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The IUE Archive at Villafranca

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Abstract.

The International Ultraviolet Explorer (IUE) mission has produced a large collection of spectroscopic data containing about 104,000 spectra of ca. 9,600 different objects. The IUE Final Archive (IUEFA) project will generate a high quality and uniform spectral archive during the final phase of the mission (when specialized knowledge on the instrument and calibration procedures are still available), and maintain it so that it is accessible to the scientific community.

This contribution describes the IUEFA project at Villafranca, and the plans to make the archive available to the scientific community under through the INES (IUE New Extracted Spectra) project.

1. Introduction

There is no doubt that scientific archives represent an invaluable resource. The IUEFA will provide important reference information for current and future UV space missions. No maintenance and support of a data archive was foreseen in IUE's original mission plan. Hence, in the context of the IUEFA project, a special effort has been dedicated to the definition of the mission archive and its distribution to the scientific community world-wide. It has been said and truly written that "IUE has led the way in promoting archiving services".

2. The Final Archive

The IUE Final Archive (IUEFA) was defined as a project between NASA, ESA and PPARC, according to the following main requirements:

- Produce a *uniformly processed* archive. Through the years of the mission, IUESIPS has experienced several modifications and different calibrations have been used, so that it has been difficult to compare data processed at different epochs.
- Apply new image processing algorithms to *improve the photometric accuracy* and *signal-to-noise ratio* of the reduced spectra.
- New calibrations have been derived to estimate *absolute fluxes* and new blaze models have been incorporated to better correct for the ripple effect in high-dispersion spectra.

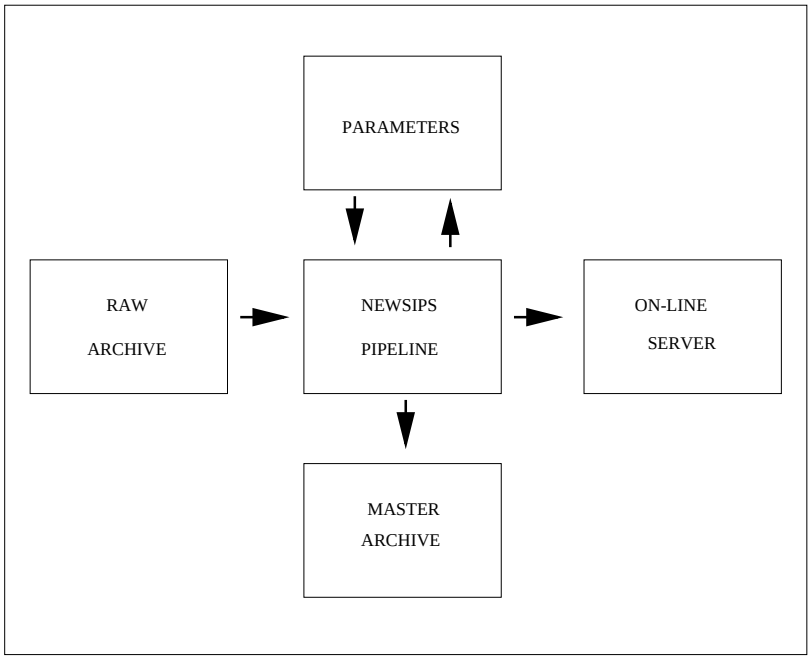

Figure 1. Final Archive data flow.

- Quality control on instrument and observational parameters. Special attention was devoted to the compilation and verification of a set of image parameters, identified as *Core Data Items*, that are required to adequately re-process the raw image and are essential for scientific analysis.

- Archived spectra written in standard FITS format (Ponz et al. 1994) on high density optical disks.

- Compatibility of output products generated at both observing stations.

3. The Production at Villafranca

Based upon the previous requirements, NEWSIPS (Garhart et al. 1997) was developed and implemented at both GSFC and VILSPA observing stations. The main elements for the production system, depicted in Figure 1, are: (1) Raw archive stored on optical disks, provides the input images to the NEWSIPS production pipeline. (2) Image parameters, defining the main object characteristics and instrumental setup. These parameters determine the calibration options, provide quality control information and are maintained under a relational data base management system (DBMS) (Barylak, 1996). (3) Pipeline (NEWSIPS), implemented under MIDAS. (4) Master archive, stored on optical disks. (5) On-line data server with extracted spectra – both two-dimensional and absolutely calibrated fluxes – available on-line.

4. Project Status

The number of observations in the archive is about 70,000 low and 30,000 high resolution images. The volume of the information of the master archive is shown in Table 1, indicating the size in Gbytes for each file type.

Table 1. Archive volume (sizes in Gbytes).

Data set	Low res.	High res.	Total
Raw images	42.0	18.0	60.0
Linearized	168.0	72.0	240.0
2D spectra	16.8	72.0	88.8
1D spectra	4.2	36.0	40.2
Total	231.0	198.0	429.0

At the time of writing, the raw archive is complete and all image parameters have been verified. Local processing at Villafranca and data exchange with GSFC are well advanced, so that the low-dispersion set is nearly finished and more than 50 % of the high-dispersion spectra have been processed and are available on the data server. The master archive will be completed by December 1997.

5. The Data Server

Access to the ESA IUE data server (Yurrita & Barylak, 1997) is available at the address `http://iuearc.vilspa.esa.es/`. This server implements the following basic features:

User identification The user logs into the data server to identify a new session. This accounting system allows users to recall queries and retrieve data from previous sessions and supports detailed usage statistics.

Query by form A simple form allows searching for objects by name, position, object type and observing date. Instrument parameters such as camera name, dispersion or aperture can also be specified.

List of observations The result of the search is a list of observations that can be used to plot selected spectra or to transfer the selected data to the local node, using different compression methods.

6. INES: The IUEFA Data Distribution System

After completion of IUEFA, data distribution is planned following the original, low-cost, distributed archive concept of ULDA/USSP (Wamsteker, et al. 1989).

The **INES** (*IUE New Extracted Spectra*) project will contain (1) the re-extracted set of low-dispersion spectra together with all high-dispersion observations re-sampled to the low-dispersion domain, (2) the two dimensional line-by-line spectra, and (3) a new version of high-dispersion spectra, with orders concatenated.

INES will be based on the following structure:

Principal center: Master archive repository, containing all the data items indicated above. Distributes the compressed versions of the archive to the National hosts via CD-ROMs.

National hosts: Located in different countries, containing the INES access catalogue and serving the absolute flux calibrated 1D spectra via HTTP.

End users: Unlimited number of nodes that access the archive at the National hosts via standard WWW browsers.

The suggested configuration for the National host data server is based upon a PC running the Linux operating system. Our prototype is running under the free DBMS MySQL employing Perl to interface with both the APACHE HTTP server and the WWW browser. This data server also implements the syntax proposed for information exchange among remote astronomical services (see ASU `http://vizier.u-strasbg.fr/doc/asu.html`). Furthermore, the access catalogue includes references to IUE spectra included in scientific publications which can be retrieved via the standard `BIBCODE` as defined in the NASA Astrophysics Data System (ADS) (Eichhorn et al. 1998).

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