European Southern Observatory

MIDAS Courier

Newsletter of the MIDAS Users' Community

Volume 1, Number 2 December 1991

Editorial

In the first issue of the Courier (June, 1991) the MIDAS verification was described. This procedure has almost been completed, and the results are clearly positive. A first impression of the MIDAS Problem Database (see elsewhere in the Courier) indeed gave the qualitative result that the number of bug reports concerning MIDAS core commands has decreased drastically. From an in-house user we in fact obtained the following question: ''What are you guys going to do, now all MIDAS commands work''. Obviously we will not lean back and be satisfied with what we have reached sofar. On the contrary, now that the verification is almost done, we finally have the possibility to spend time and effort on several new projects.

Using XWindows an obvious possibility to improve the MIDAS user interface, at least for some packages, is to offer a graphical user interface. Several public and licensed software packages are able to create such an interface and its corresponding C code. We are now experimenting with these packages and will report on experiences in one of the next Courier issues. A second project is the development of a new CCD package. The package will be able to do the basic reduction of CCD images, either in an interactive or in completely automatic fashion. Also, work is done to improve the display and graphic system, both in functionality as well as in flexibility. This work results partially from the demands for the remote observing operations, and the needs for an on-line version at ESO telescopes.

At ESO Headquarters the computer configuration was changed substantially. The old VAXes (model 8600) have been taken out, and have been substituted by two Solbourne 5E/802i computers running the UNIX operating system. In order to provide VAX/VMS services, two small VAX/VMS servers 3100 were purchased. With the VAX-station 3100 already available at ESO we have sufficient VAX/VMS technology to check the MIDAS software on VAX/VMS systems and to help MIDAS users on these systems.

With the removal of the VAXes 8600 we also had to separate from the good-old DEANZA systems. Within ESO, they have provided display capacity over a period of more than 10 years. Since the MIDAS project had started, in 1982, they have been an integrated part of the MIDAS system. To us, it was therefore sad news to hear that till now nobody could be found to take care of our friends who served ESO and the MIDAS community so well.

We would like to finish with a wish for all, who in some way or the other, and whether they like it or not, have to deal with MIDAS: Happy 1992.

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General News

Change of MIDAS Release Cycle

After internal discussion within the MIDAS group as well as after consulting a number of MIDAS sites the MIDAS Group has decided to reduce the bi-annual MIDAS release cycle to an annual one. Some users may find this a somewhat unfortunate decision, and may start worrying about issues like user support and software upgrades. We understand these concerns. However, we in fact hope that with an annual release cycle we can improve our services to the MIDAS community. There are several reasons why we took this decision.

Firstly, up to 91MAY release, in-house bug reports and reports from MIDAS sites showed that the basic system still contained a number of problems. We believe that these problems have been removed. In addition, now that the verification of the basic MIDAS commands is almost finished and the installation procedures have been simplified substantially, we think that MIDAS has become rather stable and therefore do not anticipate major changes in the system in the near future.

Secondly, a MIDAS release comes with a large number of extra work. Before MIDAS is sent to the sites, a beta-test version is tested by a number of institutes having different computer systems. After any errors reported by these test institutes have been removed from the pre-release, the final freezing of the release is done and is tested in-house once more. Thereafter, the master tapes for the various computer systems are made. Together with the software testing, the documentation is checked, made up to date, and finally printed and reproduced. Alltogether, a MIDAS release always takes of the order of two to three men months of work.

Finally, in the course of January we will install an anonymous ftp account from which external sites can obtain patches for bug fixes, new software and the complete documentation of MIDAS. Hence, with the ftp account MIDAS sites are always in the position to upgrade their running MIDAS system between releases. For a more detailed report about the anonymous ftp see below.

MIDAS via Anonymous ftp

The ESO-IPG now provides an anonymous ftp account for MIDAS patches and upgrades between releases. The ftp connections for this account should be address to the internet name ftphost.hq.eso.org or IP address 134.171.8.4. Enter anonymous or ftp as username, and gives your name or mail address as password.

Under the anonymous account, the directory `midaspub` will contain all files related to MIDAS upgrades and procedures to fix corrected bugs. Some of these files could be unix-tar files, with the .tar extension, and in compressed format, with the `.Z` extension. A `README` file will contain a generic description of the files in this directory.

The complete release of MIDAS 91NOV can also be obtained via anonymous ftp. The MIDAS release, in compressed tar files, can be found in the directory `midas`. However the contents of this directory is restricted to only those sites with a valid ESO-MIDAS User Agreement.

For those of you that prefer this procedure to get the current 91NOV and next releases of MIDAS, please contact Resy de Ruijsscher to activate your site and to provide you with the corresponding password.

To get access to the `midas` directory connect first via anonymous ftp as describe above, then type the ftp command `user midas` and enter the provided password. A successful login will move you to the `midas` directory. Another `README` file contains a description of the MIDAS installation when using this procedure.

Patches and the complete MIDAS release are available via ftp from the CPU ftphost (134.171.8.4).

Below you will find two examples. The first shows how to retrieve MIDAS patches from the MIDAS anonymous ftp account. The second example show how the obtain the complete MIDAS release. This possibility is only open for MIDAS sites who have a valid MIDAS User Agreement. In the examples commands typed by the user are in underlined. Comments are indicated in *italics.*

```
% ftp 134.171.8.4 (if ftphost.hq.eso.org doesn't work)
connected to mc3.hq.eso.org.
220 mc3 FTP server (Version 5.133) ready.
Name (ftphost.hq.eso.org:jdp): anonymous (any one can log in)
331 Guest login ok, send ident as password.
Password: jdp@wispa.goya.es (use your e-mail address)
230 Guest login ok, access restrictions apply.
ftp> cd midaspub (go to the MIDAS directory with patches)
250 CWD command successful.
ftp> ls (list the directory contents)
200
PORT command successful.
150 Opening ASCII mode data connection for file list.
README.91NOV
91N0V.0001
226 Transfer complete.
23 bytes received in 0.062 seconds (0.36 Kbytes/s)
ftp> get README.91NOV (get the instruction file)
200 PORT command successful.
150 Opening ASCII mode data connection for README.91NOV (2341 bytes).
226 Transfer complete.
ftp> cd 91NOV.0001 (go to the directory with the patch)
250 CWD command successful.
ftp> get README (get the README file)
200 PORT command successful.
150 Opening ASCII mode data connection for README (1982 bytes).
226 Transfer complete.
ftp> ..... (proceed with instructions in README file)
ftp> quit (exit the program)
221 Goodby.

% ftp 134.171.8.4 (if ftphost.hq.eso.org doesn't work)
connected to mc3.hq.eso.org.
220 mc3 FTP server (Version 5.133) ready.
Name (ftphost.hq.eso.org:jdp):anonymous (any one can log in)
331 Guest login ok, send ident as password.
Password:jdp@wispa.goya.es (use your e-mail address)
230 Guest login ok, access restrictions apply.
ftp> user midas (sublogin midas account)
331 Password required for midas.
Password: ????? (password supplied by ESO-IPG)
230 User midas logged in.
ftp> get README (get the README file)
200 PORT command successful.
150 Opening ASCII mode data connection for README (1982 bytes).
226 Transfer complete.
ftp> ..... (proceed with instructions in README file)
ftp> quit (exit the program)
221 Goodbye.
```

System News

New Installation Guide for UNIX

A new version of the installation guide "Installation of MIDAS on UNIX Systems " is now available. The document contains all information for a smooth installation of the MIDAS software on UNIX systems, described in a number of chapters. These chapters contain the following information:

- installation of MIDAS, and MIDAS setup;
- installation, modification and testing of local tape drives;
- installation of tapeserver;
- installation of graphics devices.

The document is/will be sent to all sites which have requested ESO-MIDAS for a UNIX system.

A similar document for the installation of MIDAS on VAX/VMS machines is in preparation.

MIDAS under SCCS control

As many MIDAS site managers and users may have realized, ESO-MIDAS software together with its documentation has grown substantially over the past years. Almost automatically such growth comes in combination with an increase in complexity. In the "old days" every MIDAS group member knew the MIDAS application software and the dependencies on lower level routines. In addition, one knew who was working on what. With a growing system like MIDAS is now, and developed in an UNIX environment, several problems pop up. Questions like: who is working on which code; how can I save previous versions of the code; what was the last valid version; how can I retrieve a file which was deleted by accident.

Such problems can, at least partially, be solved by Source Code Control System, or shortly SCCS. After the 91MAY version of MIDAS was released, all MIDAS code and documentation was put under SCCS control. SCCS allows you to control write access of source files, and to monitor changes made to those files. SCCS allows only one user at the time to make modifications. In addition to the solutions SCCS provides for the problems mentioned above, it keeps the complete history of all MIDAS files. Hence, all versions of the MIDAS source code and documentation (starting with the 91NOV release and the internal ESO releases between the 91MAY and 91NOV version) can be retrieved immediately. For earlier versions we still have to grab our backup tapes from the shelves.

MIDAS code and documentation put under SCCS control starts with a header (comment) line containing the SCCS version number and the date of creation. These files are retrievable by the SCCS control software at ESO; files lacking this line will not be retrievable. Hence, in case of problems with (a) particular module(s) in the MIDAS software mentioning the SCCS version number of the module(s) would help to find the problem(s) in your MIDAS installation.

For people interested in SCCS software the article by Peter Collinson (SunExpert, Vol. 2 Num. 10, pag. 34) is highly recommended.

Application News

DAOPHOT: distribution and bug fixes

After consulting the author, Peter Stetson, it was decided to include DAOPHOT in the MIDAS release tape as of version 91NOV. Hence separate requests for the package are no longer needed. Since DAOPHOT/ALLSTAR is a separate context in MIDAS it can be selected to be installed via the MIDAS installation script (see the MIDAS Installation Guide). It should be clear that DAOPHOT and ALLSTAR are not the responsibility of the MIDAS Group of ESO, but Peter Stetson's. If you have trouble with DAOPHOT/ALLSTAR, you should contact Peter Stetson. Also, when papers are published based on work with DAOPHOT/ALLSTAR, the author(s) should reference Stetson, 1987, *PASP* **99**, 191 as well as acknowledge the use of ESO-MIDAS.

In the 91NOV version a number of code modifications have been made, mainly to fix minor bugs reported by Stetson. Below you will find Stetson's listing and his solutions.

1. 6 Sep 91. I have made changes in allstar.for and allstsubs.for which should make the program run slightly faster which 2K x 2K images, and should give somewhat better precision when redetermination sky values for images stored as integers.
2. 10 Oct 91. I have corrected psf.for two typographical errors. The effect of the error was that potential PSF stars with serious defects near their centers were not being automatically rejected. Very few if any users will have been adversely affected by this bug.
3. 20 Nov 91. Because of an idiosyncracy of the random- number generator in addstar.for which I took from public-domain software, about one

time in 714,000 my program would go into an infinite loop. This has now been fixed. I'm not sure whether the common blocks conform to your new standard – - maybe you had better check.

4. 26 Nov 91. A change was made in psf.for. This bug will not have produced scientifically incorrect results. When the user has a very poor-quality image (i.e. very crowded), and when the parameter EXTRA PSF CLEANING PASSES = 0, the user will have gotten a poorer point-spread function than he should have. The bug will have had little effect in other circumstances.
5. 4 Dec 91. In mathsubs.for a slight modification was made. I honestly can't say what the consequences of this bug would be, except for the obvious statement that it affects only Lorentzian PSFs. The consequences can't be too severe or I'd have noticed it long before now, and I've been using Lorentzian PSFs quite frequently.
6. 13 Dec 91. The old version of allstsubs.for had a bug such that, in dense frames, when the size of a stellar group exceeded the MAXIMUM GROUP SIZE, the star ID numbers would get randomly scrambled amongst the group members. The photometry was still essentially correct, but the IDs of individual stars, PSF stars for instance, would no longer refer to the same object as before. In a new version of allstsubs.for this problem is solved.

Spectroscopy

The 91NOV release includes a refurbished Echelle package with a simpler syntax and new algorithms. All instrument independent commands, with qualifiers `/CASPEC` or `/EFOSC` have been removed. The data structure has been redefined and provides visibility to the user by selective display of the parameter values, on-line help facilities and the implementation of consistency checks. New algorithms have been implemented, mainly for the order definition, background subtraction and optimal extraction. In the field of 1D and long-slit spectroscopy packages `SPEC` and `LONG` include a guess option for the wavelength calibration and a new context `XSPECTRA` provides a graphical interface for the reduction.

New context OPTOPUS

A new package for the preparation of multiple object spectroscopy observations at the 3.6m telescope on La Silla has been implemented by Alessandra Gemmo. The package contains all commands needed to prepare the Optopus "starplates", which interface the 54 fibre cables with the entrance slit of the spectrograph, and that contain holes at the object positions. An extra command enables the Optopus observer to create the file with instructions for the computer-controlled milling machine at La Silla.

The package is available in the context `OPTOPUS`, that can be enabled with the command:
`SET/CONTEXT OPTOPUS`.

Users of `OPTOPUS` should not forget that the instruction file has to be transferred to La Silla. Also, note that the milling machine on the mountain can only produce 2 to 3 starplates per day. If in doubt, always check with Visiting Astronomers Section at ESO Headquarters in Garching at least three months prior to the observations.

New context PISCO

A new context `PISCO` has been implemented to reduce polarimetric data obtained at La Silla with PISCO. It has been written by Otmar Stahl and Martin Schloetelburg. People interested can find the documentation in the MIDAS User's Guide, Volume B, Appendix F.

New context MVA

Until the 88OCT version the MIDAS release tape contained a package for multivariate analysis, the context `MVA`. However, since the package was considered to be of less interest to the community no major effort was taken to convert it and to include it in the Portable version of MIDAS. With the help of Michèle Peron, Fionn Murtagh (ST-ECF) has now implemented the package in the 91NOV release. For more information see elsewhere in the Courier.

ONCE MORE: MIDAS Release Tapes and Cassettes

Due to the non-negligible cost of the tapes and cassettes used for the MIDAS distribution we kindly ask you to return these magnetic media with their cases. Also we also would like to have returned the green plastic boxes, in which the tapes were packed, including the filling and the green clips to close the boxes. We can only provide MIDAS releases to sites which indeed have returned the release tapes or cassettes, with the exception, obviously, if a MIDAS release is requested for the first time.

The MIDAS Problem Database

Michèle Peron, *European Southern Observatory, MIDAS Group*
Miguel Albrecht, *European Southern Observatory, Archive Group*

As of October 1991 all user reports of MIDAS bugs and MIDAS related questions, submitted to the ESO-IPG or the MIDAS Hot-Line service are being stored in the ESO-MIDAS Problem Database. All related information (*e.g.* the local environment, installation, etc.) is included in the database and is available to all MIDAS users as well as to the person assigned to fix the bug or problem. Once a solution to the problem has been found, irrespective of the problem actually had lead to a real code modification, a brief summary is included in the associated solution database and a reference to a "patch-file" containing more details (*e.g.* code modification) is given. These patch files are available through anonymous ftp mc3.eso.org, one of the main computer at ESO Headquarters. The files can be found in the subdirectory `midaspub`. For the availability of the MIDAS software and documentation via anonymous ftp, see elsewhere in the Courier.

The ESO-MIDAS Problem Database facility has been developed in conjunction with the ESO Archive and is available through STARCAT[1] from any of ESO's main computers or from external computer systems, provided they have a network connection with ESO. In order to access it, internal users can just invoke: `starcat ESO midas` from any of the organization's main computers. External users need to connect to ESO first and login under the `starcat` account (no password required) and within STARCAT to type `ESO midas` to access the database.

As an example the layout of the MIDAS Problem Database as it appears on your screen is displayed below. In the table you will find the entries listed in the database together with their meaning.

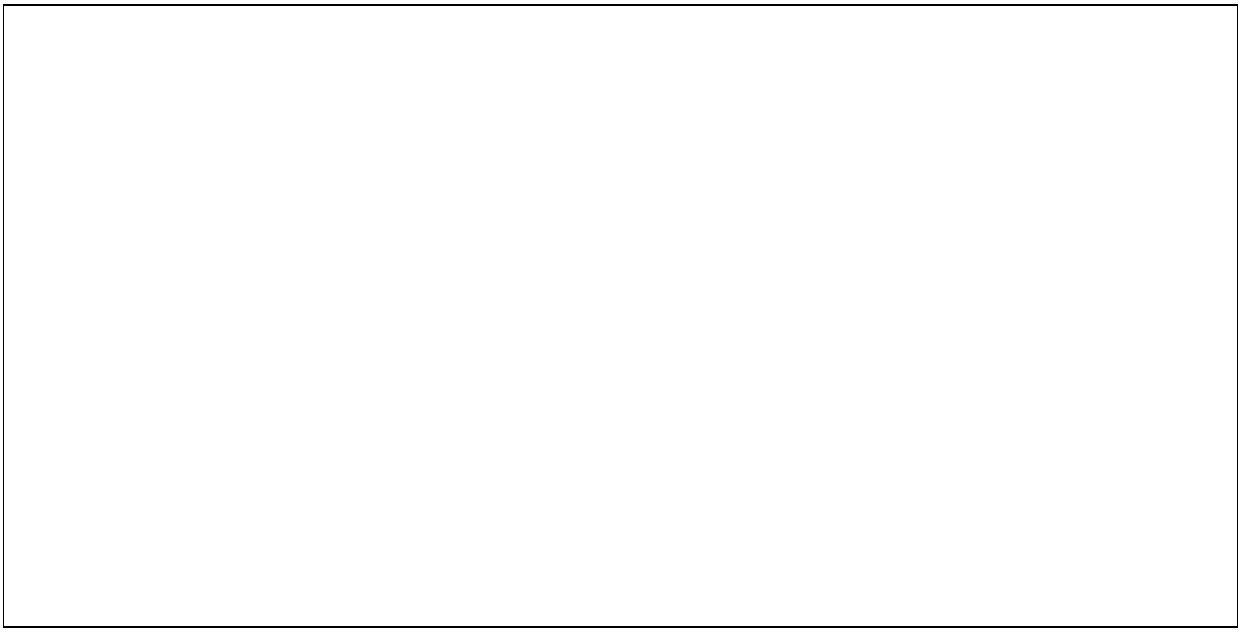
Name	Meaning
Report Date	entry date of problem report
MIDAS Version used	MIDAS release installed at user site
System	local environment (hardware, OS, etc.)
Problem	brief description of problem
Solution Date	date of solution (updated upon fix)
PatchFile	path/file name of patch in ESO anonymous ftp
Solution	brief description of solution

More information about STARCAT and how to use it is available under:

1. the STARCAT User Guide (ST–ECF O-02 series, Vol VI, edition 3.3, June 1991)
2. the STARCAT Documentation for On-Line Catalogues (ST-ECF and ESO-IPG Archive. Vol 1, Version 3.0 June 1990 and Vol. 2, Version 3.0 UPDATE December 1990)

[1] STARCAT (Space Telescope Archive and CATalogue) has been jointly developed by the ESO/Archive, the ST-ECF Archive and the Space Telescope Science Institute Data Management Facility Group

These documents can be obtained by sending a letter or electronic mail to:
ESO/ST-ECF Archive
c/o: Susan Hill
Karl-Schwarzschild-Str. 2
W 8046 Garching bei München
Federal Republic of Germany
SPAN: ESO::SHILL
BITNET/EARN: shill@dgaeso51.bitnet
Internet: shill@eso.org



An example how STARCAT displayed the ESO-MIDAS Problem Database on the user's screen. The various database entries are explained in the table.

The MIDAS Bulletin Board

Preben Grosbøl, *European Southern Observatory*

The distribution of information is a traditional problem which we for MIDAS have tried to solve by including printed documentation with releases, arranging MIDAS User meetings, writing the MIDAS Memo in the ESO Messenger, and lately by starting this newsletter. These measures are certainly needed but they all have significant intrinsic delays before reaching the user. Beside specific problems and questions which can be solved through the MIDAS Hot-Line Service, other types of information need a fast distribution such as updates on the current status of MIDAS *i.e.* problems reported including solutions to them, new implementations and developments. The MIDAS problem report data base was initiated to address the first of these issues (see previous article) while the latter two are more suited for a bulletin board.

The MIDAS Bulletin Board has been created to provide general information on the system with respect to current and planned developments of application packages, new system features, and implementation status on different hardware platforms. It uses the USEnet News facility defining a local News group called 'eso.midas'. This News group is moderated and currently only available on the ESO computer systems. People outside ESO will be able to read it through a general account 'esobb' which also will give access to other ESO Bulletin Boards. Later this year, it is expected that sites with a News implementation can obtain these News groups directly by using ESO as a feed. The general information will be issued by the MIDAS Group, however, we strongly encourage

you to post news items relating to your own MIDAS developments on this Bulletin Board. In this way, the user community can much easier share solutions *e.g.* by exchanging applications developed locally. Such News messages should be e-mailed to the moderator Rein Warmels 'rwarmels@eso.org' or posted directly on the "eso.midas" News group.

Deadline for the Next ESO-MIDAS Courier

The next issue of the ESO-MIDAS, Volume 2, Number 1, will be prepared and printed in June 1992. MIDAS users are invited to send their contribution(s), preferably in computer-readable format to the MIDAS account (see the back side of the Courier) before June 1, 1992.

Spectroscopy News

Pascal Ballester, *European Southern Observatory*

Echelle Package

Session manager

The data structure of the Echelle package, previously based on three MIDAS keywords (ECHC, ECHI, ECHR), is now organized as a set of about 80 independent MIDAS keywords corresponding to the different parameters involved in the reduction process. The set of keywords is threefold and includes option keywords which allow to perform or not a given step (e.g. FFOPT for flat-field correction), method keywords to choose between different available methods for a given step (e.g. EXTMTD for extraction methods) and parameter keywords to tune the reduction or to document the reduction session.

A set of session management commands handle these keywords. Among them, the command SHOW/ECHELLE displays selectively the keywords, depending on chosen options and methods. Hence the displayed information corresponds always to the required input. Two new commands have been implemented: HELP/ECHELLE provides information on the package itself and the keywords, and VERIFY/ECHELLE checks the class of input images (raw, extracted, rebinned), thus avoiding to transgress the basic logic of the package.

Algorithms

A new command DEFINE/HOUGH provides an alternative method for the order definition. The algorithm involved is described in Ballester (1991, Finding Echelle Orders by Hough Transform, in *Proceedings of the 3rd ESO/ST-ECF Data Analysis Workshop*, p. 23-28). The command enables to process images of lower quality than required by DEFINE/ECHELLE, like standard star spectra. Observers are advised however to take well contrasted exposures, like narrow slit flat-fields, in prevision of the order definition.

The background definition involves a new process table (back.tbl) which reference positions cover the complete width of the frame and brackets the first and last order of the spectrum. Many parameters are available to set the step along X-axis, to omit insensitive parts of the CCD (keyword SCAN) and to deselect background reference positions to avoid bright features like sky lines or particle hits (command SELECT/BACKGROUND). Three methods are available, including polynomial and smoothing spline interpolation. A third method enables to perform a background correction without previous order definition.

An algorithm for the optimal extraction of echelle spectra has been implemented by M. Peron in the command EXTRACT/OPTIMAL. This algorithm is

based on a paper of Koji Mukai (1990, Optimal Extraction of Cross-Dispersed Spectra, *Pub. of Astr. Soc. of the Pacific*, **102**, p. 183-189). The algorithm however is released on an experimental basis and does not cope in its present version with cosmic rays and sky lines in the spectrum. An improved version will be made available through anonymous ftp (see elsewhere in this Courier).

In the field of wavelength calibration, the previous instrument dependent method has been removed. The instrument independent algorithm available since 91MAY release is now the default. Enhancements implemented in the 91NOV release enable to skip already performed steps of the calibration, involves a faster process for the identification of new lines, and include a binning factor CCDBIN to take into account an optional binning of the CCD pixels.

The correction for the instrumental response involves a rewritten command `RESPONSE/ECHELLE`. The standard star spectrum was previously resampled to the bin size of the flux table which often resulted in unnecessarily truncated response function for one or many orders and apparent dropouts in the flux calibrated object spectrum. The present command resamples the flux table to the bin size of the observed standard star spectrum. The response is smoothed by median and smooth filtering, controlled by echelle keywords `FILTMED` and `FILTSMO`. The command `REPEAT/ECHELLE` has been re-introduced and can be used for interactive optimalisation of the instrumental 2D response function. It is noteworthy that the standard star method is the best way to correct efficiently for the instrumental response and that observers should always take standard star exposures.

Long slit and 1D Spectroscopy

Wavelength calibration

A Guess option has been implemented in the wavelength calibration for the RBR method in the Long Slit (command `CALIBRATE/RBR`) and in the Spec (command `CALIBRATE/LINE`) packages. This option enables to use a previously saved session to perform the wavelength calibration, so that repeating the interactive identification of lines can be avoided.

Graphical interface

A graphical interface for long-slit and 1D spectroscopy has been developed by C. Levin and is available within the X11 environment under the context `XSPECTRA`. This context provides a window based interface for spectral reduction. The package can be invoked by the command: `SET/CONTEXT xspectra`. This package is released on an experimental basis and ESO reserves the right to revise it completely. MIDAS documentation includes a description and operating mode of the package. On line help on the functions is provided by pressing the right button of the mouse while the cursor is in a window button.

Expeditions into the MIDAS Jungle: The HELP System

Klaus Banse, *European Southern Observatory*

This article is the first in a series of guided tours through the main areas of MIDAS. The idea is not to simply rehash the help text about these topics; instead we will try to collect all the bits and pieces of information which are spread all over the system and present them in a more coherent way.

The first (and often biggest) problem with an unknown system is to find out what functionality is available and how to get at it. Therefore, we begin with a trip to the HELP system.

The MIDAS help facility has been modeled after the VMS help system. That means you look for information in a hierarchical way. Type the command `HELP` and you get a list of all available MIDAS commands as well as a list of subjects about which help information exists.

The set of available MIDAS commands consists of the "basic" commands and the commands added dynamically by the contexts which are enabled at this moment. Besides these commands there exists

a set of MIDAS procedures providing useful but maybe not so frequently needed tools, the command HELP/APPLIC will display a list of these procedures.

To find out all the different options (*qualifiers* in MIDAS jargon) of a MIDAS command you found in the general list, e.g. READ, enter HELP READ. A list of all existing command/qualifier combinations will be displayed, e.g. READ/IMAGE and READ/TABLE. The final step is then to type HELP READ/TABLE which will result in the display of detailed and (hopefully) exhaustive information about the command READ/TABLE. To obtain a one line help just showing the parameters used with the command enter READ/TABLE ??.

This looks all pretty straight forward - but what about if you don't know which command to look for? This is the harder problem and MIDAS tries to help you with that in various ways.

First, the command HELP/SUBJECT may be used to obtain references to commands and documentation related to a given subject. Thus, e.g., HELP/SUBJECT ROTATION will reference commands which rotate images as well as tutorials which exercise some of these commands.

Second, if you have an idea which qualifier might be used, enter the command HELP/QUALIFIER qualif. A list of all commands with the qualifier qualif will be displayed. Some commands have a so called *wildcard* qualifier, indicated by 3 dots (...) in MIDAS, i.e. these commands accept several qualifiers and the check for the valid ones is only done at run time. Thus, it is good practice to use also HELP/QUALIFIER ... in order to get also the commands which *might* have the desired qualifier.

Finally, if you just remember the first letter(s) of a command, say CO, type CO? for a list of all MIDAS commands beginning with the letters CO.

The last few lines of the HELP display show a list of topics about which you can also get information. To distinguish these topics/subjects from MIDAS commands they are enclosed in square brackets ([and]). These topics cover general aspects of the MIDAS system like ''contexts'' as well as site specific information like a list of available printers.

The MIDAS Command Language consists of all interactively available commands as well as some additional commands, only applicable in MIDAS procedures, which provide the necessary functionality to write "programs". In order no to overload the output from the HELP command, these extra commands are displayed when using the command HELP/CL.

All the information obtained via the interactive help is also available in printed form in the MIDAS Users Guide, Volume A and B. This is a hefty document which we cannot reproduce for each and every release. Therefore, the printed help text may sometimes contain outdated information. In other words, always check first the interactive help, if a command seems not to react in the way described in the printed documentation. If you really detect a discrepancy, use the command PRINT/HELP to get the correct help on paper (and update your local MIDAS Users Guide so that your colleagues don't have to fight with the same problem).

So much for the theory - now try the real thing. A good start would be to execute the tutorial for the interactive help system via TUTORIAL/HELP.

MVA: The Multivariate Analysis Package Re-installed

Fionn Murtagh, *Space Telescope — European Coordinating Facility*
Michèle Peron, *European Southern Observatory*

In the reinstalled context MVA, the following commands are now available in MIDAS. The following commands have been installated; they all operate on MIDAS tables.

1. PCA — principal components analysis;
2. CLUST — hierarchical clustering;
3. PART — partitioning, or nonhierarchical clustering;
4. LDA — Fisher's linear discriminant analysis;
5. MDA — multiple, or canonical, discriminant analysis;
6. KNN — k-nearest neighbors discriminant analysis;

7. CORESSPONDENCE — correspondence analysis.

There routines are briefly discussed below. Further information is available in the relevant chapter of the MIDAS User's Guide, Volume B.

For handling large amounts of data, pca or part can effectively be used as a first step. In the former case, a smaller set of (uncorrelated) variables are formed. In the latter case, a small set of (non-overlapping) clusters are arrived at. Of course, how small the number of worthwhile principal components is, or how small the number of "natural" clusters in the data is, are both data-dependent questions. PCA can also be used for checking out linear dependencies.

Assessment of assignments to clusters can be undertaken using one of the discriminant analysis routines available. LDA caters for a 2-group situation. MDA allows any number of groups. KNN, as currently available, allows 2 groups. This latter discrimination method allows very flexible separation boundaries between the groups, while the former methods are based on linear separation.

CORRESPONDENCE analysis is a dimensionality reduction method similar to PCA. It allows the representation of row- and column-points in the same space. It also caters for various input data types.

These methods are some of the more important multivariate analysis methods. Recent years have seen a tendency towards interactive and graphical support environments. Insofar as multivariate analysis methods are used for exploratory purposes, they fit very well into such environments. It is often fruitful to "look at" data in different ways, using for example the spatial framework of one method to cast light on interpretation of clusters arising from another method.

Apart from the interest that such interactive environments have to offer, the following are a few of the questions which have been raised over the past years. It might be interesting to briefly discuss such issues in upcoming issues of the Courier:

- Robustifying multivariate methods: in particular, how does one carry out a PCA in a robust manner? Robust methods circumvent the possibly awkward effects of outlying observations, by excluding them from the analysis in some way which is germane to the method used.
- Handling large data sets can often present problems. How large are the data sets which one can feasibly analyze with these multivariate
- How are errors to be handled, when using multivariate analysis methods?

MIDAS Questions and Answers

The MIDAS Group, *European Southern Observatory*

With this article we want to start a standard column in the ESO-MIDAS Courier, where we present answers to questions which the MIDAS Group encounters frequently. If you have your own bag of questions which are asked very often at your site or any other suggestion and commentary, please, send them to us. This time, we want to deal with questions concerning the image display.

Problem: I have created a new MIDAS image and want to look at it, but when I type `LOAD/IMA myima` all I get is a blank screen.

Answer: In most cases this behavior results from bad *cut values*. All MIDAS images have the real descriptor LHCUTS (4 values). The third and fourth element of LHCUTS hold the minimum and maximum of the image data. MIDAS preserves the integrity of the min-, max-values in all operations but it is the responsibility of the user to initialize them correctly. If you use `CREATE/IMAGE` or another MIDAS command to generate your image file, the system takes care of that, but if you create the new MIDAS image with your own application you have to set LHCUTS(3,4) correctly yourself.

The first two elements of LHCUTS contain the user provided values used as low and high cut values when scaling the image data to the 8-bit intensity of an image display. These values are not changed by a MIDAS operation; the user sets these values either via the command `CUTS/IMAGE` or `LOAD/IMAGE`.

If the user cut values are equal, e.g. both set to 0.0,

then LHCUTS(3,4), the real minimum and maximum are taken as cut values without checking their sanity. Thus, you may get "wild" cut values if the descriptor LHCUTS is not initialized.

The solution is, therefore, to use first a MIDAS command which will find the minimum and maximum of the image data and set the descriptor LHCUTS correctly, e.g. `STATISTICS/IMAGE` or `FIND/MINMAX`.

Note, that also the PLOT commands can be badly affected by strange cut values in a MIDAS image.

There is, however, another possibility for an ill fated `LOAD/IMAGE`, related to the integer descriptor `DISPLAY_DATA`. This descriptor is created by the very first `LOAD/IMAGE` command for a given image. Among other data this descriptor contains the x,y center pixels of the frame as well as frame and screen fixpoint pixels (see the help of `LOAD/IMAGE` for details). If for any reason these center pixels get peculiar values you will not see your image in the display, i.e. it would be like you tried to load your image *beside* the display. Here the solution is to force the image center back to the display center via `LOAD/IMAGE myima center=c`.

Problem: What is the difference between `CLEAR/OVERLAY` and `CLEAR/CHANNEL OVERLAY`?

Answer: The command `CLEAR` has two main uses:

1. First, to unset a switch (so there exists also the relevant SET command). In that sense `CLEAR/OVERLAY` disables the display of the contents of the overlay channel, but what is in the overlay channel remains untouched. Therefore you can display again the overlay stuff with a `SET/OVERLAY` command which enables the display of the overlay channel.
2. The other usage of the `CLEAR` command is to clear or erase something. Thus, the command `CLEAR/CHANNEL` clears out the contents of an image display memory (called channel in MIDAS).

To summarize, `CLEAR/CHANNEL OVER` blanks out the overlay channel, whereas `CLEAR/OVERLAY` just disables the display of the contents of the overlay channel momentarily.

Problem: How can I zoom my image on an X-window display, there seems to be no zoom command when using X11...

Answer: This is true. In the X11 environment no explicit `ZOOM` command exists, because in contrast to e.g. a Gould/DeAnza display, zooming is not supported by hardware in standard X11.

But other commands let you magnify your images on an X11 display. One possibility is to load your image with scaling parameters set to values greater than 1. The pixels and rows of your image are replicated accordingly in the display. This method, however, decreases the part of the original image which can be displayed in a given window.

A better way is to use the X-specific functionality provided by the `GET/CURSOR` command. Setting the 5. parameter to the character `W`, like Window, will lead to a somewhat different behavior of the `GET/CURSOR` command.

A zoom window will be created (if not already existing) with half the x- and y-dimension of the display window. When you move the cursor into the display window and click the mouse (left button) you do not get the current cursor values and related data, as usual; instead a subwindow will be extracted, magnified and redisplayed in the zoom window. Now, move the cursor into the zoom window and get your cursor values from there. In order to return to the main display window and to choose another region, exit from the zoom window via pressing the EXIT (middle) mouse button and move the cursor back into the display window. The zoom factor can be changed once the cursor is back in the display window; several other functions are also available by typing single characters (with the cursor in the display window). For example, type `h` (for "help") to get a listing of all the possible functions.

To exit completely from the command, press the EXIT mouse button instead of choosing a new region with the cursor in the display window.

Also the command `VIEW/IMAGE` (supported only for X11) let's you examine a magnified part of your image in a zoom window as well as offering different graphical representations of the extracted data.

The MIDAS 91NOV News File (with minor modifications and additions)

The following text contains a detailed summary of revisions and changes in the MIDAS application software during the period between the previous 91MAY and the new 91NOV release. MIDAS users can produce this text with the MIDAS command `news`.

FILTER/... — KB 910527 The filter command has been modified: Now also the "border" rows and columns are filtered. If the filter radius is rx, ry in x and y, then the frame is expanded by rx columns in the beginning and end and by ry lines at the top and the bottom. The expansions is done by folding over the relevant columns and lines (excluding the very first and last column/line).

FILTER/MEDIAN — KB 910531 The algorithm for finding the median has been revised. On a SPARCstation 1 the following results have been achieved on a 512 * 512 image:
FILTER/MEDIAN in out 5,5,0. => 8 minutes (11*11 = 121 pixel kernel)
FILTER/MEDIAN in out 10,10,0. => 53 minutes (21*21 = 441 pixel kernel)

.../ACAT — KB 910603 We now support also ASCII file catalogues. This should help you in getting your files from VAX/VMS via INTAPE, OUTTAPE over to the Sun. See the Help for details.

SET/PLOT — RHW 910610 Four new symbol types have been included in the symbol set of the plot package. They are all filled symbols and have symbol type numbers 18 (filled octagon), 19 (filled square), 20 (filled triangle) and 21 (filled lozenge).

DELETE/DISPLAY, DELETE/GRAPHICS — KB 910611 These commands now work on individual windows. So you don't have to always delete all display + graphics windows (but that's still an option).

Flux Standard Star Table — MP 910612 It has been found that the flux standard star table L745X4 contained data pertaining to some other star than L745-46A. As of June 12th, this error has been corrected.

GET/ITT, MODIFY/ITT — KB 910613 The problems with these commands have been fixed.

SET/BUFFER — KB 910618 New command SET/BUFFER has been implemented to enable dynamic sizing of the MIDAS command buffer.

OVERPLOT/ERROR — RHW 910621 An extra option is implemented for those who don't like the small cross bars at the end of the error bar. The default is 'Y': cross bars will be drawn.

BIN/TABLE — JEH/RHW 910621 This new command creates from an input table and two columns (col1 and col2) an output table, containing the average values of col2 in bins of col1. The command was written by Edwin Huizinga from the State University of Groningen.

COMPUTE/KEY — KB 910621 Function M$LOG has been renamed M$LOG10 to be consistent with COMPUTE/IMAGE. M$LOG will be still recognized until the next release of MIDAS - please, change your procedures in the meantime if necessary. Also the function M$EXP10 has been added. Thus we have MLN, MEXP to work with base e and M$LOG10, M$EXP10 to work with base 10.

ADD/xCAT, SUBTRACT/xCAT — KB 910621 New options for the frame_list parameter in these commands have been added: you can use now either file names (default file types are added) or wildcard specs or catalogs. Please, consult the (interactive!) HELP for details.

Context SURPHOT — RHW 910621 A new ellipse fitting command has been included in this context. The command is written by Martin Schloetelburg and is based on the method described by Bender and Moellenhof: 1987. A&A 177, 71.

PRINT/HELP — KB 910624 Since we're always behind the on-line help with the printed help text, a new command PRINT/HELP has been implemented. It will print the same text which is displayed on your terminal with the interactive Help facility on the print device specified via ASSIGN/PRINT.

SEARCH/ICAT, TCAT, FCAT — KB 910624 The search commands for different catalogue types have been added - see the help for details.

SORT/ICAT, TCAT, FCAT — KB 910624 The sort commands for different catalogue types have been added - see the help for details.

SET/PLOT, (OVER)PLOT/CONTOUR — RHW 910710 In the SET/PLOT the CTYPE keyword specifies the line type(s) of contours to be drawn by the PLOT/CONTOUR and OVERPLOT/CONTOUR commands. An extra possibility is now included as input. If in the SET/PLOT CTYPE=LTYPE is specified, the line type of the contours will be the one specified with the LTYPE keyword.

COMPUTE/IMAGE — KB 910723 The functions ATAN, ASIN, ACOS gave wrong results and ATAN2 returned radians instead of degrees. These problems have been fixed now.

PLOT/VECTOR, OVERPLOT/VECTOR — RHW 910812 These two new graphics commands have been added. For both commands the main input is two .bdf frames: the length of the vectors in the first frame, and the position angles of the vectors in the second. Scaling of axes and vectors is possible. See the help for details.

UPDATE/DISPLAY — KB 910911 The command UPDATE/DISPLAY has been removed (no need anymore).

PLOT/COLUMN, PLOT/ROW — RHW 910911 These two new commands now enable you to plot any column or row in your image. The command PLOT/ROW does, of course, exactly the same as the command PLOT/IMAGE. However, users are encouraged to use the PLOT/ROW command, since it is anticipated that PLOT/IMAGE will be removed.

DEBUG context - KB 910912 The context DEBUG has been removed and its commands (DEBUG/PROC,DEBUG/MODU and SHOW/CODE) are now general MIDAS commands.

Opening modes — KB 910921 MIDAS images and tables are always opened with READ-WRITE mode. If that's not possible they are opened only in READ mode. If that's not possible you get an error. Thus you can control how a file is opened in MIDAS via the protection of that file which you can change with $SET PROTECTION (VMS) or $chmod (Unix).

PISCO Context — MP 910924

PLAYBACK mode — KB 911002 The PLAYBACK commands do work now. Nobody seems to have noticed that since version 89NOV...

Tables and descriptor HISTORY — MP 911003 The tables related commands update now the descriptor HISTORY

MVA context — MP 911004 The context MVA (Multivariate Analysis Method) has been implemented in MIDAS The following commands are available: CLUSTER/TAB, KNN/TAB, LDA/TAB, MDA/TAB, PCA/TAB, PART/TAB, CORRESPONDANCE/TAB

WRITE/IMA, READ/IMA, PRINT/IMA — KB 911008 The syntax for the table option in these commands has been changed! See the help for details.

WRITE/COMMANDS — KB 911009 The syntax for this command has changed (now you can specify the file to which the commands should be written)! See the help for details.

VIEW/IMAGE — KB 911018 An option for perspective plotting has been added.

WRITE/TAB — MP 911019 The command WRITE/TAB can be used to expand a table, i.e to increase its number of rows.

HELP/SUBJECT — KB 911024 The command HELP/INFO has been renamed to HELP/SUBJECT. For those who don't know this command - it provides help for subjects, like e.g. zooming, rotation, ...

FILTER/COSMIC — MP 911121 The command FILTER/COSMIC has been updated with a new algorithm written by P. Magain and M. Remy from the Institut d'Astrophysique de Liege. See the Help for more info

---

Problems found in the 91NOV Release

The following text contains a listing of problems found in the 91NOV release. Partially these problems are detected on both VMS and UNIX systems, partially only on one of these two. If you find one of the problems described below, check with your local MIDAS site manager to get the solutions implemented.

VMS and UNIX Systems

1. In file `/midas/91NOV/libsrc/ftoc/sti.fc` 4 new lines have to be inserted between lines 72 and 74.
   The file looks:
   line 72: `char *mypntr;`
   line 73:
   line 74: `*status = SCIGET(STRIPPED_STRING(name),*dattype,*iomode,*filtype,`

   and it should be:
   line 72: `char *mypntr;`
   line 73:
   line 74: `oscopy(myident,CHAR_LOC(ident),CHAR_LEN(ident));`
   line 75: `myident[CHAR_LEN(ident)] = '\0';`
   line 76: `oscopy(mycunit,CHAR_LOC(cunit),CHAR_LEN(cunit));`
   line 77: `mycunit[CHAR_LEN(cunit)] = '\0';`
   line 78:
   line 79: `*status = SCIGET(STRIPPED_STRING(name),*dattype,*iomode,*filtype,`

   Do modify this file accordingly to the above lines and if you have not yet installed MIDAS, just follow the installation notes. if you have already installed MIDAS you will need to update the installation:

```
% cd /midas/91NOV/install/unix
% config
...........
Select: 7     (update MIDAS)
Do you want to continue [yn]? (y): y
...........
Select: q     (quit config)
```

2. All Fortran applications reading the descriptors IDENT and CUNIT by the Fortran standard interface STIGET (and using these descriptors) should add two DATA statements:

```
DATA   IDENT  /' '/
DATA   CUNIT  /' '/
```

   In particular a number of programs in `/midas/91NOV/prim/plot/src` to plot images should be modified to ensure correct image identification and units along the axes.

3. In the file `/midas/91NOV/prim/general/copymi.c` the line 139 has to be changed.
   Currently:
   line 139: `if ((dely[0] == 'D') || (dely[0] == 'd')) SCFDEL(infile);`

   and should be changed to:
   line 139: `if ((dely[0] == 'D') || (dely[0] == 'd'))`
   line 140: `{`

```
line 141    CGN_CLEANF(infile,0L,cunit,100,&n,&i);        /* get full name */
line 142:    SCFDEL(cunit);
line 143:    }
```

4. The internal storage of the keyword has been enlarged. Therefore, all private application programs using the ST interfaces have to be recompiled + linked.

5. A bug was found in the AGL library routine `/midas/91NOV/libsrc/agl/bsddep.c` causing the graphics cursor to misbehave on tektronix compatible devices on UNIX systems running BSD. If you use such configuration, please replace the original code by the one below, exchange the module in the library `agl3lib.a` and relink the cursor dependent plot programs (mainly in `/midas/91NOV/prim/plot/src` and `/midas/91NOV/applic/plot/src`).

```
/*************************************************************************/
/*                      AGL_setraw  AGL_reset                            */

/* This routines are used to set the specified device handler in RAW mode  */
/* and to reset it in COOKED mode thereafter                               */

static struct sgttyb argp;
static unsigned long flags;
void AGL_setraw (filpt)
FILE * filpt;
{
int handler = fileno(filpt);
ioctl(handler,TIOCGETP,&argp);  /* Get current terminal status  */
flags = argp.sg_flags;   /* Save flags */
argp.sg_flags = (flags & (~ECHO)) | RAW; /* LF 920117            */
ioctl(handler,TIOCSETP,&argp);  /* Force RAW mode               */
}

void AGL_reset(filpt)
FILE * filpt;
{
int handler = fileno(filpt);
argp.sg_flags = flags;
ioctl(handler,TIOCSETP,&argp);  /* Reset terminal status         */
}
```

6. The number of points that can be plotted in one go is limited to 10.000 This number can by increased to 100.00 by changing the parameter NPOINT in the module `/midas/91NOV/prim/plot/libsrc/plsymb.for`.

```
       PARAMETER    (NPOINT=100000)
```

   After the change update the `plotlib.a` library and relink the plot package.

UNIX Systems

1. This patch applies only to IBM6000.
   In the file `/midas/91NOV/install/unix/systems/ibm6000/make_options.c` the line 4 has to be changed.
   Currently:

line 4: `SLIB=-lc`

and should be changed to:
line 4: `SLIB="-lc -lm"`

In the file `/midas/91NOV/libsrc/os/unix/ost.c` the following lines should be deleted:
line 102: `VOID ostalarm();`
line 676: `#if ((OS_ULTRIX||OS_BSD) && TIMEOUT)  /* ALARM function to stop */`
line 686: `#endif`

The next line should be included:
line 136: `VOID ostalarm();`

If you have not yet installed MIDAS, just follow the installation notes. if you have already installed MIDAS you will need to update the installation:

```
% cd /midas/91NOV/system/machine
% make clean
............
% cd /midas/91NOV/install/unix
% config
............
Select: 7       (update MIDAS)
...........
Do you want to continue [yn]? (y): y
...........
Select: q       (quit config)
```

2. There may still be problems in the MIDAS installation on Apollo and IBM RS/6000 machines. If necessary, patches for these machines will be provided later.

VMS Systems

1. The plotting can be VERY slow on VAXstations with VMS. To fix that problem you have to make the following three modifications in the file `mid_disk:[midas.91nov.system.idiserv.x11]idiserv.c` :
   Exchange the line:
   `static int osx_cod, prflag, first_bytes;`

   by:
   `static int osx_cod, prflag, first_bytes, jsecs, msecs;`

   And add twice 2 lines in:

```
#if vms
 first_bytes = 4096;
 strcpy (servername[0], unitnam);
 strcat (servername[0], "XW");

#else
 first_bytes = BUFHEAD;
 strcpy (servername[0], pipedir);       /* sockets will be in pipedir */
 strcat (servername[0], unitnam);
```

```
 strcat (servername[0], "XW.soc");
#endif
```

to get:

```
#if vms
 first_bytes = 4096; `
 strcpy (servername[0], unitnam);
 strcat (servername[0], "XW");
 jsecs = 0;
 msecs = 100;

#else
 first_bytes = BUFHEAD;
 strcpy (servername[0], pipedir);       /* sockets will be in pipedir */
 strcat (servername[0], unitnam);
 strcat (servername[0], "XW.soc");  jsecs = 1;  msecs = 0;
#endif
```

Finally, change line:

```
osxi = osxinfo(osxchan,1,0);            /* see, if something to read  (UNIX) */
```

to:

```
osxi = osxinfo(osxchan,jsecs,msecs);    /* see, if something to read  (UNIX) */
```

After having made sure, that the IDIserver is NOT running, compile and link idiserv.c again via:

```
$ @idinstall
```

2. The installation requires to execute the option
   `2 - Select C compiler`
   in the main menu *configmidas* before
   `7 - Install MIDAS`

3. The file `['MIDASHOME'.'MIDVERS'.monit]syskeys.dat` has to be edited.
   You should replace:

```
MID$SYS/C/30/R
SUN/SUNOS             $dbx
C Stellar/Stellix     $dbx
C mVAX/ULTRIX         $dbx
C HP/UX               $xdb
C BULL/SysV           $sdb
C VAX/VMS
```

   as follows:

```
MID$SYS/C/30/R
VAX/VMS
C SUN/SUNOS           $dbx
C Stellar/Stellix     $dbx
C mVAX/ULTRIX         $dbx
C HP/UX               $xdb
C BULL/SysV           $sdb
```

Announcement of the 4th ESO-ST/ECF
Data Analysis Workshop

ESO, Karl-Schwarzschild-Strasse 2

D-W 8046 Garching, FRG

May 13–15, 1992

ESO-ST/ECF Data Analysis Workshop
ESO, May 13–15, 1992

ESO-MIDAS™ Request Form

This is a request for the latest release of the ESO-MIDAS[2] system. To obtain a new release, please complete this form and return it to us (see reverse). Material will be shipped only to users with a valid ESO-MIDAS User Agreement. If you still have a tape or a tape mailing box from the last release, you MUST return these before we send the new release.

1. ESO-MIDAS User Agreement No.[1] _____

2. Technical Support Coordinator _____

3. E-Mail _____

4. **Tape format**
   VAX/VMS backup format, density: O 1600 bpi O 6250 bpi
   Tar format, density: O 1600 bpi O 6250 bpi
   O QIC-24 O 8mm
   O DDS/DAT 4mm
   O ftp

5. **Documentation requested**
   (one set per site)
   O MIDAS User Guide 91NOV
   O MIDAS Environment Ver. 1.1
   O IDI-routines
   O AGL Reference Manual

6. **Computer facilities**
   Computer model: _____, RAM (Mb): _____, Disk (Mb): _____

   Operating system: _____, Version _____

   Display systems: _____

   Graphic terminals: _____

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   Network address: EARN _____ SPAN _____

   Internet _____ Others _____

   Date: _____ Signature: _____

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[1] for new user agreements t.b.a.

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The following MIDAS support services are available for sending suggestions, comments or to obtain help when problems arise. These services can also be used to submit the ESO-MIDAS Request Form information, or contributions for the ESO-MIDAS Courier.

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