Figure 2.

displays them interactively as X/Y plots (Fig. 2).

The rather complicated back-end of this utility retrieves a FITS table from the archive, extracts the requested columns using IRAF and puts them into a cache area. The cache provides accelerated access when the same information is requested repeatedly by web users within 24 hours.

Outlook

Activities in the near future will include:

• JDBC interface to SQL server (replacing CGI scripts)
• collaboration with STScI in the field of enhanced web interface
• adding advanced features to overcome browser incompatibilities, like automatic updates

Acknowledgements

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HST Archive News: On the Fly Recalibration (OTF) of NICMOS and STIS Data

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Introduction

HST science data are automatically calibrated when they are received at STScI (Space Telescope Science Institute) and these calibrated data are included in Baltimore's archive. The calibration software, which is contained in the IRAF/STSDAS hst_calib package, takes as input the raw data and any necessary calibration reference images or tables if they are already available [2]. The software determines which calibration steps to perform by checking the values of the calibration switches in the header. It selects which reference files to use in the calibration by examining the reference file keywords. The values of these switches and keywords depend upon the exact configuration of the instrument, the date of the observation and any other constraints. The values are set in the headers of the raw data in OPUS (OSS-PODPS Unify System).

Until the end of 1995, when users requested calibrated data from the HST archive, they received the data produced by the OPUS pipeline. However, with instrumental properties changing with time, better approaches for calibration of some instruments have been introduced and there have been other general improvements to the calibration of HST data. So what is a user to do? Fortunately, the same, or improved, software that runs in the calibration pipeline at STScI is also available in the released version of IRAF/STSDAS. One can recalibrate data from the archive by starting with the

raw data, editing the appropriate header keywords to reflect the new calibration files and running the appropriate software. The STScI maintains a database that contains the recommended calibration reference files for each observation. However, this is not the most convenient approach for users, and this led us to develop an automatic recalibration process for HST data that essentially duplicates what a user would do manually. The on-the-fly re-calibration of the first generation of HST instruments was developed and introduced in the CADC and ST-ECF archive at the end of 1995 [1].

Implementation

In 1997, two new instruments were put on board of HST. During the last year, CADC and ST-ECF worked together on the extension of the OTF calibration pipeline to support NICMOS and STIS. The long developing period is due to the fact that the initial life of a new instrument is always somewhat difficult due to teething problems: instrument description keywords are found to be missing, or wrongly populated, the calibration software must be revised to consider changes in the instrument responses compared to the ground tests, calibration reference files are not immediately available, etc. All those stabilisation problems led us to actually offer the OTF pipeline only about 1 year after the Servicing Mission.

A decision was taken to not rely on the header of the files, but instead to retrieve the calibration keywords form the HST database. While the keywords in the files cannot change anymore, the HST database can be kept up-to-date and keywords values corrected. Therefore the OTF pipeline for NICMOS and STIS is completely database driven.

The OTF calibration pipeline steps for a science observation are the following:

1. getting raw data from CDs (stored in a compressed form)

2. getting latest database information on relevant keywords (new/updates)

3. getting latest database information on relevant calibration files (new/updates)

4. setting the proper calibration switches relevant to the observation mode for a specific instrument

5. update the header of the science file

6. apply calibration software (STS-DAS)

As already mentioned some pre-requisites are necessary:

1. Database updates
2. Calibration file updates
3. Software updates

A SYBASE replication server keeps the CADC and ST-ECF HST database copies identical to the STScI one in real time; the calibration reference files are kept up to date via a retrieval that takes place on a daily basis by CADC, via a Starview request, and are then "pushed" to ST-ECF.

Particularities

While building the OTF pipeline, we had to deal with some aspects which are particular to the new instruments and which originate from some choices made by the IDTs (Instrument Dedicated Team) in the designing phase of the instruments data products. Multiple extension FITS files were introduced, and we had to wait for a stabilised release of a new version of IRAF (v 2.11) to be able to manipulate the new file types. The STSDAS calibration software (calnica, calnicb and calstis) evolved rapidly and is still changing. Some STIS observing modes are not yet completely covered by the calibration software. STIS and NICMOS association concepts differ, introducing therefore asymmetry in the development of the pipelines.

Conclusions

The OTF system contributed (and still contributes) to the reliability of the calibration software: we found and reported problems to the STScI/STSDAS group, which quickly fixed them. As soon as a new version of the calibration software is released, we install it in our pipeline. Our archive users, with their archival re-quests, also contribute to extensively test the software. The OTF pipeline is used at CADC to produce NICMOS and STIS preview images/spectra of all the available datasets (15 minutes after release date), further contributing in testing the pipeline.

In other words, the OTF pipeline, being in a never-ending development phase and continuously receiving new reference files, is a lively system. An observation calibrated two months ago is different from the one calibrated today. Only at the end of the life of an instrument, when the "final archive" is produced (i.e. no further development is foreseen), will this process stop and the best (?) calibration pipeline be available to the community.

At the time of writing, the HST archive is composed of 269 CDs for the RAW data (as of July 1st, 1998), and has 18 GBytes of calibration files.

The HST OTF service is available at:
http://archive.eso.org/archive/hst/ at ST-ECF (catalog@eso.org)
http://cadcwww.hia.nrc.ca/hst/ at CADC (cadc@hia.nrc.ca)

The ESO OTF service is foreseen; sometime in the future, also NTT and VLT archive users will benefit by this indispensable archive tool.

References

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HST Archive News: WFPC2 Associations

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Astronomers having browsed/visited the HST archive in the last six months have encountered a new type of WFPC2 dataset: the Association. This is the materialisation of a new service offered to ST-ECF archive researchers, meant to reconstruct the otherwise missing knowledge of the observing strategy (expected CR-SPLIT, expected dithering) adopted by a WFPC2 PI. Unlike NICMOS and STIS, where a dataset might be constituted of a set of exposures, the WFPC2 dataset's structure was thought to be a repository of all the files belonging to a single exposure. Building associations of WFPC2 exposures is therefore to be considered an important step towards a comprehensive description of the HST archive contents. The association concept alleviates the need to discover:

• which observations can be grouped together in order to run a cosmic-ray cleaning algorithm;

• how a set of WFPC2 images map the region around an astronomical source of interest.