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JMMC

MIDI

DATA REDUCTION SOFTWARE

USER'S MANUAL

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CHANGE RECORD

<table>
<tr><th rowspan="2">REVISION</th><th>DATE</th><th>AUTHOR</th><th>SECTIONS/PAGES AFFECTED</th></tr>
<tr><th colspan="3">REMARKS</th></tr>
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<tr><td colspan="3">Fixed typo, added instructions for IDL Virtual Machine and removed note about file name length limitation (no longer exist).</td></tr>
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<tr><td rowspan="2">4.0</td><td>29/08/2005</td><td>Quynh Nhu NGUYEN</td><td>2.4, 3.4.2</td></tr>
<tr><td colspan="3">Differential phases computation and recording (file: FRGE*.fits, extension index = 7, extname = “DIFF_PHASE”)</td></tr>
</table>

CONTENTS

1 INTRODUCTION

1.1 Purpose

The purpose of this handbook is to provide all information necessary for the installation and use of the MIDI data reduction software, developed by the Paris Observatory / LESIA based group of the JMMC.

1.2 Reference document

[1] VLTI Data Interface Control Document, Version 1.0, VLT-SPE-ESO-15000-2764/1.0, May 2004

[2] A Data Exchange Standard for Optical (Visible/IR) Interferometry, Release 5, First Version: 10 January 2001, Last Update: 7 April 2003, Prepared by NPOI and COAST

1.3 Abbreviations and acronyms

MIDI	MID-infrared Instrument
VLTI	Very Large Telescope Interferometer
JMMC	Jean-Marie Mariotti Center
LESIA	Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique

1.4 Typographical conventions

ASCII	American Standard Code for Information Interchange
DRS_MIDI	MIDI Data Reduction Software
FITS	Flexible Image Transport System
IDL	Interactive Data Language
IDLDE	Interactive Data Language Development Environment
PSD	Power Spectral Density (Power Spectrum)
OI_FITS	Optical Interferometry Flexible Image Transport System

2 DESCRIPTION

2.1 General

DRS_MIDI is an IDL Widget-based program which includes three parts:

- The control and browsing of the MIDI data files in FITS format
- The computation of fringe contrasts
- The computation of the visibilities

2.2 Controlling the data files

The control of the MIDI data files allows one to list their contents: headers and data (without any processing). The contents of these files are described in [1].

2.3 Computation of fringe contrasts (Reduction of the data)

This part pertains to the computation, for each fringe data FITS file from a list selected by the user, of the factor of contrast for all wavelengths. The results are recorded in standard FITS files (and not MIDI standard) whose names are identical to the names of the data files, except that MIDI is replaced by FRGE.

Example: Data file : `MIDI.2004-06-08T05_32_18.660.fits`
Reduced file : `FRGE.2004-06-08T05_32_18.660.fits`

In this part, the OI_FITS files (OIF1*.fits for the first method of the visibilities computation and OIF2*.fits for the second one) are recorded in the same folder as the fringe files. Theirs OI_VIS2 table will be completed by the "Visibilities Computation" part and the new files will be recorded in the "Save Visibilities Directory".

2.3.1 Selection of the MIDI data files:

This step consists in selecting the files containing the fringes, i.e. the files corresponding to «OBS_FRINGE_TRACK_FOURIER» or/and «OBS_FRINGE_TRACK_DISPERSED».

2.3.2 Research of the files of photometry:

With each fringe file are associated two data files of photometry (one for each telescope). These files are selected as follows:
- the acquisition time is the closest to the fringe file's
- one file pertains to the open output A, while the other to the open output B

2.3.3 Checking the photometry files and the calibrators:

With the sky background it is difficult to extract the position of the source on the detector by inspecting the flux only in the tracking files (note that during the tracking, no chopping is applied at the moment. Hence the photometric files are used to define the location of the source on the detector and to compute a mask to extract the fringes. It is necessary to check the time consistency of the files: for instance if two photometry acquisitions were made before and after the fringe acquisition, both the AOPEN and BOPEN photometry files may be used. In this case, the hours of photometry are very different. To avoid such a case, a test over the acquisition hours is carried out.

2.3.4 Detector masking and photometry computation:

The photometry files are used to mask out the detector patches free of interferometric signals (computation of the mask). Photometry data contain observations on the sky (OFFSOURCE) and source (ONSOURCE). The target signal is extracted by substracting the ONSOURCE signal from the OFFSOURCE one acquired at a chopping rate between 0.5 and 2Hz generally.

Three methods of mask calculation are proposed by the software:

Fix Mask: the position of the maximum signal is found for each pixel (i.e. each wavelength), for AOPEN (telescope 1) et BOPEN (telescope 2). Then the mean of these two values is computed to define the position of the fringe mask. This mask is 1 in the chosen region and 0 outside, the size of the mask, is predefined.

Rectangular Mask: this method returns a mask determined by the area where the value of the signal is higher than a threshold, then a filtering by median in order to eliminate the irregularities due to noise is applied.

Gaussian Mask: a 1D gaussian is fitted at each pixel (i.e. wavelength λ). A low order polynomial function is fitted to follow the change of FWHM(λ) and MAX(λ). A gaussian mask is computed by creating gaussian at slowly evolving position of maximum and FWHM.

Each mask (i.e. one for each telescope) is then applied to the photometry. The photometry is computed as follows:

$$Photometry = \sqrt{PhotometryA * PhotometryB}$$

2.3.5 Computation of the Power Spectrum:

The power spectrum is calculated from the difference between the two interferometric outputs (the two outputs are complementary). It is a very efficient way to remove the background and any sources of noise, but this method is limited by the quality of the beam splitter. A fringe peak is detected, a correction of the background noise is applied by fitting of the noise at various frequencies in Fourier plane and the integral of the peak provide the correlated flux in counts unit (ADUs).

Three methods of calculation of the background are available:

Constant: the minimum of the signal is taken

Edges: the average of the edges values of the PSD is taken

Histogram: the histogram of the PSD allows one to define the background pixels and to take their average value

2.3.6 Computation of raw visibilities (fringe contrasts):

The fringe power is the integral of the calibrated power spectrum. The power spectrum is windowed to improve the signal-to-noise ratio.

The squared coherence factor is the ration of the power to the squared photometry:

$$\mu^2 = \frac{Power}{Photometry^2}$$

2.3.7 Recording of the results:

The results are recorded in FITS files. These files contain a primary recording and 7 extensions.

Primary: (*Extension = 0*)

***Header*:** the whole information necessary to the computation of the transfer functions and the visibilities such as: name of the data file, name of the files of photometry, date of observation, name of the object, UTC, LST, projected bases, U, V, azimuth, name of the mask applied, diameter and associated error (for the calibrators)…

***Data*:** no data.

Here is an example of the primary header of a file:

```
SIMPLE  =                    T / Written by IDL:  Mon Dec 13 13:13:31 2004
BITPIX  =                  -32 /
NAXIS   =                    2 /
NAXIS1  =                  151 /
NAXIS2  =                   71 /
DATE    = '2004-12-13'         / Creation date (CCYY-MM-DD) of FITS header
EXTEND  =                    T /
TFILE   = 'E:/Data/2003/11-08\MIDI.2003-11-08T05_27_58.000.fits' /Target filename
AOPEN   = 'E:\Data\2003\11-08\MIDI.2003-11-08T05_32_06.000.fits' /AOPEN filename
BOPEN   = 'E:\Data\2003\11-08\MIDI.2003-11-08T05_34_29.000.fits' /BOPEN filename
DATE_OBS= '2003-11-08T05:27:58.00' /Date of observation
EPOCH   =              2000.00 /
TARGET  = 'hd39400 '           /Target name
CALCODE = 'C       '           /C-calibrator, S-Source
RAEPP   =            88.110224 /Right Ascension (decimal degree)
DECEPP  =            1.8550700 /Declination (decimal degree)
EQUINOX =              2000.00 /
DIAMETER=              2.25000 /Diameter (m)
DIAM_ERR=             0.120000 /Diameter error (m)
TIME_OBS= '25645:27:58.0000'   /Observation time
BEGINTIM=            52951.228 /
ENDTIME =            52951.229 /
UTC     =            19669.000 /UTC at start (decimal sec)
LST     =            14050.560 /Local Sideral Time at start (decimal sec)
PBASE   =            36.712655 /Projected baseline (m)
TEL1I0  =             -44.9146 /Telescopes coordonates
TEL1I1  =             -66.1831 /
TEL1I2  =           0.00940000 /
TEL2I0  =             -14.8937 /
TEL2I1  =             -30.4893 /
TEL2I2  =          0.000247539 /
BLENGTH =              46.6401 /Baseline length (m)
INCLIN  =         -0.011243479 /Baseline Inclination (decimal degree)
AZIMUTH =            30.795986 /Azimuth (decimal degree)
PARALAT =             -24.6279 /Site Latitude (decimal degree)
PARALONG=             -70.4048 /Site longitude (decimal degree)
U       =            18.796243 /U (m)
V       =            31.536016 /V (m)
MODE_ID = 'PRISM   '           /Mode ID
SHIFTWIN=                  150 /Detector Window shift
FIL_ORG = 'E:\Data/2003/11-08\MIDI.2003-11-08T05_27_58.000.fits' /Data file
END
```

Extension 1 (`EXTNAME = MEANDSP`): average power spectrum.

Extension 2 (`EXTNAME = DSP`): Power spectrum on all scans.

Extension 3 (`EXTNAME = PHOTO`): Photometry acquisitions.

Extension 4 (`EXTNAME = MASK`): Mask.

With header `USE_MASK` giving the name of the mask (either `FIX`, or `RECTANGULAR`, or `GAUSSIAN`)

Extension 5 (`EXTNAME = MU2`): squared factor of contrast (μ^2) computed for each scan.

Extension 6 (`EXTNAME = WAVELENGTH`): wavelength.

Extension 7 (`EXTNAME = DIFF_PHASE`): differential phases.

Extension 8 `(EXTNAME = DATA_UT)`: Acquired data for image centering.
This information is recorded for data reduction quality check. This check can be carried out in «Computation of the visibilities» section.

2.4 Computation of the visibilities

This part allows to compute the transfer functions, the visibilities, along with their errors, and to display the results obtained.
Computations are carried out on the whole list of contrast files (FRGE*.fits) selected by the user.
For each source file, a search of the closest calibrator files is carried out.

Computations include:
For calibrators, the transfer function based on the contrast estimate and diameter input.
For sources, the estimate of the transfer function, either by interpolating the transfer functions of the two calibrators bracketing the source (1st method), or by calculating the average transfer function of all the calibrators belonging to the same night selected by the user (2nd method).

The visibility of the source is:

$$Visibility=\frac{Contrast}{TF}$$

More exactly, the (Co-Transfer Function)^2, i.e. $1/TF^2$, is computed and multiplied to the (Contrast Factor)^2 to yield the (Visibility)^2:

$$(Visibility)^2 = (Co\_TF)^2 \times \mu^2$$

These values can be recorded in files, either in FITS format, or in ASCII format. The files of results of the first method have the name RESU*.fits or RESU*.asci and those of the second method have the name MEAN*.fits or MEAN*.asci.

The FITS files contain a binary table with 7 columns:
- Column 1: wavelengths
- Column 2: (Co-Transfer Function)^2
- Column 3: Error(CoTF)^2
- Column 4: (Visibility)^2
- Column 5: Error(Visibility)^2.
- Column 6: (Average_FactorContrast)^2
- Column 7: Error(Average_FactorContrast)^2

as well as the headers giving information on the dimensions of the table of results, the name of the object, the date of observation, the projected baseline, the azimuth, U, V, names of the calibrators and their times, …

This same information is recorded in the ASCII files.

The OI_FITS files (described in [1]) can be recorded:
- The filename is OIF1*.fits for the first method.
- The filename is OIF2*.fits for the second method.

These files contain:
- an OI_ARRAY table.
- an OI_TARGET table.
- an data table OI_VIS2 that refers to an OI_WAVELENGTH table.

3 USER'S GUIDE

3.1 Prerequisite

The MIDI Data Reduction Software needs that either *IDL runtime* (version 5.6, 6.0 or 6.1) or *IDL Virtual Machine* (version 6.1) is installed on your computer to operate.

The *IDL Virtual Machine* can be freely downloaded on http://www.rsinc.com/idlvm.

3.2 Installation

The software can be downloaded on http://mariotti.fr in the *Data Processing* section. You must download the software corresponding to the version of your IDL.

After download, the first step consists to unpack the .tgz file using either the Unix/MacOS command, as shown below:

```
% tar -xzvf drs_midi-IDLv<IDL-Version>.tgz
```

or the *WinZip* or *PowerArchiver* tool on Windows.

3.3 Startup

To run the Software using *IDL runtime*, go into the created directory, start IDL and restore the software using the command:

```
IDL> RESTORE, 'drs_midi.sav'
```

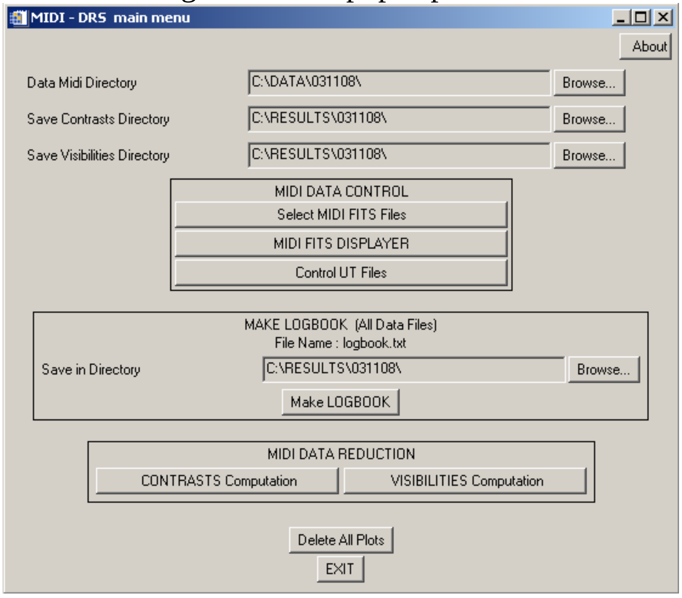
And to start it:

```
IDL> drs_midi
```

To run the Software using *IDL Virtual Machine*, go into the created directory, start directly IDL using the following command:

```
% idl –vm=drs_midi.sav
```

The main widget software pops up:

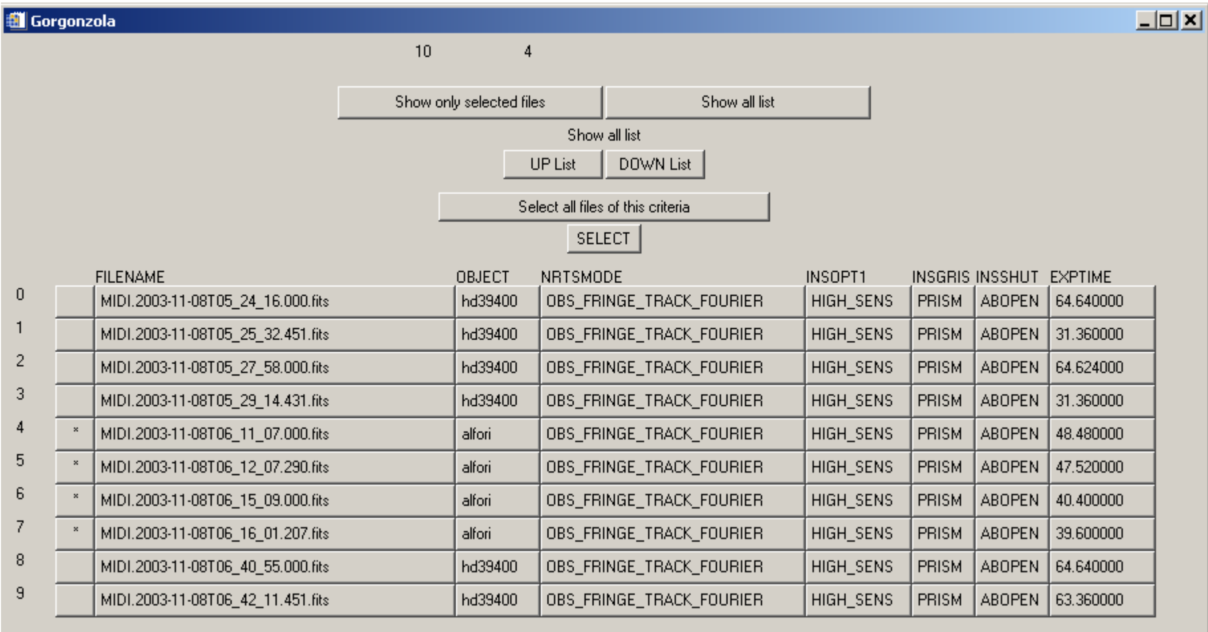


For ***Data Midi Directory***: select the path of the folder containing the data files FITS.
For ***Save Contrasts Directory***: select the path of the folder where the files resulting from the computation of contrasts will be recorded.
For ***Save Visibilities Directory*** select the path of the folder where the files resulting from the Computation of the visibilities will be recorded.
For ***Save in Directory*** (Make LogBook): select the path of the folder where the file logbook.txt will be recorded. This file contains information pertaining to all the data directory (*Data Midi Directory*) files: file names, object names, observation modes (Prism or Grism and High_sens or Sci_phot), NRTS mode (Obs_Fringe_Track_Fourier, Act_UT_Coarse_Chop, Obs_Photometry_Chop, …), Shutter name (ABOEN, AOPEN, BOPEN), diameter, exposure time, …

These folders must be created before any use. Make sure that writing permissions are enabled.

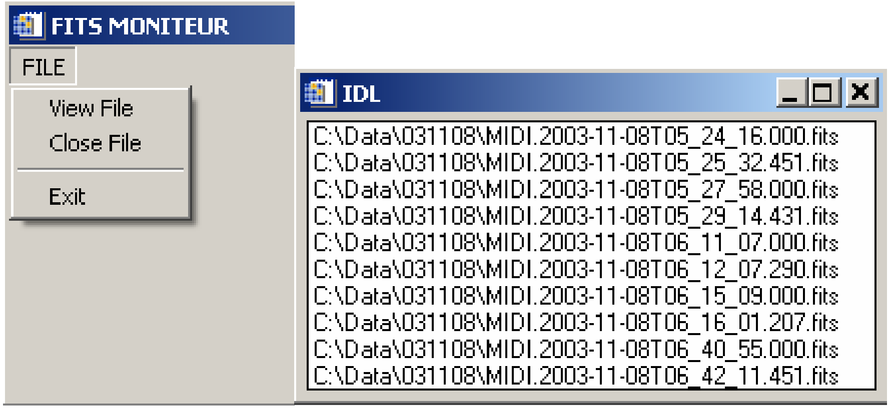
It is preferable that the path of the data folder does not comprise the string « MIDI » and those with the folders of the reduced files and visibilities, «FRGE », « RESU » and «MEAN ». Such a case would be extremely confusing for the automatic research procedures.

↳ SELECT MIDI FITS FILES

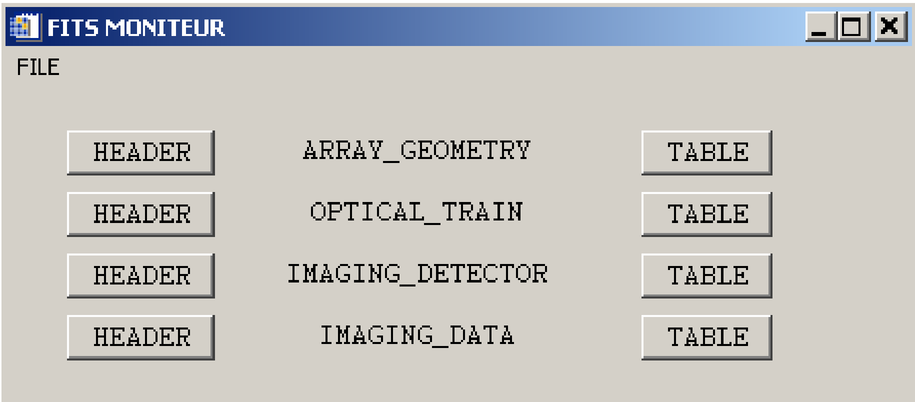


The selection of the files is done, either by checking the choices one by one, or by desired type. Example: to select all of the ALFORI files, it is suitable to click on a box «ALFORI » then to click on «Select all files of this criteria». The same shortcut is available for all the types of desired files (OBS_FRINGE_TRACK_FOURIER, PRISM, ABOPEN, …).

MIDI FITS DISPLAYER

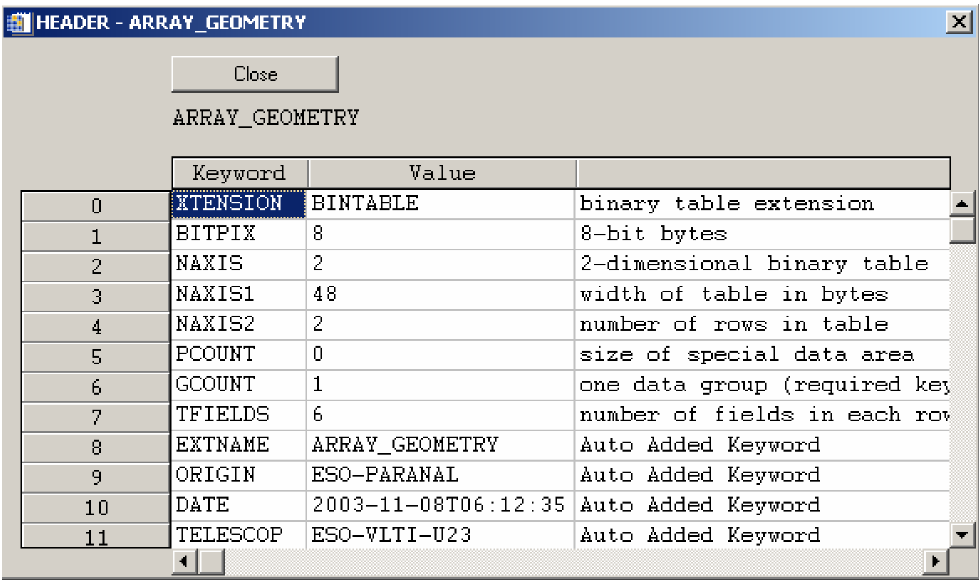


Select a file to visualize its principal headers and its data by clicking on the buttons *HEADER* and *TABLE* (Caution: since some data can be heavy to load the use should be restricted to header visualization):



Example: file `C:\Data\031108\MIDI.2003-11-08T06_11_07.100.fits`

- Header for ARRAY_GEOMETRY:



	Keyword	Value	
0	XTENSION	BINTABLE	binary table extension
1	BITPIX	8	8-bit bytes
2	NAXIS	2	2-dimensional binary table
3	NAXIS1	48	width of table in bytes
4	NAXIS2	2	number of rows in table
5	PCOUNT	0	size of special data area
6	GCOUNT	1	one data group (required key
7	TFIELDS	6	number of fields in each row
8	EXTNAME	ARRAY_GEOMETRY	Auto Added Keyword
9	ORIGIN	ESO-PARANAL	Auto Added Keyword
10	DATE	2003-11-08T06:12:35	Auto Added Keyword
11	TELESCOP	ESO-VLTI-U23	Auto Added Keyword

- Table for ARRAY_GEOMETRY:

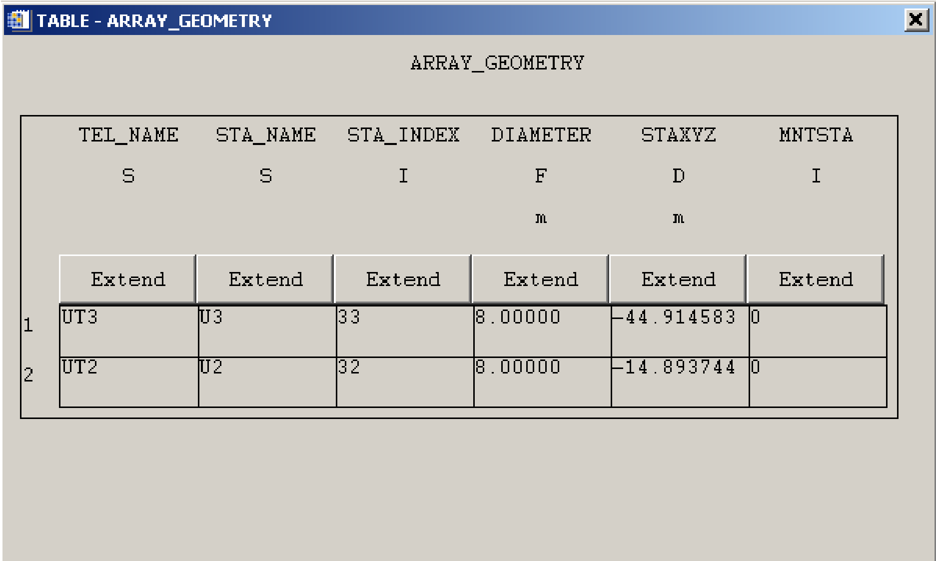
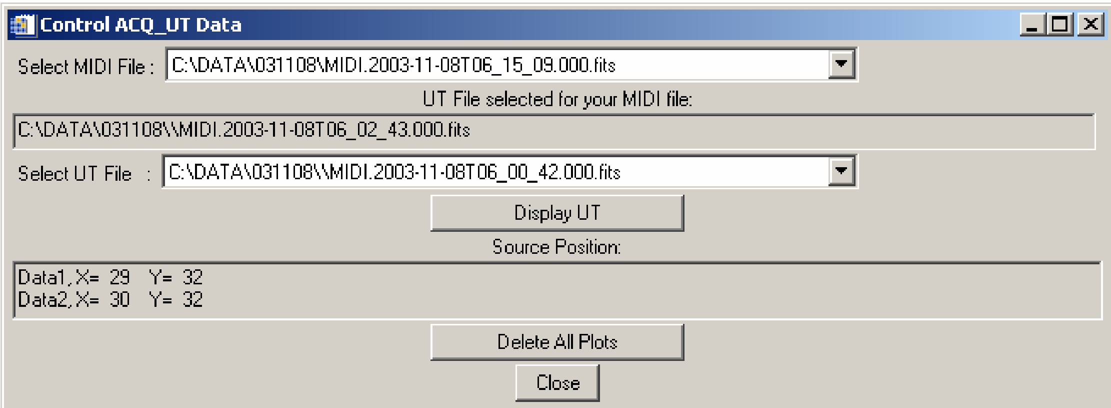


TABLE - ARRAY_GEOMETRY

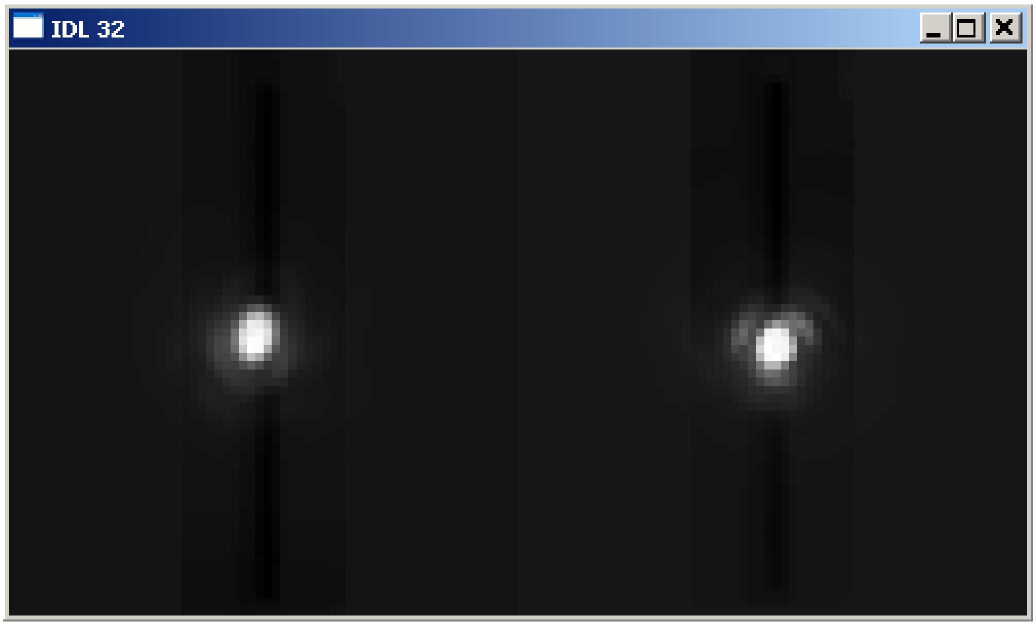
ARRAY_GEOMETRY

	TEL_NAME	STA_NAME	STA_INDEX	DIAMETER	STAXYZ	MNTSTA
	S	S	I	F	D	I
				m	m	
	Extend	Extend	Extend	Extend	Extend	Extend
1	UT3	U3	33	8.00000	-44.914583	0
2	UT2	U2	32	8.00000	-14.893744	0

↳ CONTROL UT FILES

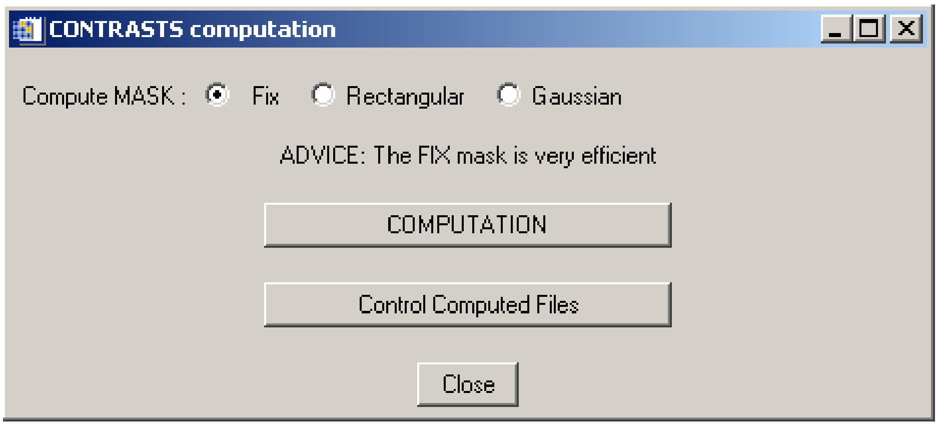


This widget allows one to know which UT file is associated with a given data file, and to visualize the positions of the source:



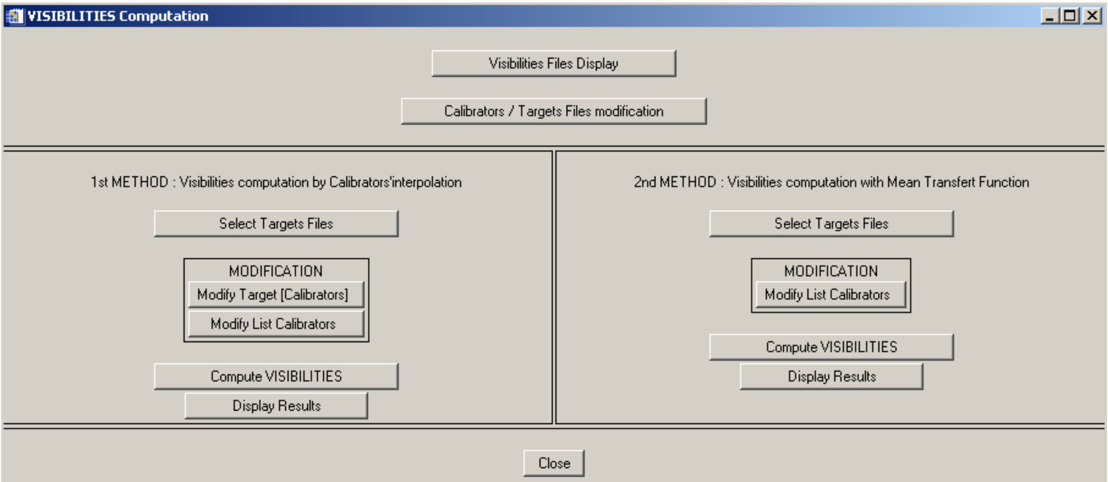
↳ CONTRASTS COMPUTATION (SEE 3.4.1)

This widget pertains to the factors of contrast Computation.



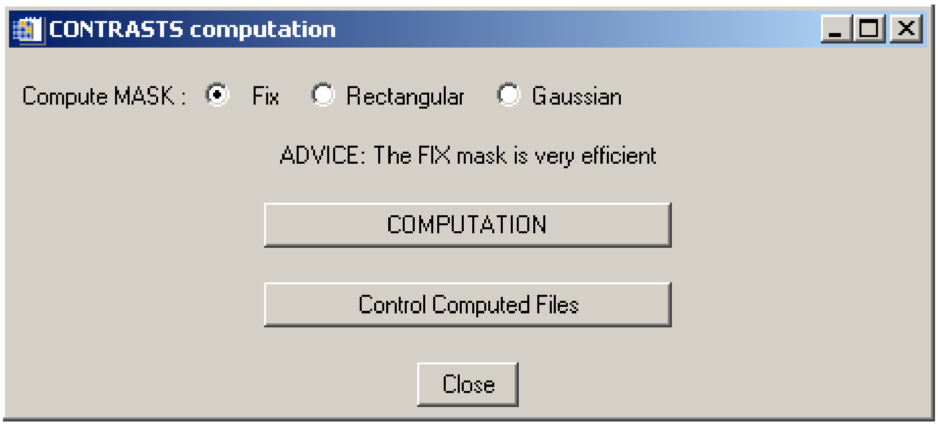
↳ VISIBILITIES COMPUTATION (SEE 3.4.2)

This widget calculates the visibilities.



3.4 Data reduction

3.4.1 Computation of contrasts



The Computation of contrast consists in:

a) Determining from the photometry files a mask to isolate the part which contains data. Three options of mask are proposed: Fix, Rectangular and Gaussian (the mask which returns good results with almost all data is the “Fix” one).

b) Applying the mask to the photometry files to extract the photometry values.

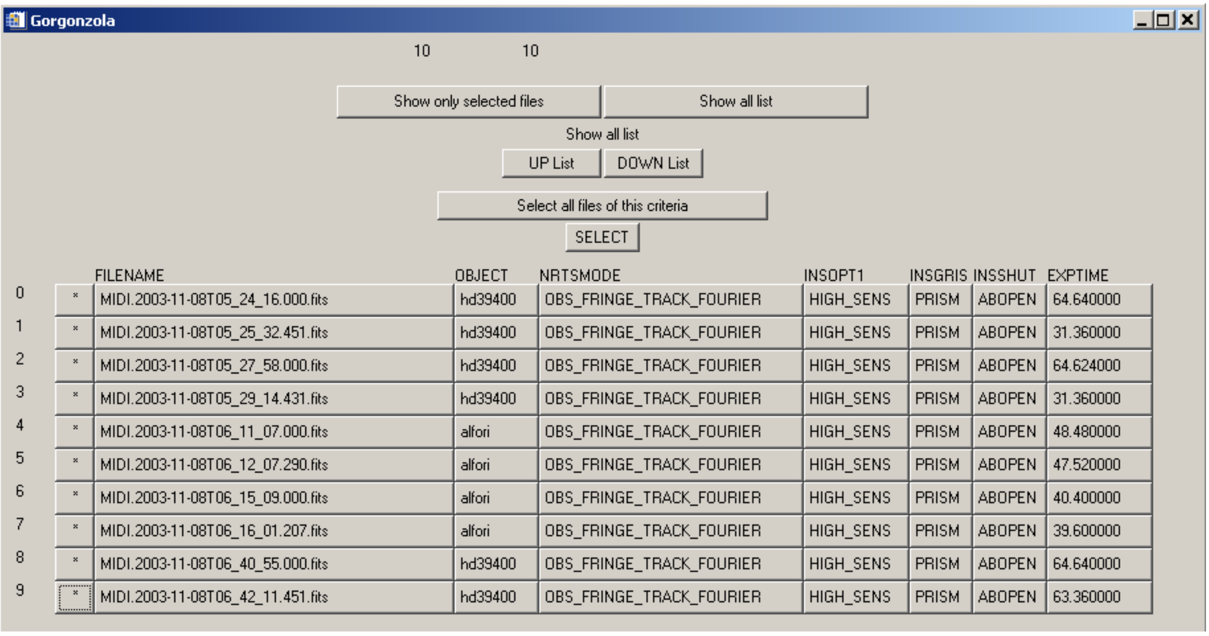
c) Calculating the power spectrum of the fringes signal pertaining to the area defined by the mask.

d) Calculating the factor of contrast by normalizing the power spectrum by photometry.

The results will be recorded in the FITS files whose names are deduced from the names of the MIDI data files by replacing MIDI by FRGE. The contents of these files can be visualized in the section “***VISIBILITIES Computation”***, as described below.

First of all, it is necessary to choose a mask, then to click on "Computation". The list of MIDI data files contained in the Data Midi Directory with the

OBS_FRINGE_TRACK_FOURIER or/and OBS_FRINGE_TRACK_DISPERSED flag appears:

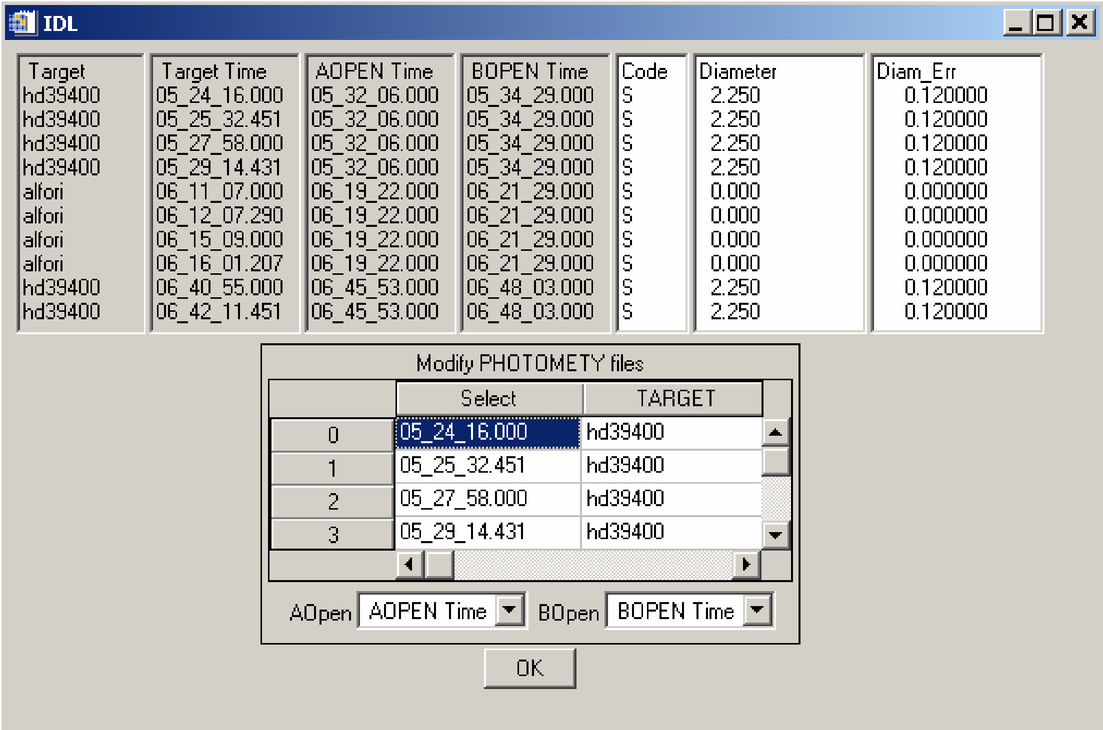


		FILENAME	OBJECT	NRTSMODE	INSOPT1	INSGRIS	INSSHUT	EXPTIME
0	*	MIDI.2003-11-08T05_24_16.000.fits	hd39400	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	64.640000
1	*	MIDI.2003-11-08T05_25_32.451.fits	hd39400	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	31.360000
2	*	MIDI.2003-11-08T05_27_58.000.fits	hd39400	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	64.624000
3	*	MIDI.2003-11-08T05_29_14.431.fits	hd39400	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	31.360000
4	*	MIDI.2003-11-08T06_11_07.000.fits	alfori	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	48.480000
5	*	MIDI.2003-11-08T06_12_07.290.fits	alfori	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	47.520000
6	*	MIDI.2003-11-08T06_15_09.000.fits	alfori	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	40.400000
7	*	MIDI.2003-11-08T06_16_01.207.fits	alfori	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	39.600000
8	*	MIDI.2003-11-08T06_40_55.000.fits	hd39400	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	64.640000
9	*	MIDI.2003-11-08T06_42_11.451.fits	hd39400	OBS_FRINGE_TRACK_FOURIER	HIGH_SENS	PRISM	ABOPEN	63.360000

For this example (we only have the OBS_FRINGE_TRACK_FOURIER files), check the **OBS_FRINGE_TRACK_FOURIER** files for the sources and the calibrators to be processed to select them (left-hand column) or all the files of this type by checking an **OBS_FRINGE_TRACK_FOURIER** box, then click on «**Select all files of this criteria**». Complete the selection by checking on «**Select**».

The program carries out the first step which consists in recovering all the parameters necessary to the reduction and seeking the associated files of photometry automatically.

A window appears indicating the source names (Target) and the acquisition times of photometry files associated with AOPEN and BOPEN:



It is mandatory to check the consistency between the source file and the photometry files AOPEN and BOPEN. A time difference larger than 2 or 3 minutes (this criterion can be adjusted by the user) between AOPEN and BOPEN indicates a probable bad choice. It is possible to manually select the photometry files associated with a given source: boxes AOPEN and BOPEN propose the list of the possible photometry files for this source.

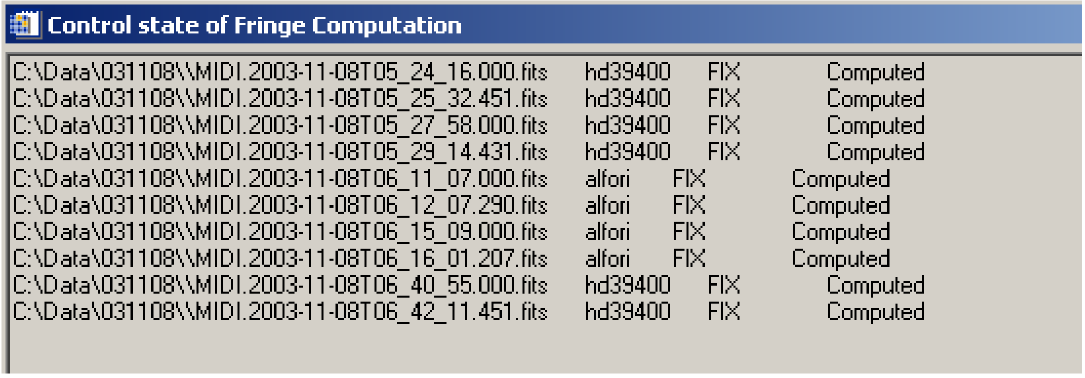
At this stage, all files are marked as sources (S). The columns Diameter and Error_Diameter display the diameter estimate for the sources which were indexed as possible calibrators in the associated data base. It is possible to redefine the calibrators thereafter.

Blank lines can appear. This indicates that Computations could not be carried out because some photometry files are missing.

The next steps of the processing are automatic and lead to the recording of the fringe files in the folder **Save Contrasts Directory**.

During the processing, so messages can appear, indicating that the chosen mask is not valid for some of the files and suggest, once the computation is over, to select another mask for these files.

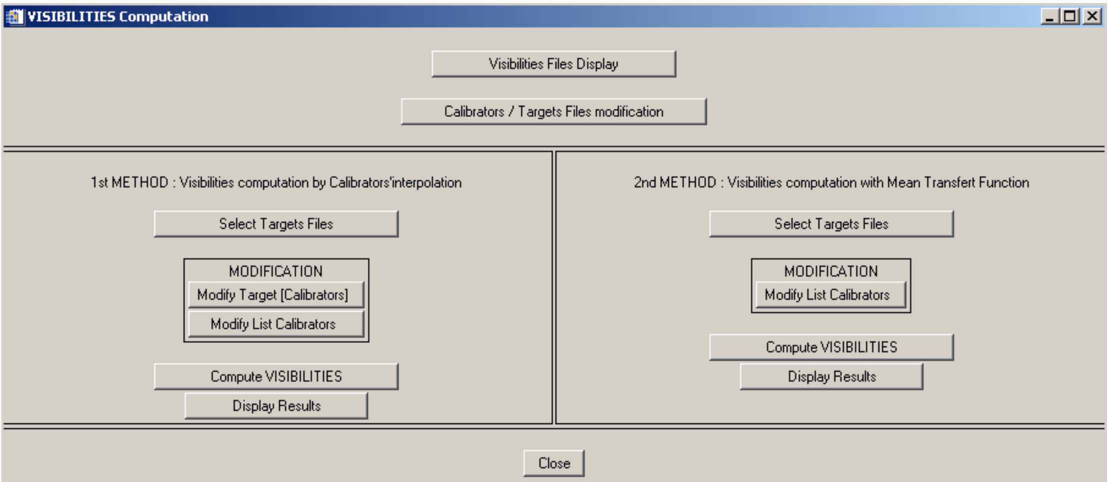
CONTROL COMPUTED FILES



This widget shows which files have been reduced (indicated by «Computed»).

3.4.2 Computation of the visibilities

Clicking in the principal menu on the VISIBILITIES Computation button launches the computation of visibilities widget:

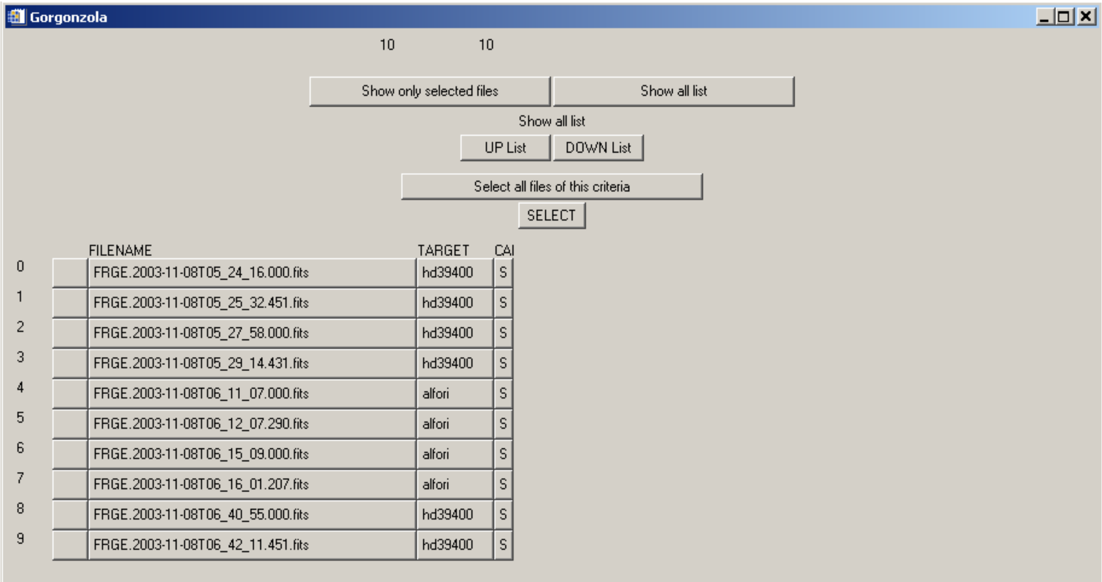


This part relates only to the reduced files recorded in the folder ***Save Contrasts Directory***, and does not use the raw data of the ***Data Midi Directory*** any more.

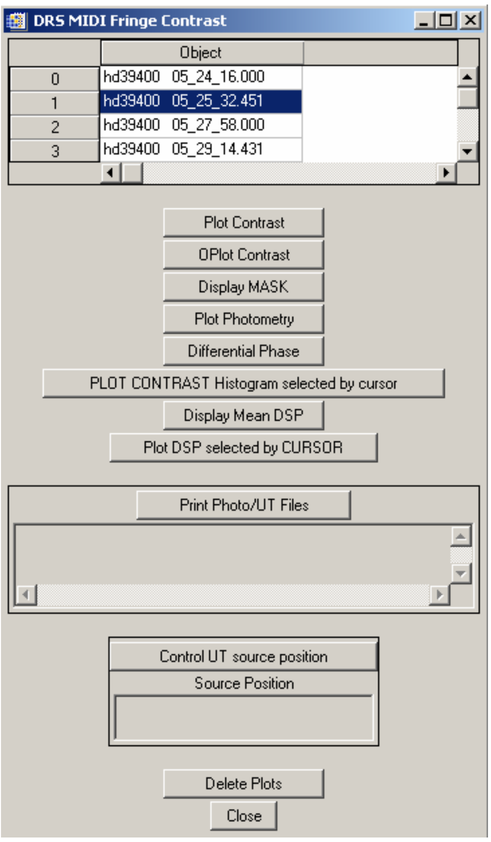
At this stage, two methods of computation are available:
First method: makes an interpolation of the transfer functions of the two calibrators bracketing the source.
Second method: calculates the average transfer function of all the calibrators belonging to the same night chosen in the list by the user.

It is compulsory to carry out computations in the order of the Widget IDL buttons, i.e. from top to bottom, as will be reminded by error messages.

↳ VISIBILITIES FILES DISPLAY

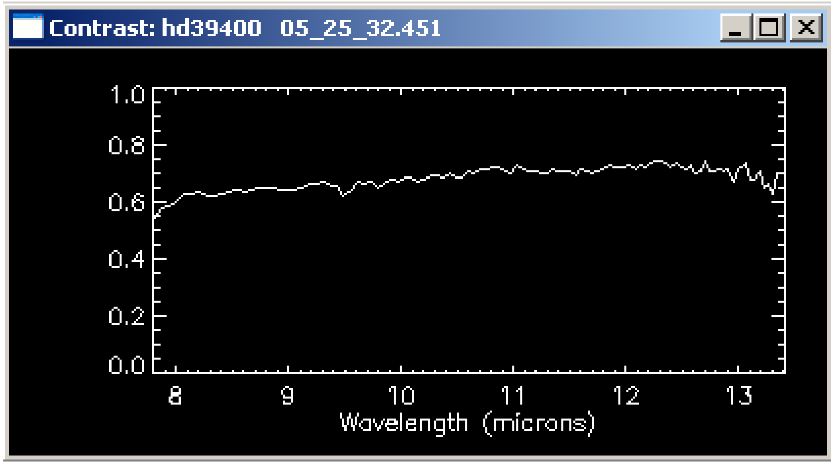


The file selection window shows up:

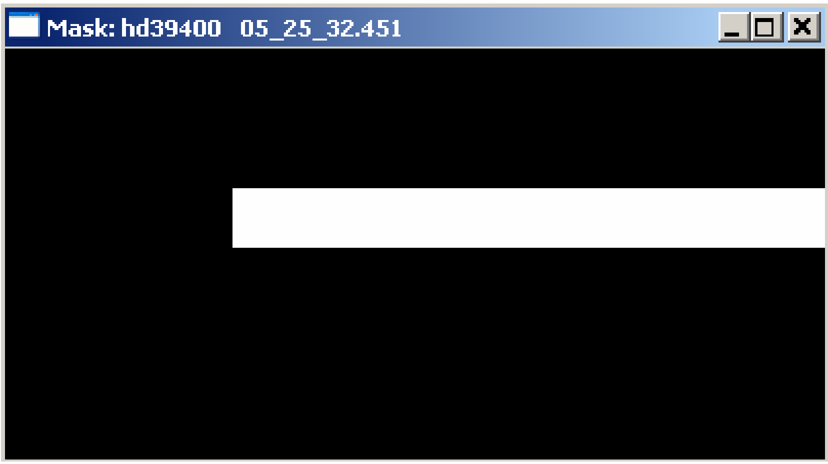


This widget allows to visualize the contents of the reduced files (FRGE*.fits), i.e.:

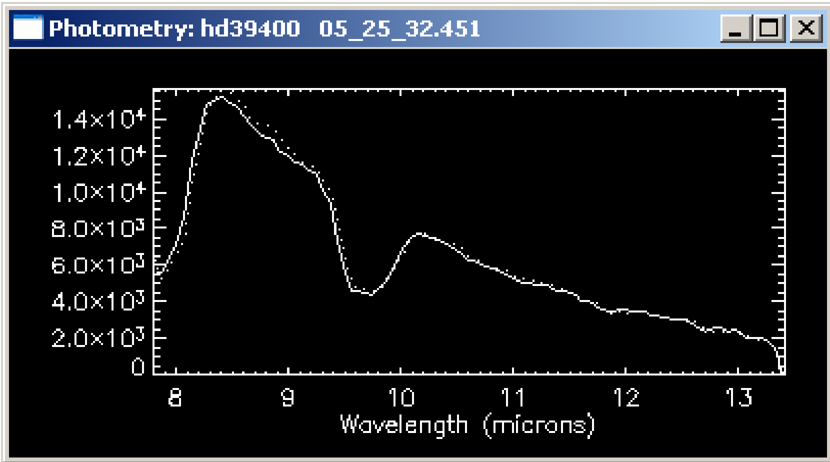
- The factor of contrast as a function of wavelength:



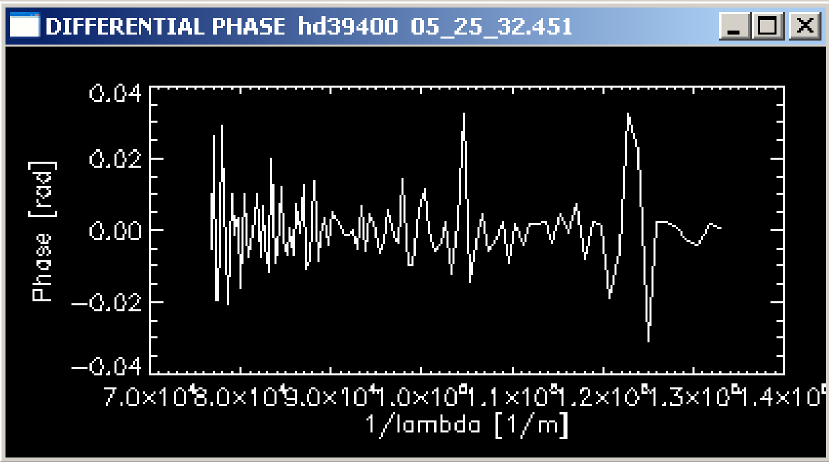
- The mask:



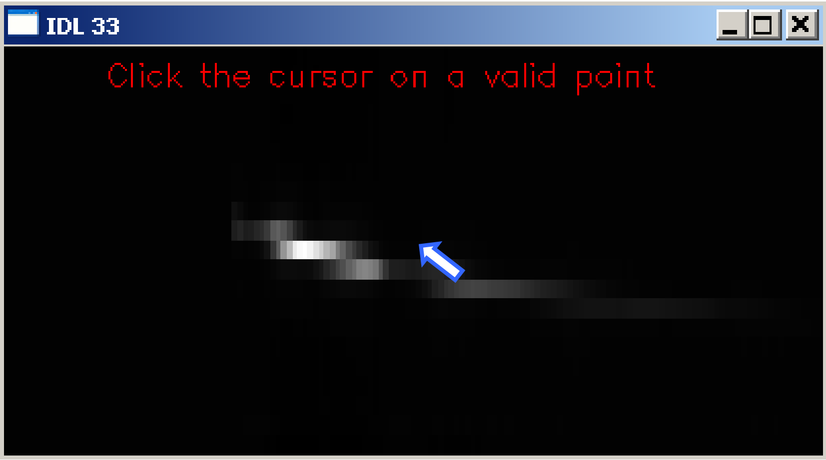
- The photometry:

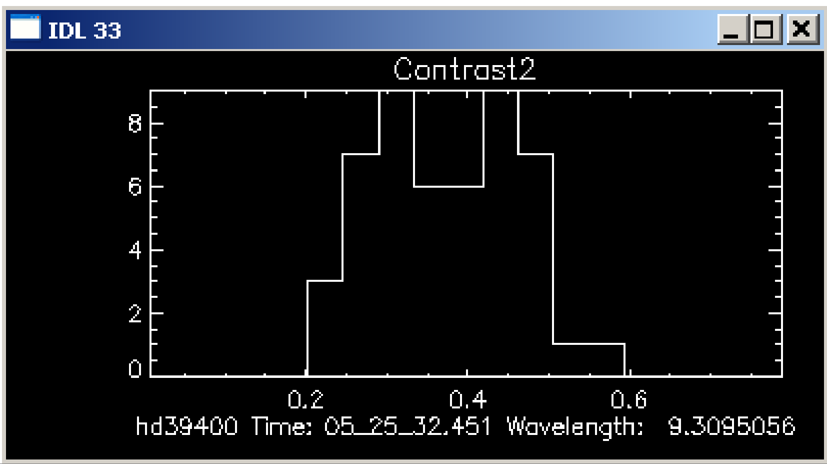


- The differential phase:

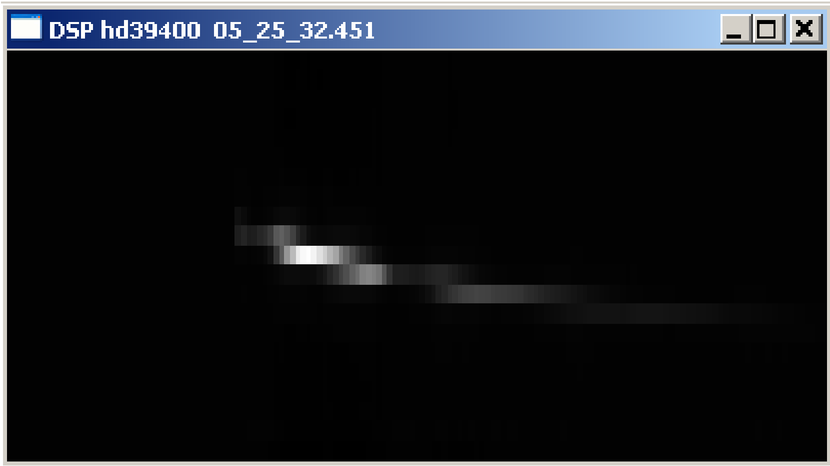


- The histogram of the PSD for a given wavelength selected by the cursor:

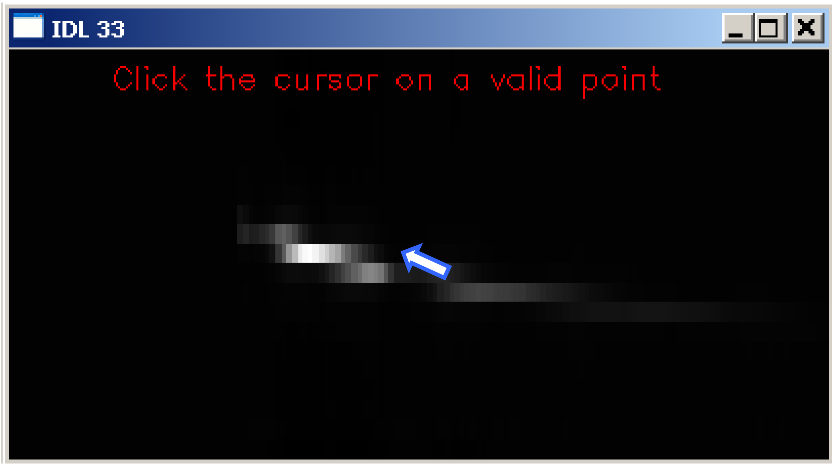


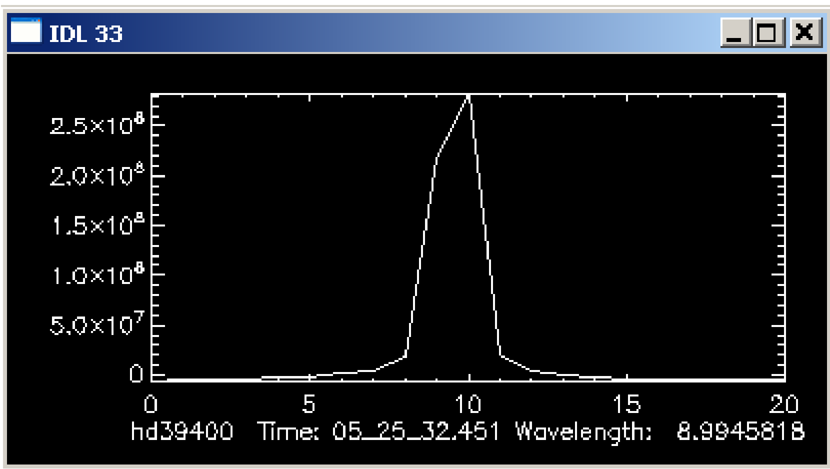


- The average PSD on an observation:

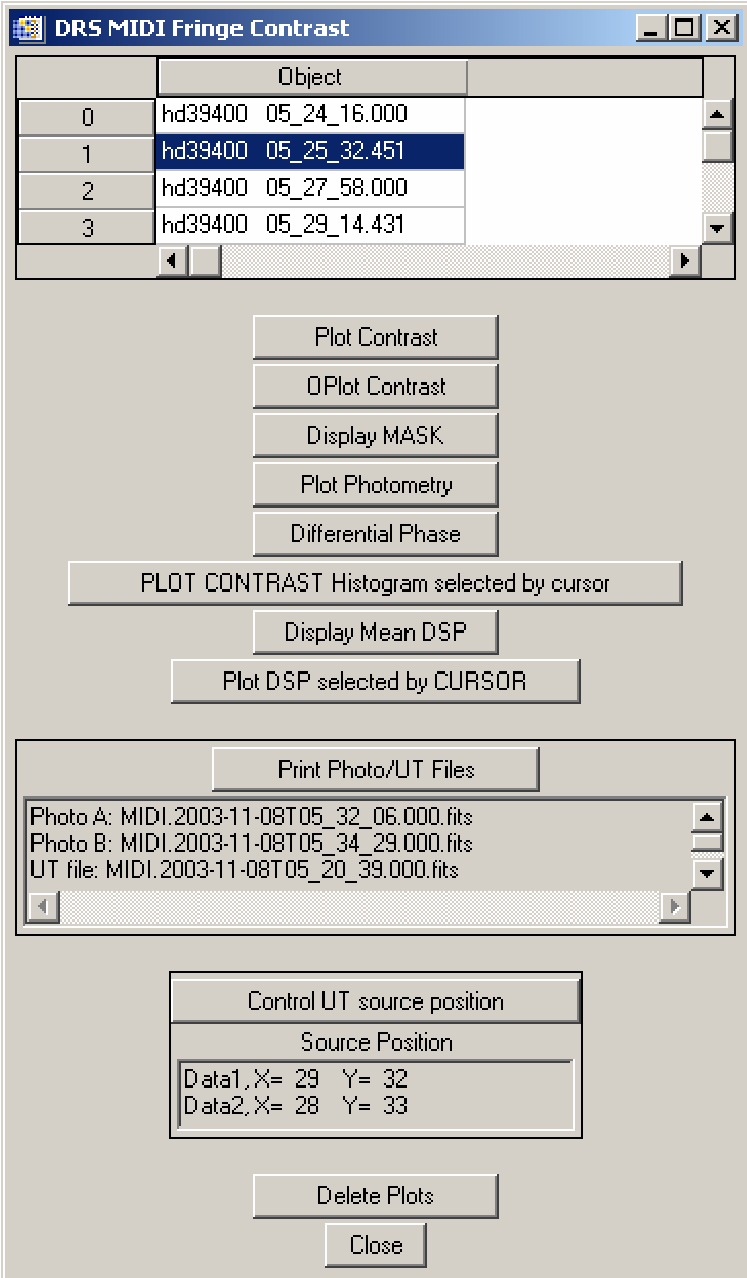


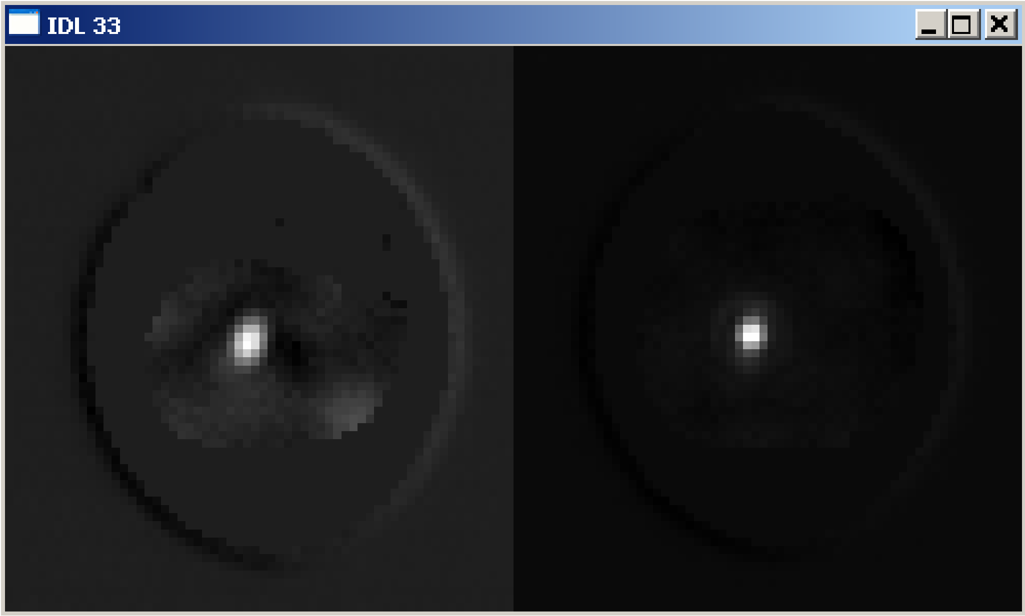
- The average PSD for a given wavelength selected by the cursor:





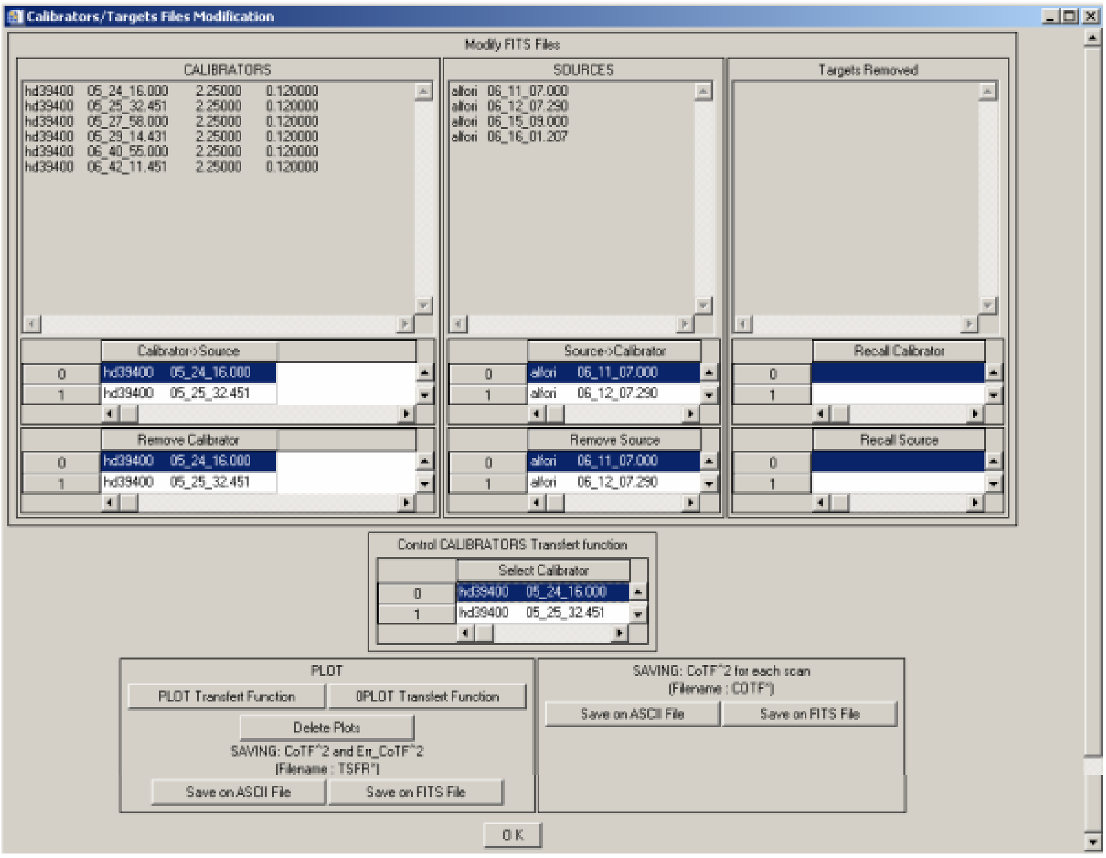
- The name of the photometry files associated with a given source and the ACQ_UT_COARSE_CHOP file preceding the source:





↳ CALIBRATORS/TARGETS FILES MODIFICATION

Controlling and choosing the calibrators:

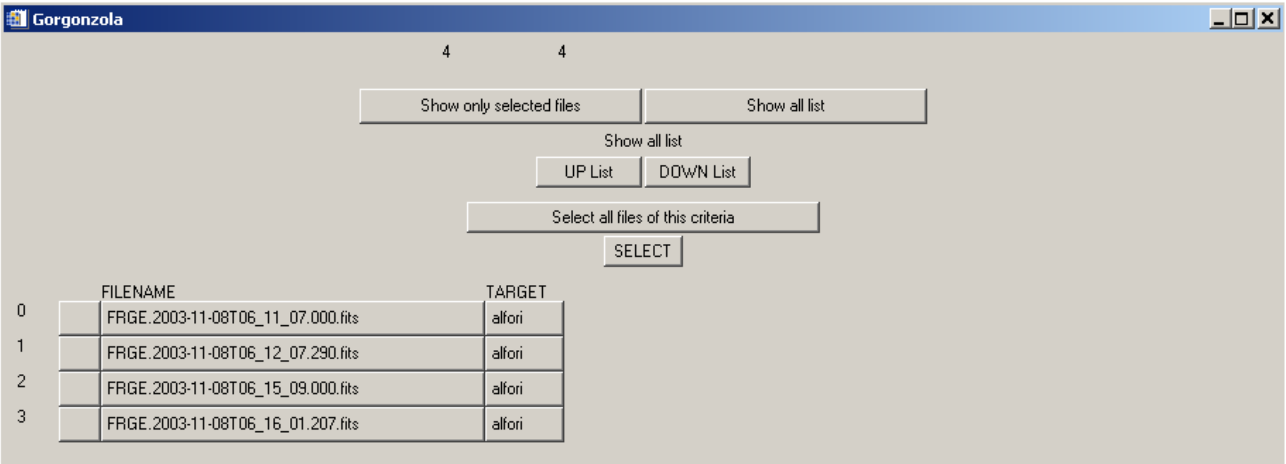


In this widget, one can:

- Redefine which are the sources and calibrators (At the beginning, by default, all the files are in the column SOURCE. It is up to the user to modify them: either Source, or Calibrator, or Removed).
- If some source files or calibrator files are of poor quality, they can be removed by ***Remove Source*** or ***Remove Calibrator*** (and also recovered as a source or calibrator by ***Recall Calibrator*** or ***Recall Source***).
- Trace the transfer functions of the calibrators to assess their quality and record them in the FITS or ASCII files. The name of these files is deduced from the names of files FRGE by replacing FRGE by TSFR.
- Record the (Co_TF)^2 computed for each scan in the FITS or ASCII files. The name of these files is deduced from the names of files FRGE by replacing FRGE by COTF.

The modifications made at this stage are recorded in the FRGE files, therefore the selection of the sources and calibrators is recorded and remembered even after quitting the session.

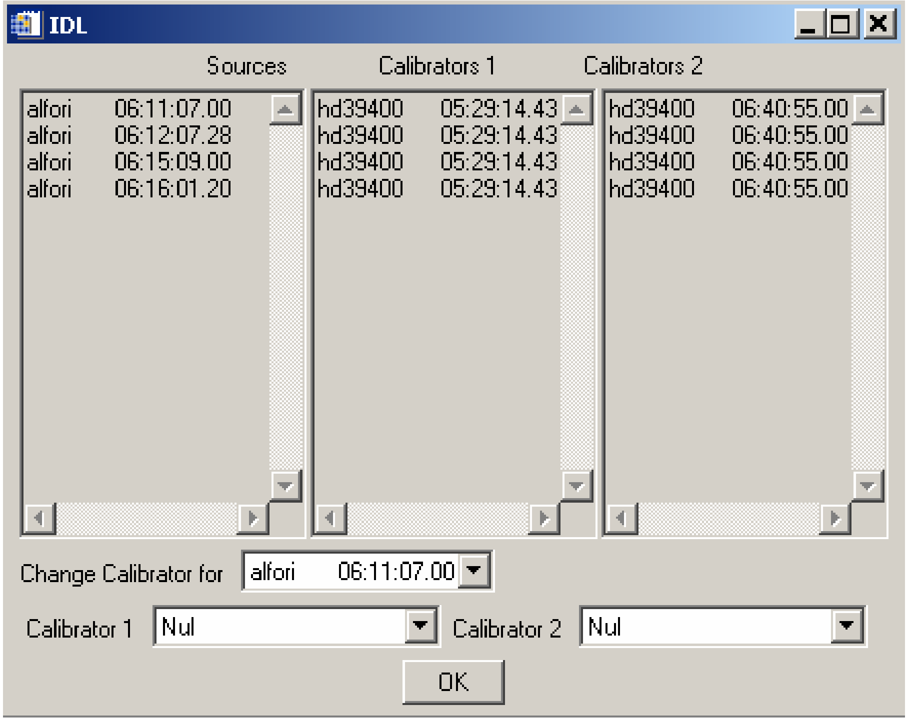
SELECT TARGETS FILES



It is necessary to select the sources for which visibilities are to be computed.

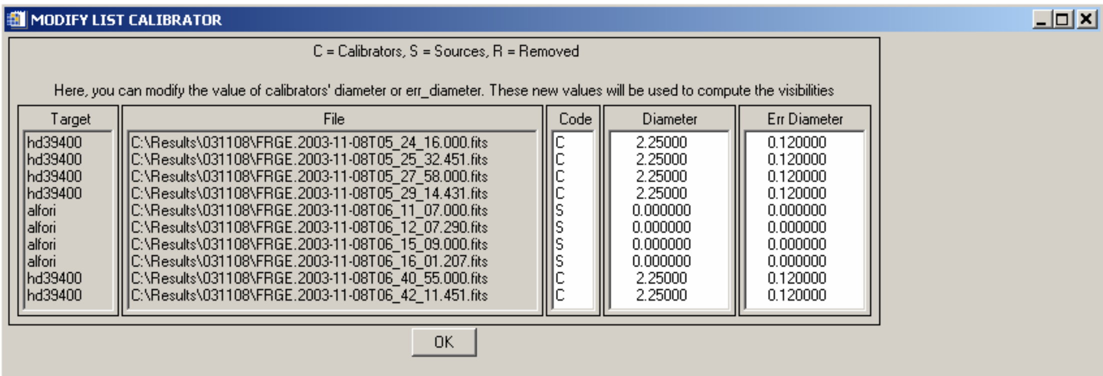
↳ Modify Targets [Calibrators]

Once the sources are selected, another window pops up with the list of the sources and the calibrators associated with each of these sources.



The automatic calibrator research procedure selects for each source the first calibrator preceding it and the first following it, if they exist. The procedure works even if there is only one calibrator regardless of its acquisition time (before or after the source). The user can change the associated calibrators by selecting a source and then by choosing in the lists of calibrators 1 and 2 which are to be used or removed («null» meaning the corresponding calibrator will not be used).

↳ Modify The List Of Calibrators



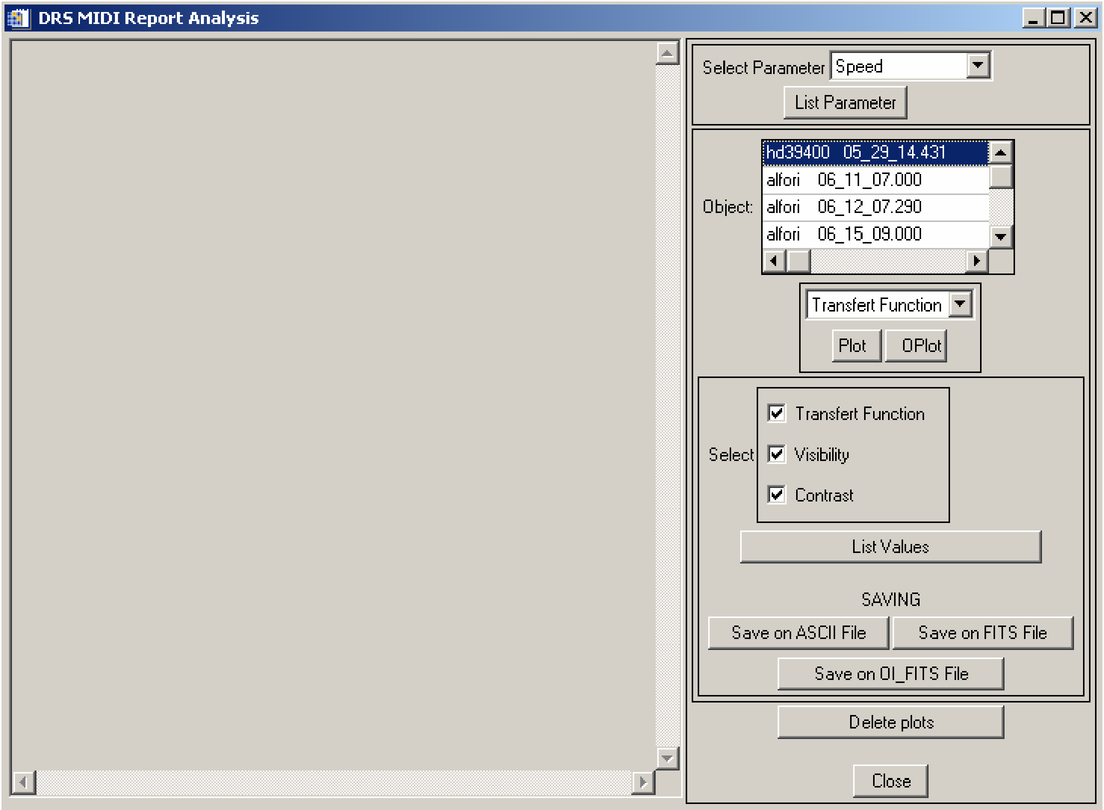
Here, it is possible to modify the value of the diameters of the calibrators and their errors. These modifications are taken into account in the following steps to calculate the visibilities.

↳ Compute Visibilities

The computation of the visibilities is done without graphic interfaces. The program will inform by a message that the computation is finished.

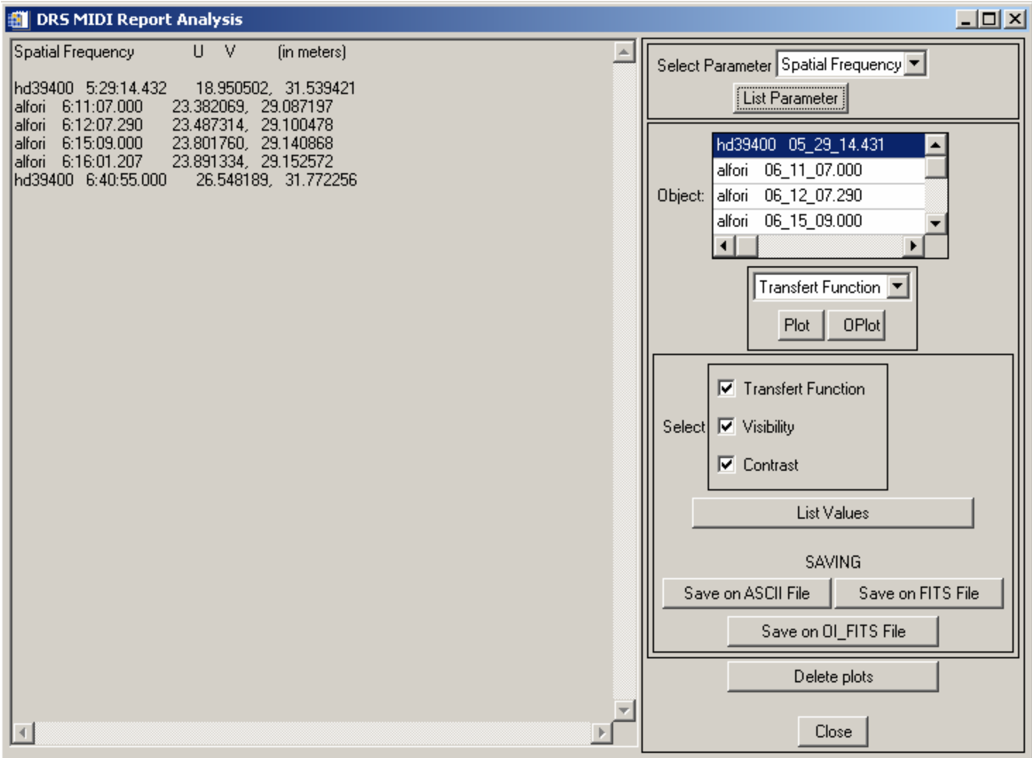
DISPLAY RESULTS

The box ***Display Results*** can display the results of the computations thanks to the following widget:

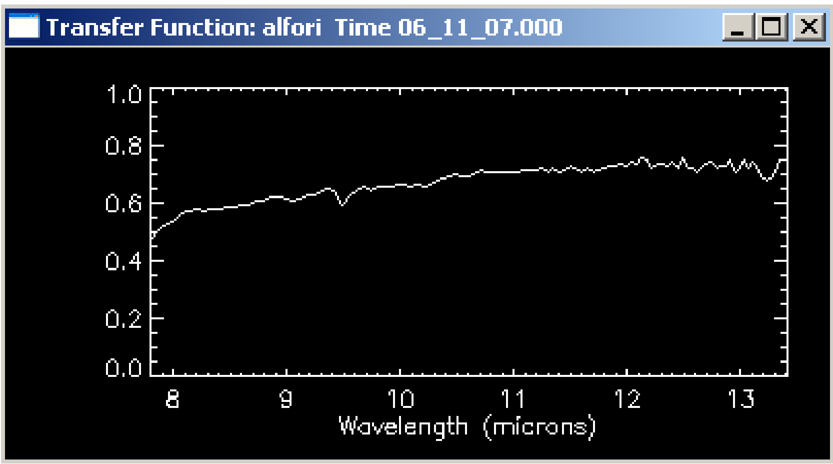


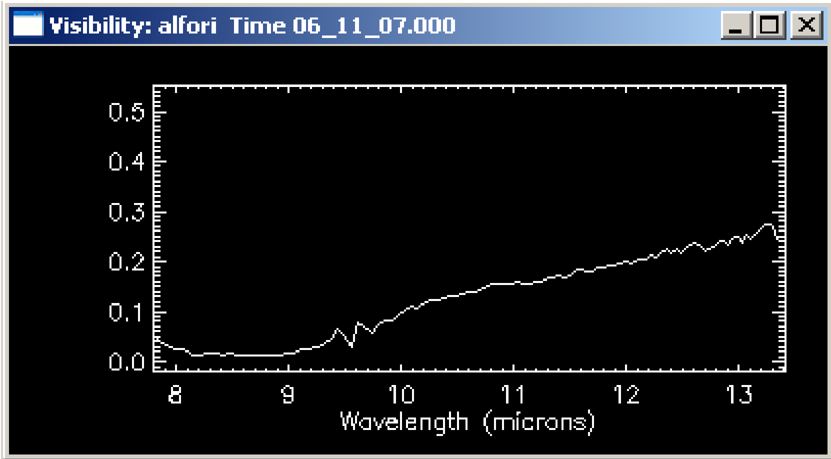
The user can:

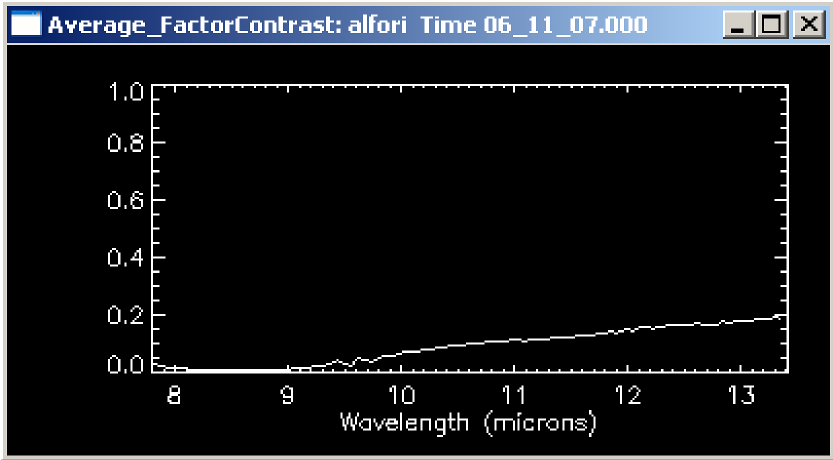
- List the parameters corresponding to the various sources/calibrators (***Select Parameter***): baseline, list of sources, list of calibrators, projected baseline, U, V coordinates, …



- Plot the transfer function, visibility and contrast for the sources as well as for the calibrators which were processed. Here is the example of the Source ALFORI 06_11_07.000:
  ⇒ Select the object: click on ALFORI 06_11_07.000
  ⇒ Select the layout desired then click on ***Plot***

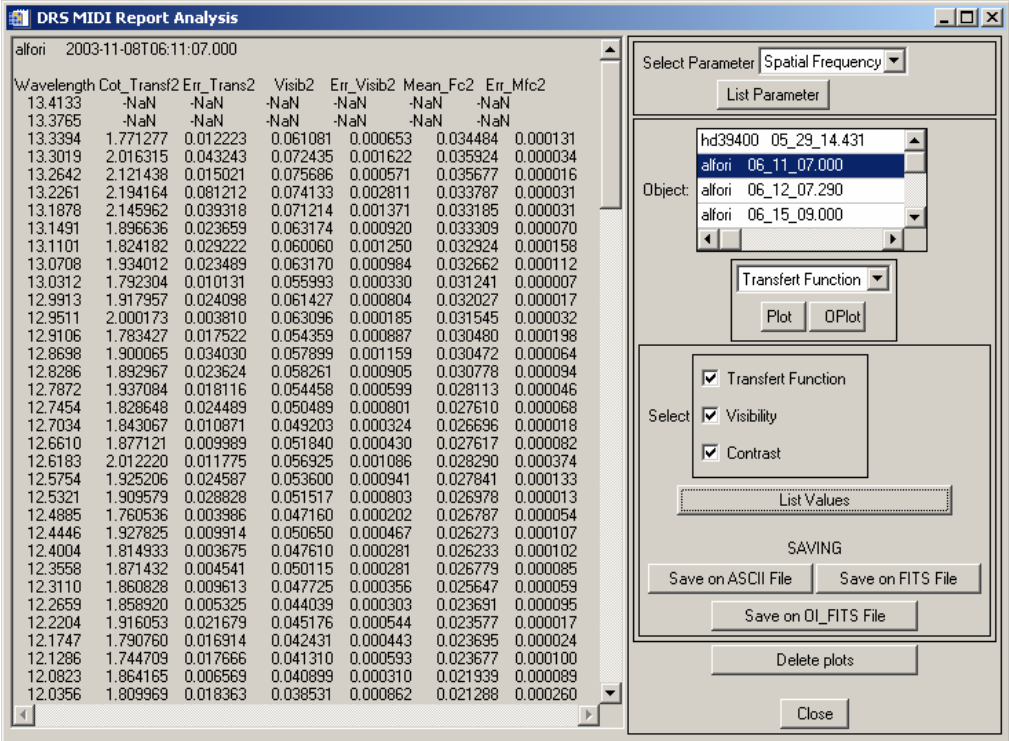



Visibility: alfori Time 06_11_07.000
0.5
0.4
0.3
0.2
0.1
0.0
8
9
10
11
12
13
Wavelength (microns)


Average_FactorContrast: alfori Time 06_11_07.000
1.0
0.8
0.6
0.4
0.2
0.0
8
9
10
11
12
13
Wavelength (microns)

It is possible to superimpose the layouts of the same type (click on ***Oplot***), for example: visibility for all the sources, in order to compare the results obtained.

- List the preceding values (or a selection of these values) with the corresponding error bars:



- Record the preceding values (or a choice of these values) :
  1. in a FITS or ASCII file whose name is derived by replacing FRGE in the fringe file name by RESU (for the first method) and by MEAN (for the second method).
  2. in a OI_FITS file whose name is derived by replacing FRGE in the fringe file name by OIF1 (for the first method) and by OIF2 (for the second method).

Caution:

The layouts are:

- Transfer function
- Visibility
- Contrast

The FITS or ASCII record files contain:

- (Co- Transfer Function)^2
- Error(CoTF)^2
- (Visibility)^2
- Error(Visibility)^2
- (Average_FactorContrast)^2
- Error(Average_FactorContrast)^2

The OI_FITS files (OIF1*.fits for the first method, OIF2*.fits for the second method) contain:

```
Primary (Extension = 0)
Extension = 1, EXTNAME = 'OI_ARRAY'
Extension = 2, EXTNAME = 'OI_TARGET'
Extension = 3, EXTNAME = 'OI_WAVELENGTH'
Extension = 4, EXTNAME = 'OI_VIS2'
```

For the moment, the MIDI data do not enable us to have certain values for the OI_TARGET table:

```
RA_ERR    : Error in RA at mean equinox (degrees)
DEC_ERR   : Error in DEC at mean equinox (degrees)
SYSVEL    : Systemic radial velocity (meters per second)
VELTYP    : Reference for radial velocity ('LSR', 'GEOCENTR', etc.)
VELDEF    : Definition of radial velocity ('OPTICAL', 'RADIO')
PMRA      : Proper motion in RA (degrees per year)
PMDEC     : Proper motion in DEC (degrees per year)
PMRA_ERR  : Error of proper motion in RA (degrees per year)
PMDEC_ERR : Error of proper motion in DEC (degrees per year)
PARALLAX  : Parallax (degrees)
PARA_ERR  : Error in parallax (degrees)
SPECTYP   : Spectral type
```

Thus by default, they are set to zero or " ".