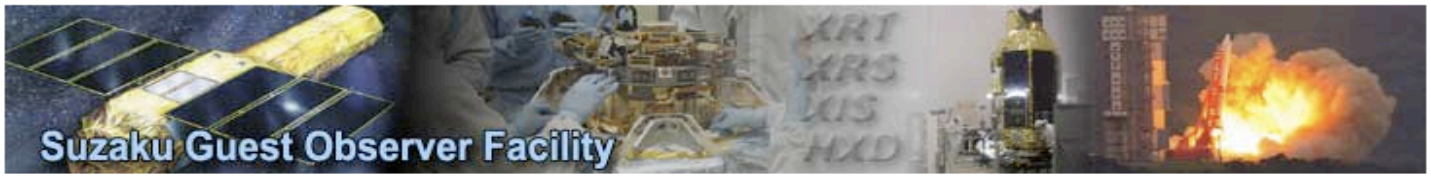
GODDARD SPACE FLIGHT CENTER

Helpdesk
Suzaku What's New
HEASARC Site Map
NASA Homepage

Search the Suzaku site: enter search text

HEASARC Quick Links
---Quick Links---

HEASARC HOME | SUZAKU HOME | ARCHIVE | DATA ANALYSIS | PROPOSALS & TOOLS | STUDENTS / TEACHERS / PUBLIC



ABOUT SUZAKU | WHAT'S NEW | DATA PROCESSING | TIMELINES & MISSION INFO | RELATED SITES | GALLERY

Suzaku Archive

Suzaku Archive Access

The Suzaku archive can be accessed via the following interfaces:

HEASARC Browse interface	Make searches across multiple missions, including Suzaku
Anonymous FTP or wget	Do direct data retrieval via FTP or wget protocol without browsing the observation logs (for expert users). Retrieval of monitoring and instrument trend data are only available via FTP or wget).

NOTE: **The archive contains public and propriety data.**
The Suzaku data may also be accessed at:

- DARTS Suzaku Data Center (Japan)

Suzaku source name :
Suzaku-discovered sources are to be named using the following convention:

Suzaku Jhhmm-ddmm

or

Suzaku Jhhmmss-ddmmss

where hhmm-ddmm and hhmmss-ddmmss are RA and DEC in J2000 and '-' is either - or +.

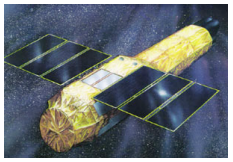
Suzaku Archive documentation

- Overview of the Suzaku Data Archive [PDF] [HTML]
- Getting started & Processing
- Suzaku "Timeline" updated weekly at ISAS .

Suzaku Calibration archive and software

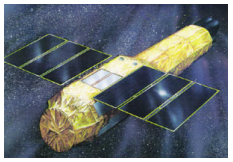
The calibration data are archived in the HEASARC calibration database (CALDB). The latest releases of the calibration data and their supporting information are available in the Suzaku Caldb page . The latest software is available from the HEASARC software download page

- History of calibration releases
- History of software relaeses



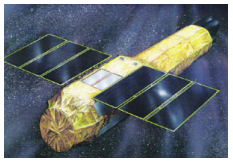
Archive: Version 2 processing

- HEASARC data management for version 2 processing:
  - The results of the version 2 processing will populate new disks
  - The content of the current disks (processing version 1.X.X.X) will be backup into final archive tapes
  - New disks will be populated at first with links to the 1.X.X.X data
    - —The link is substituted with the version 2 soon as ready
  - Users will always see the latest version
  - Version 1.X.X.X of observations that have already the version 2 available is kept on disk but not visible from the users
  - When all data are reprocessed, the 1.X.X.X version will be moved out from disks



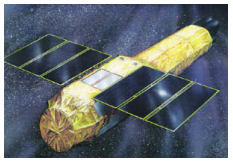
Archive and Public data

- Currently the archives includes 56 public sequences data
  - 5 are TOO , 10 are from SWG time, remaining are calibration observations
- May 27 the propriety period for all the SWG data ends
  - All SWG data will be decrypted, checked for data corruption & put on-line
  - Estimate time to conclude operation ~10 days (or earlier)
- AO data. The propriety period is one year. The clock starts after calibration is made available (CI and Timing) . Public date set at ISAS
- Operationally : ISAS sends to GSFC the list with the observations that become public 15 days ahead their public date.
  - GSFC notify US PI & Co-PI within 10d , before data are decrypted
  - At the end of the propriety period both archive sides decrypt the observation. It is expected up to 2 days difference .



Software and CALDB

- **Calibration data distributed via the HEASARC CALDB**
  - Deliveries from Japan arrive to the GOF
  - GOF checks the agreed file standards and requires CALDB keywords
  - GOF deliveries the file to the HEASARC for ingest into CALDB and distribution
  - CALDB updates one a month (end of the month, if any)
- **Software distributed in the HEAsoft package**
  - Suzaku tools are developed in Japan & delivered to the HEASARC by the Software Team via CVS
  - General support software is provided by the HEASARC
  - GSFC performed the software testing before distribution :
    - Individual tool with test bed provided from Japan
    - Within the pipeline with test bed generated at GSFC
  - Software updated on 3 months timescale (if needed)
  - Software allows to reprocess the data (all the steps in the pipeline are reproducible)
  - Software available from the HEASARC software distribution page

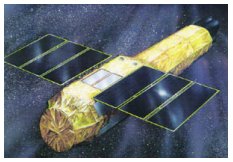


Software distribution

- Four Software releases. First public software release May 2006
- Most of the software is used within the pipeline
  - Pipeline is running version 2 of the software
  - Version 3: tools updates not relevant to the pipeline processing
  - Version 4 : tools updates mostly in parameter file adjustment and CALDB query

Software release date	Description
2007-03-07	Suzaku Software ver 4.0 (HEAsoft 6.2.0). CURRENT VERSION
2006-12-06	Suzaku Software ver 3.0 (HEAsoft 6.1.2).
2006-08-30	Suzaku Software ver 2.0 (HEAsoft 6.1.1).
2006-05-17	Suzaku Software ver 1.0 (HEAsoft 6.0.6).

- Next software freeze May 7. Expected release in early June
  - New tools and updates, support for CI . Attitude library update new rigidity file
  - Updates of the help files
  - Support for new/old version of the science FITS files
  - Support for new/old version of the CALDB files
- This new version will be used in the version 2 of the pipeline



CALDB distribution

- Twelve CALDB releases
  - First release April 2006
- Include all files necessary for the processing or for the spectral analysis
- CALDB updated in the pipeline if new files are relevant to the processing
- Next delivery is May 7 . Includes :.
  - Files necessary for the CI data
  - New gain format for the GSO
- Still under discussion the creation of a XIS background data

REMOTE ACCESS | DOCUMENTATION | KEYWORDS | CROSS-CALIBRATION | MISSION-SPECIFIC CALIBRATION INFO

Suzaku Calibration Files

This page contains a summary of the Suzaku Calibration files which are currently in the Suzaku Calibration Database (CALDB). For each instrument, each table links to the latest CALDB release, from where individual files can be downloaded as well as the CALDB index file. The tables also link to the current CALDB tar files which users can install on their local machines. Instructions for installing the CALDB for Suzaku or other missions are available from the CALDB Installation page.

Caldb access for Suzaku requires an updated version of the caldb.config file which is available at ftp://heasarc.gsfc.nasa.gov/caldb/software/tools .Please replace your current $CALDBCONFIG file with this updated version.

Note: The Suzaku software currently support the automatic queries to CALDB only in some of the tasks. Therefore the full path and filename to CALDB files has to be explicitly given in the Suzaku software task parameters that require CALDB files.

Note: The tar files for the HXD, XIS and XRT already include the XRS CALDB file (the teldef) necessary to run some of the software tools. Also download the multimission calibration tar file since it is required to run xissimarfgen.

HXD Calibration Products

Item	Date	Comments
Current CalDB Release	2007-04-10	GSO Gain and responses
Documentation	2007-04-10	
Retrieve TAR file	2007-04-10	Size 222 MB compressed

XIS Calibration Products

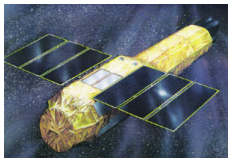
Item	Date	Comments
Current CalDB Release	2007-04-10	Microcode
Documentation	2007-04-09	
Retrieve TAR file	2007-04-10	Size 303.6 MB compressed

XRT mirror Calibration Products

Item	Date	Comments
Current CalDB Release	2006-07-20	Several upates
Documentation	2006-08-01	
Retrieve TAR file	2006-08-30	Size 82.4 MB compressed

Latest news

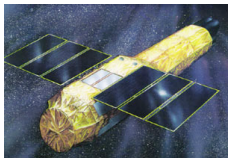
- Current CALDB : HXD (20070409), XIS (20070409) and XRT (20060720)
- Latest CALDB update on 2007-04-10 : HXD XIS
- History of Suzaku CALDB releases
- The pre-launch XRS calibration files are archived in CALDB and a TAR file is available. There will be no updates since the XRS is not longer operating.



Conclusions

NEXT two months :

- Processing version 2 is coming :
  - All data will be reprocessed
- New software and Calibration soon to be released
- Several Suzaku data will be made public



Software test procedure (??)

- Next release foreseen
  - Software changes
  - Data file changes
  - Calibration changes

- Next software release has to be tested against:
  - Two different data formats ,
    - since for a while 2 processing version will be availalble
  - New calibration formats , need to work on old and new data format