EUVE Guest Observer Software User's Guide

Extreme Ultraviolet Explorer

Guest Observer Center Documentation

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PREFACE

Purpose

This User's Guide describes the IRAF/EUV layered software packages (also called the **euv** package)[1] furnished to all EUVE Guest Observers, and the use of the **euv** layered packages in IRAF. The functioning of each task is described in general, with a sample parameter file, and notes on running many tasks with EUVE data are provided. The most important and frequently used applications to reduction of EUVE Guest Observer data are described, and some are illustrated with examples. Please refer to the IRAF help pages on each task for more detailed descriptions of the tasks' algorithms, their parameters, output, and command line formats. Information about the EUVE Guest Observer data products, their format, and the EGO Center nominal reduction of GO data are now included in the *EGO Center Data Products Guide*, which is also delivered with every data set.

The **euv** software package is integrated with IRAF, the Imaging Reduction and Analysis Facility (IRAF) software, using version **2.10.3** or later. This *User's Guide* is intended for use with all versions of the IRAF/EUV software numbered **1.5**, and the EUVE reference data, version **1.9** or later. The addition of the **tables** layered packages, version **1.3.1** or later, is also used at many stages. The IRAF system is readily available, and is widely used by the astronomical community. See the resources in Appendix D for information on obtaining IRAF, additional copies or updates of the IRAF/EUV layered packages, and the EUVE reference data set.

All the data products on the standard EUVE Guest Observer data tape are furnished as FITS format tables and images. GO's who wish to work in another software system should obtain and read the *EGO Center Data Products Guide*, to become familiar with the various data files, their production, and important instrumental effects. They may occasionally want to refer to this *Software User's Guide* also, as it describes the IRAF/EUV tasks used to produce the data products.

What This Guide Assumes

This User's Guide is not intended as an introduction to IRAF, and it is assumed that the user is familiar with starting IRAF and setting its environment variables, package structure, editing parameter files, and running tasks and the use of IRAF's graphics cursor mode. New IRAF users should obtain a copy of **A Beginner's Guide to Using IRAF**, by Jeanette Barnes, available from the NOAO *ftp* site. Detailed instructions for obtaining this and other IRAF documentation are in Appendix D.

We hope this Guide will be equally useful to you in reducing your data at the EGO

Center in Berkeley and as a guide to using the IRAF/EUV software at your home institution. This document assumes that you have access to your data on disk at the EGO Center, or that you are working on a system with IRAF version **2.10.4** or later, installed. The IRAF/EUV software packages should be installed in IRAF, along with the EUVE reference data, according to the installation instructions on the data tape. It is assumed that your data have been read from tape to disk, and that all FITS files have been converted to their internal IRAF formats. Specific instructions for unpacking the data and the standard arrangement of data directories and files on disk are given in Chapter 0 of the *EGO Center Data Products Guide*. If you are working at the EGO center, you need only obtain a password for the appropriate guest account, log in, and start IRAF before beginning.

Many of the **euv** tasks are written to be applicable to other types of event-based data, and some tasks have parameters that may not seem strictly necessary for processing EUVE data. In each case, the hierarchy of parameters and the default values assigned to them are arranged to facilitate processing EUVE data. So when in doubt, using the default value is usually the best course. Some exceptions have to do with running IRAF in a VMS environment, and are specified in the notes on the relevant tasks.

Style Conventions

Throughout this guide, the names of IRAF tasks are set off in **boldface** type. The standard IRAF notation **package.task** is used for the first instance of a task name, to show which package must be loaded for access to the task. Typed commands, IRAF parameter names, and commands typed in interactive mode are displayed in `typewriter` font. Typewriter font is also used for terms internal to IRAF files, such as the column names of ST tables or QPOE attribute names. What the user types is set off with an IRAF style prompt, e.g.

```
eu> taskname arg1 arg2 ...
```

for running a task in the **euv** layered packages. Other file names, directory names, program names, titles, and non-IRAF commands are set in *italic* type.

Task names in subsection titles are set off in **CAPITAL**s to make them easy to spot when scanning the table of contents. They are NOT generally capitalized in IRAF. Tasks that are part of the IRAF/EUV layered packages usually appear at the *beginning* of a subsection title. Task names elsewhere in a subsection title indicate other IRAF packages.

Examples and processing recipes in this *Guide* show two methods for running most IRAF tasks. The user who wishes to edit parameter settings before running a task can enter **eparam** and use the sample parameter files as a model. Then typing a ":go" while in the editor will start the task running. Users who wish to avoid using **eparam** will find that example command lines with the necessary parameter settings have been provided for many common applications.

$\boxed{\text{text}}$ in boxes deserves your special attention. It is used to indicate items of special interest, *and* of un-interest. Boxes with titles like "Do I need to run < **task** >?" are meant to help you avoid reading about tasks that you may not need to use; others are meant to inform you about important points or potential problems.

Organization of This Guide

The chapters approach the tasks and their application to data products in roughly the order that most GO's use them. The order is based on the assumptions that many GO's will want to perform some data quality selection on the basis of their science criteria, and that most will want to re-extract their one-dimensional spectra. The introduction to each chapter, and the list below provide an overview to help GO's pick their starting point, if the front-to-back approach is not appropriate. In addition to the usual table of contents and list of figures, this *User's Guide* includes a list of examples, to help users quickly locate the example material that most closely matches a particular task.

1. **Using Telemetry in ST Tables** – focuses on using the telemetry tables to make time filters for data selection. Commonly used types of filters are constructed in the examples. Tasks that create new ST tables by reprocessing the telemetry information are introduced, including a specialized task for use in correcting aspect errors.

2. **Selecting Events From QPOE Files** – describes tasks and operations performed on the QPOE files. We include an introduction to QPOE interface expressions, tasks for installing filter macros in the files, and for making spectral images, and light curves.

3. **Extracting and Fluxing EUVE Spectra** – treats the extraction of 1-d spectra using two tasks, the IRAF/EUV task **euvextract** and the standard NOAO task **apextract.apall**. A task to dump EUVE-format spectral images to ASCII files is provided for those who wish to continue their analysis outside IRAF.

4. **Simulations and Model Comparisons** – describes tasks for simulating the output of the EUVE Spectrometer from an input spectrum, determining flux at the telescope from a target spectrum, and for making statistical comparisons between spectra.

5. **Doing Your Own Data Reduction** – gives instructions for reprocessing the EUVE event table, *table0.tab*, with the **euv** event pipeline task **euvred.cep** to produce new QPOE files. GO's may need to reprocess their telemetry if an improved reference data set becomes available, or to correct problems with aspect reporting.

6. **Converting EUVE Data Products to FITS Format** – describes the process of converting EUVE data and reduction products to FITS files for transport on tape or via *ftp*. The process of packing QPOE files into FITS files has two stages, but allows QPOE's to be transported between machines with different types of binary encoding.

Appendices

A **Using the QPOE I/O Interface** – gives more general and detailed information about QPOE interface expressions and QPOE macros, for those who wish to explore the possibilities provided by the QPOE I/O interface.

B **Plotting ST Table Columns with tbplot.igi** – describes an alternative to **dqselect** for plotting the columns of the telemetry tables. While **tables.tbplot.igi** does not have the capability of **dqselect** for creating data selection filters, it can show a plot of every entry in a table column, rather than sampling the table.

C **Obsolete IRAF/EUV Tasks** – Beginning with this version (**1.5**), a number of tasks from previous **euv** versions have been transferred to the package **euvobsolete**. While it is hoped that these tasks won't be used in future because their functionality has been replaced by better tasks that are more user-friendly, information about them is preserved in Appendix C.

D **Other Resources** – A short guide to obtaining more information on IRAF packages, IRAF user manuals and programming guides, and FITS documentation.

Questions and Feedback

Please send comments, suggestions, and questions to:

egoinfo@cea.berkeley.edu

Your questions will be answered as quickly as possible by the appropriate EUVE GO personnel. Your comments and suggestions for improving this *Software User's Guide* are very important to us, and we appreciate your feedback.

Thanks,

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