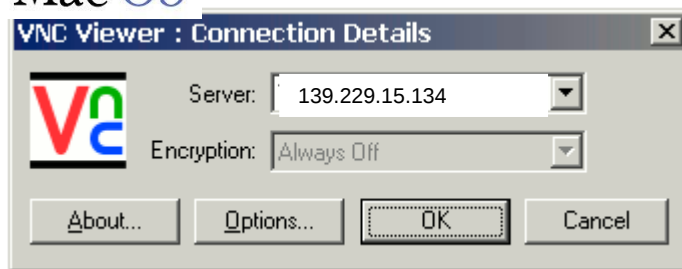


* Virtual Network Computing (VNC) allows you to connect remotely to another computer desktop



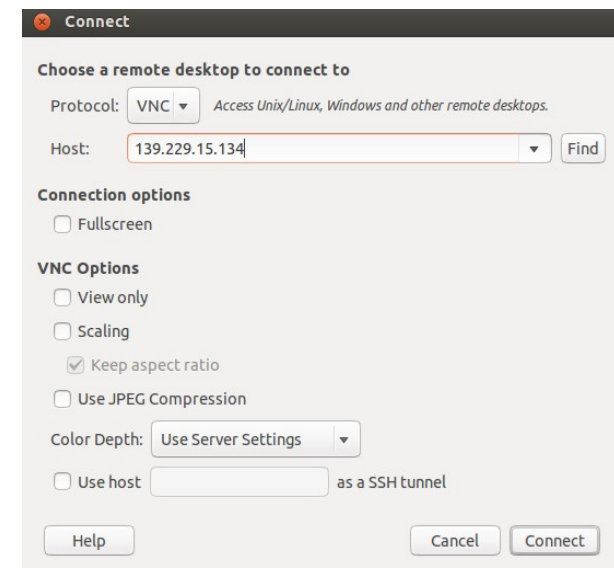
Mac OS

For Windows or Mac OSX you need to install a VNC client like RealVNC: www.realvnc.com



Though most Linux distributions already come with some sort of VNC client, like *vncviewer*, *vinagre* or *Remmina*, RealVNC also has a Linux client.

Vinagre



Connecting to the SOI computers

1) The SOI data acquisition computer (GUI) is accessed with the following command:

```
vncviewer -Shared soaric1.ctio.noao.edu:9
```

or

```
vncviewer -Shared 139.229.15.131:9
```

2) The SOI data analysis computer (IRAF) is accessed with:

```
vncviewer -Shared soaric1.ctio.noao.edu:8
```

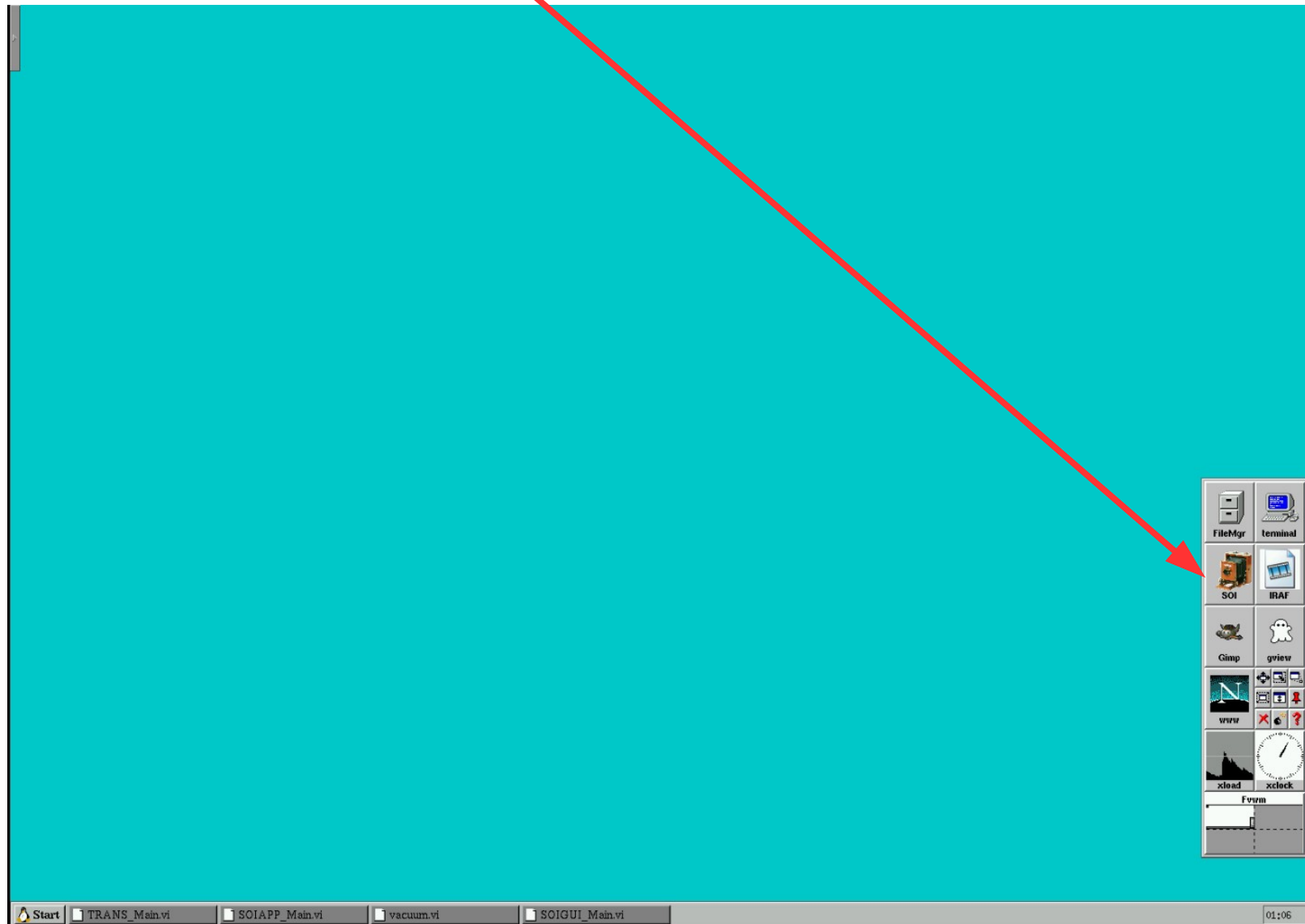
ou

```
vncviewer -Shared 139.229.15.131:8
```

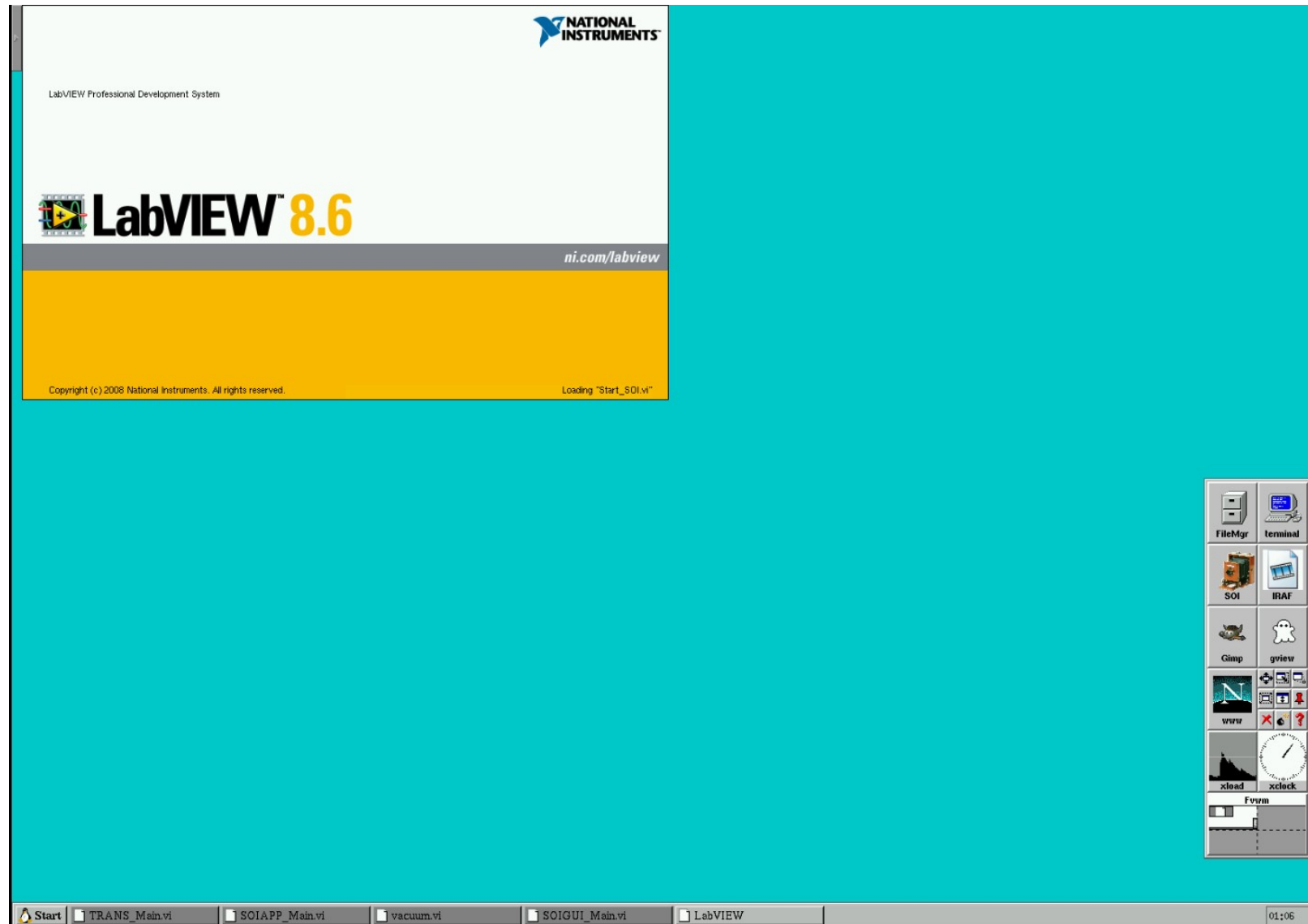
If you have obtained time through NOAO or the Chilean TAC, please contact Sean Points (spoints@ctio.noao.edu) or Cesar Briceño (cbriceno@ctio.noao.edu) to get the password information.

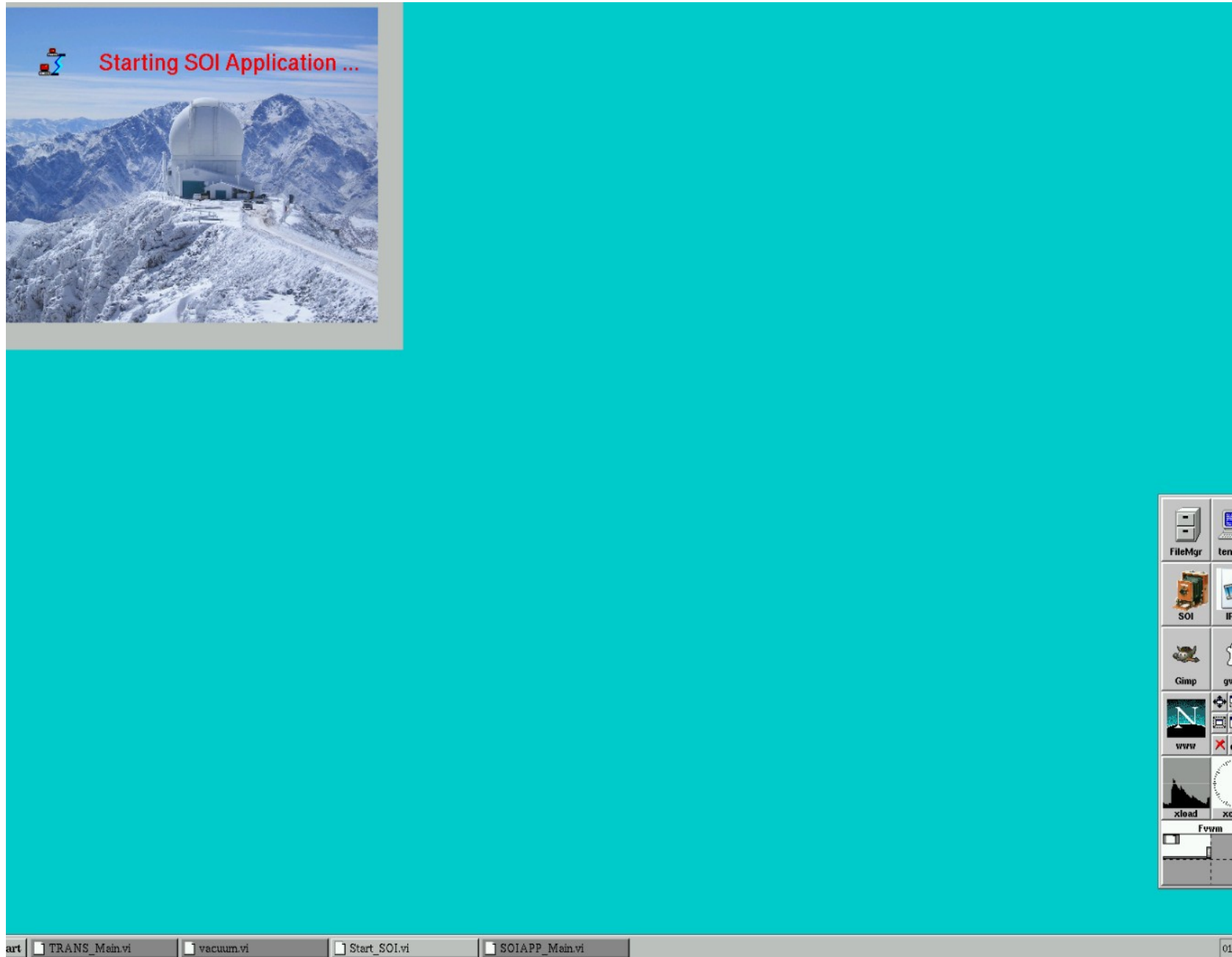
If you have time through the Brazil TAC, contact David Sanmartim (dsanmartim@ctio.noao.edu) or Bruno Quint (bquint@ctio.noao.edu)

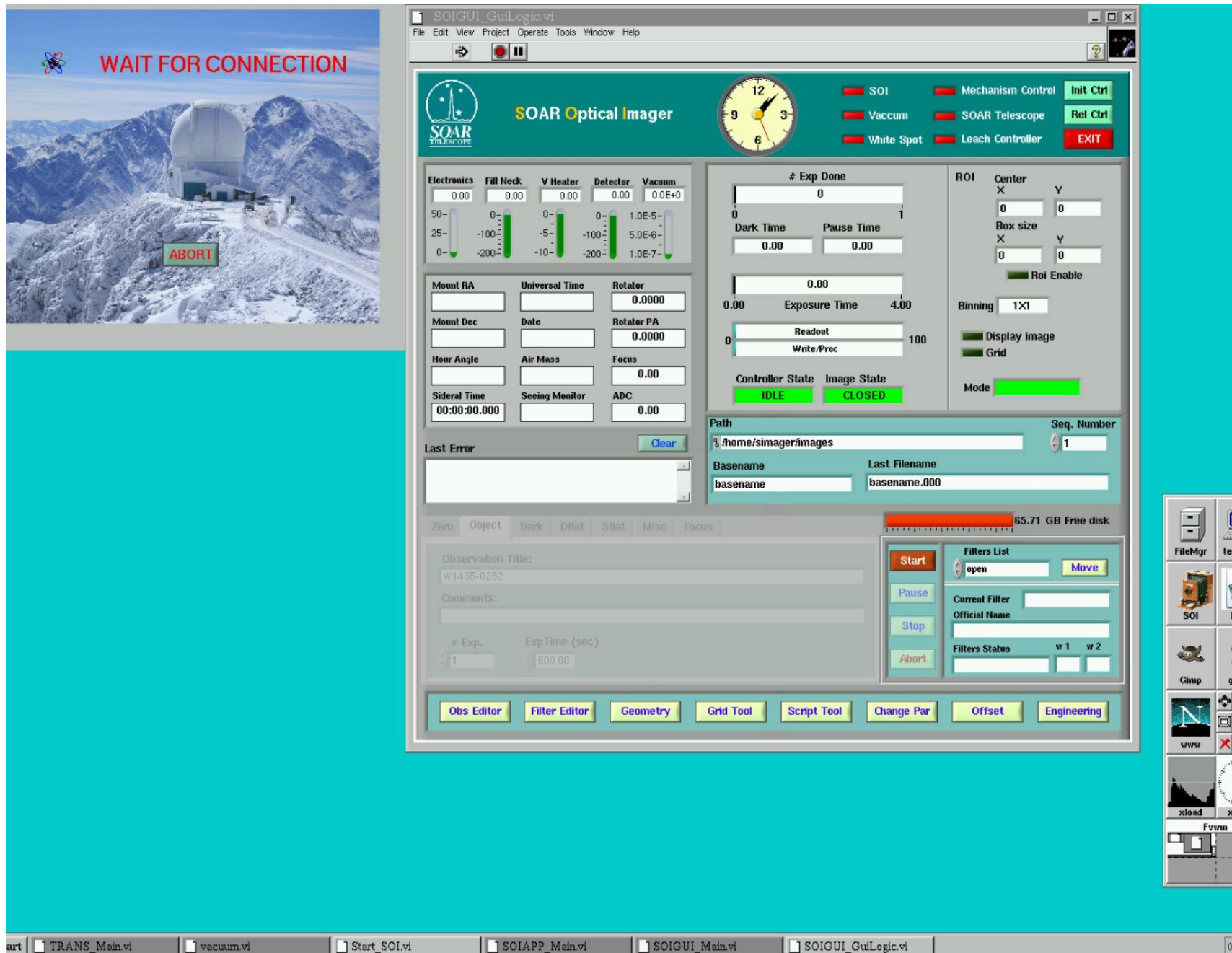
This is what the SOI computer desktop looks like when you have successfully connected via VNC. If the SOI GUI is not already running, click on the SOI icon to start it.



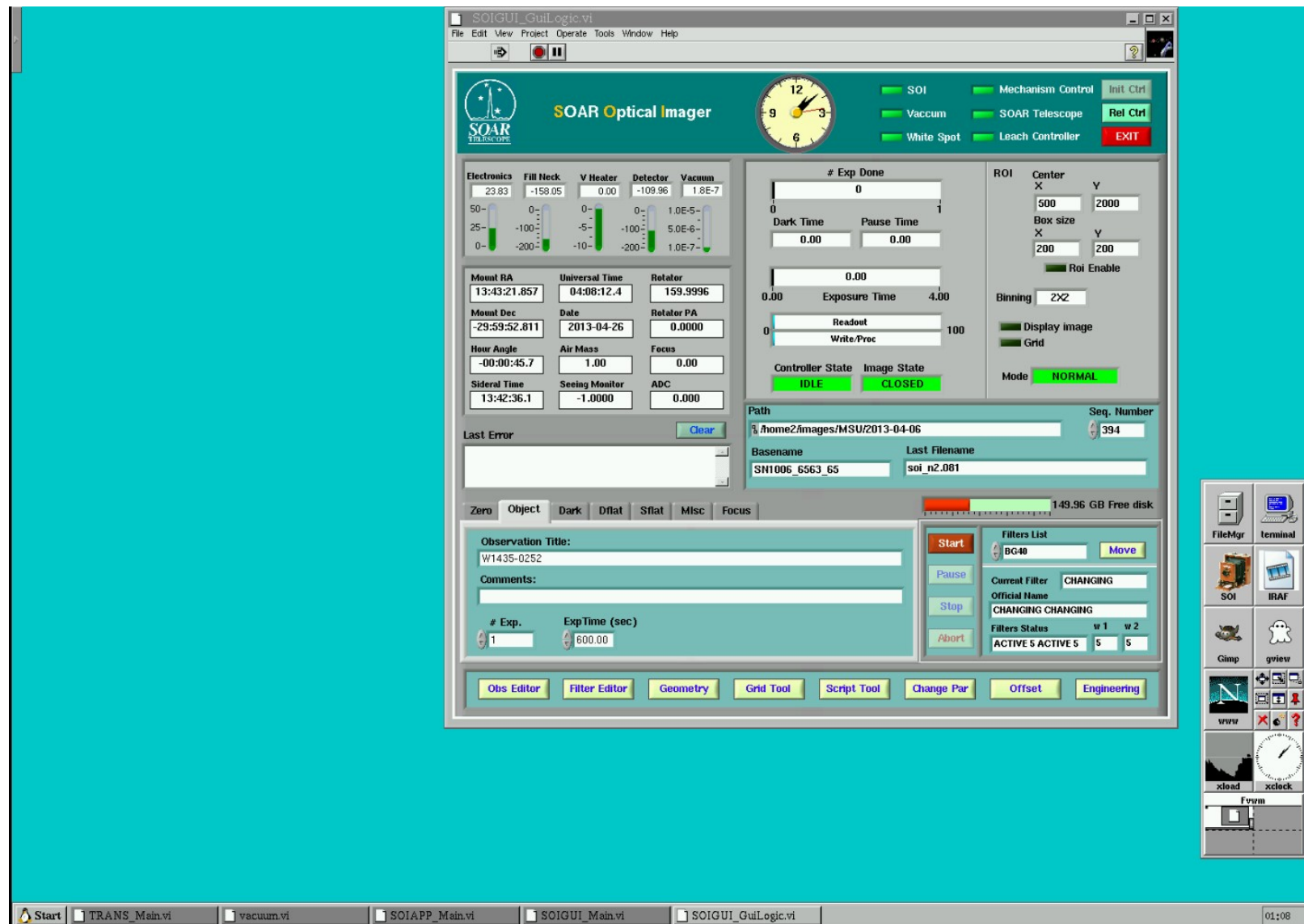
Click on the SOI icon among the group of icons on the right. This is the SOI GUI, which is a LabView-based application

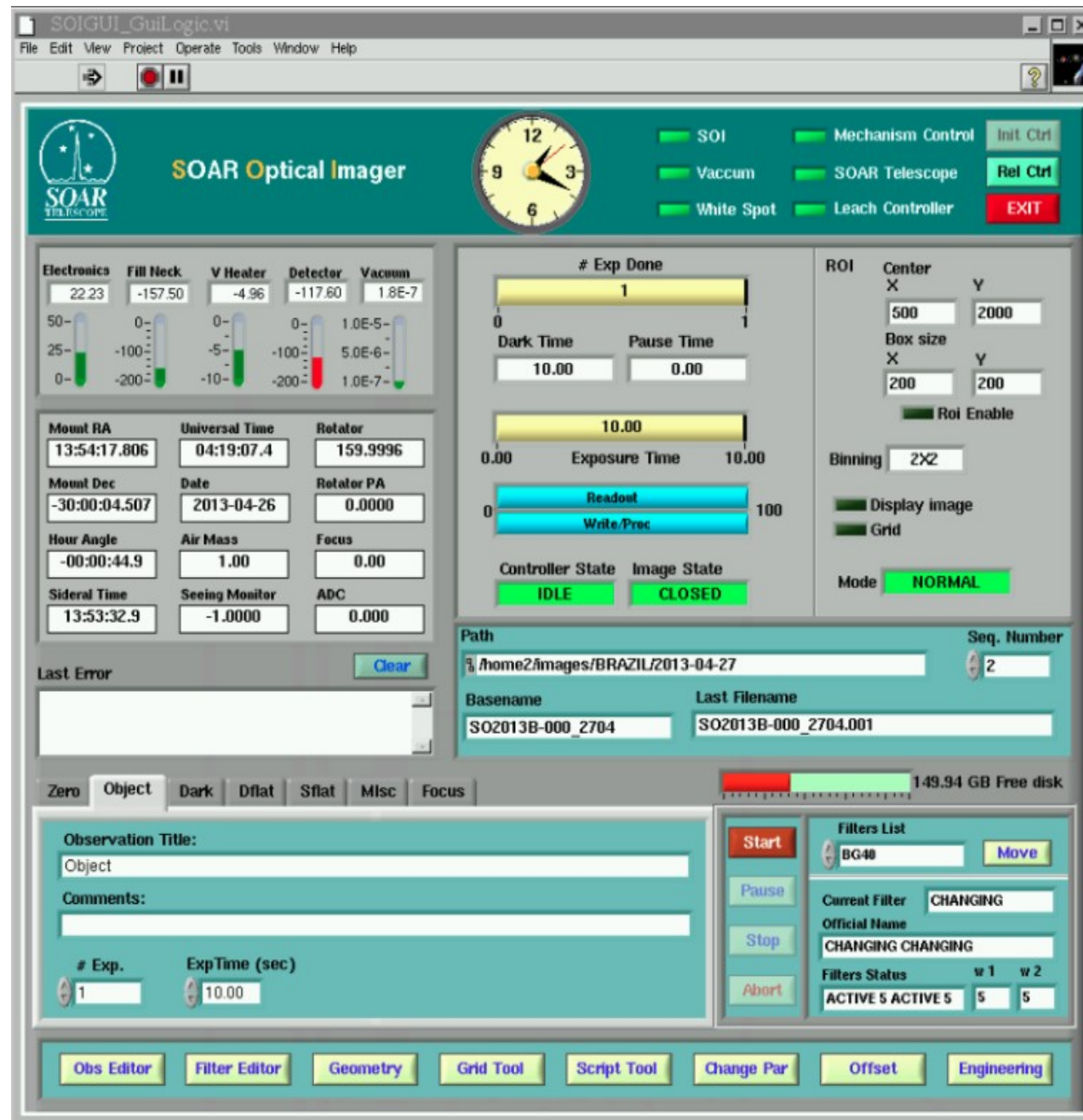


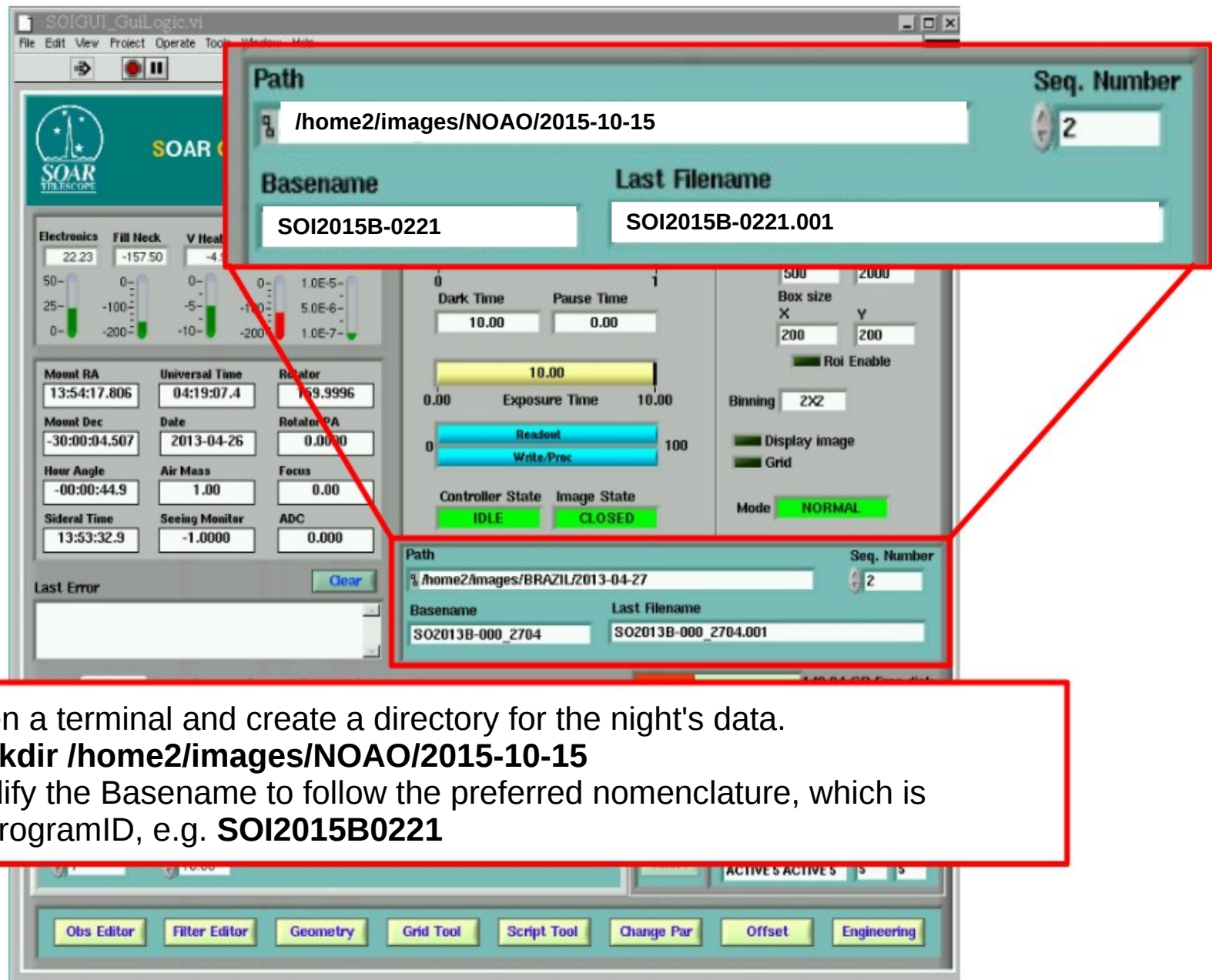




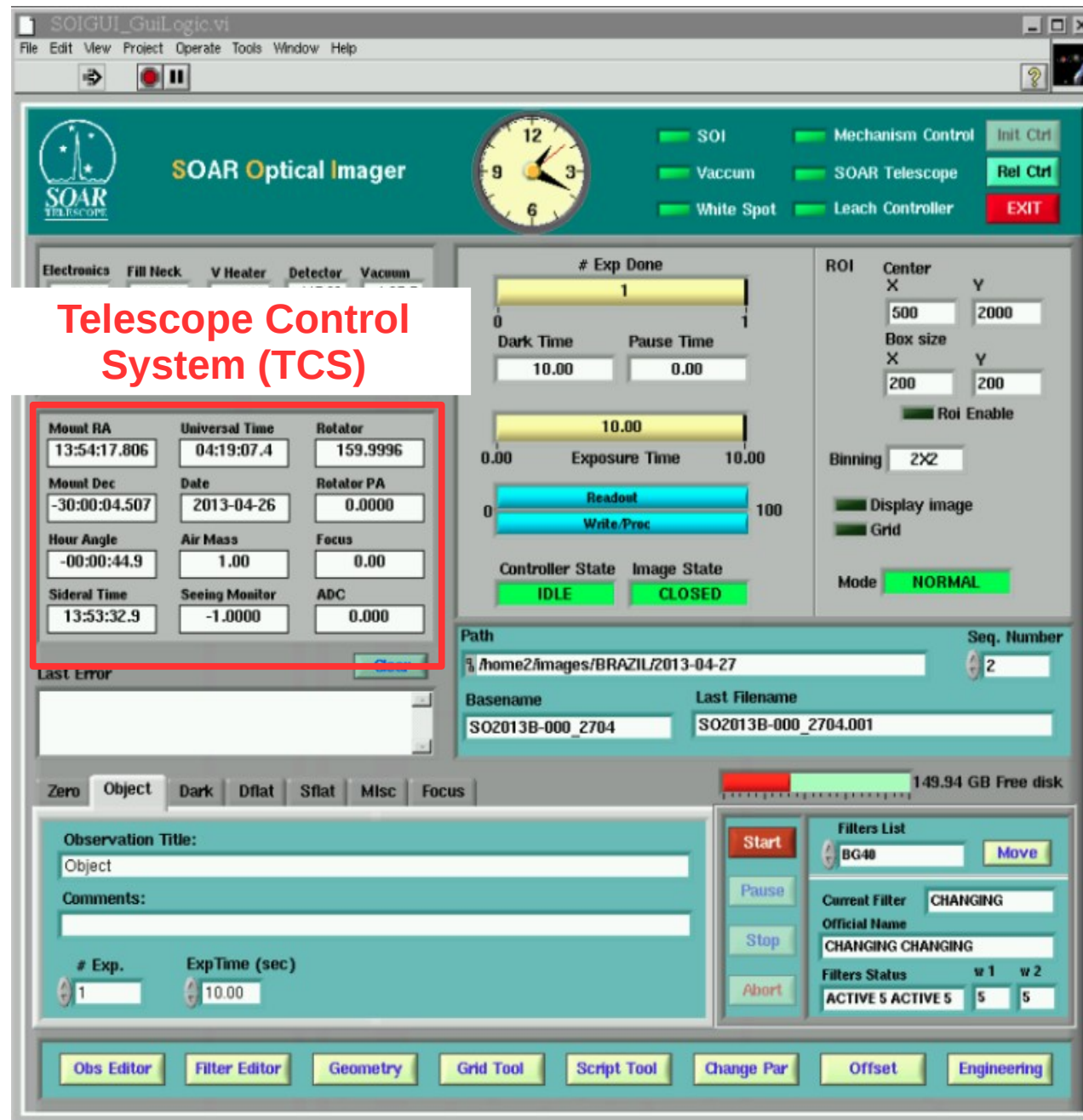
Labview applications need you to click on the upper left arrow to run them. Once the SOI GUI is up and running this is what it looks like. All your connection LEDs in the upper right should be green, and overall no error messages should show up



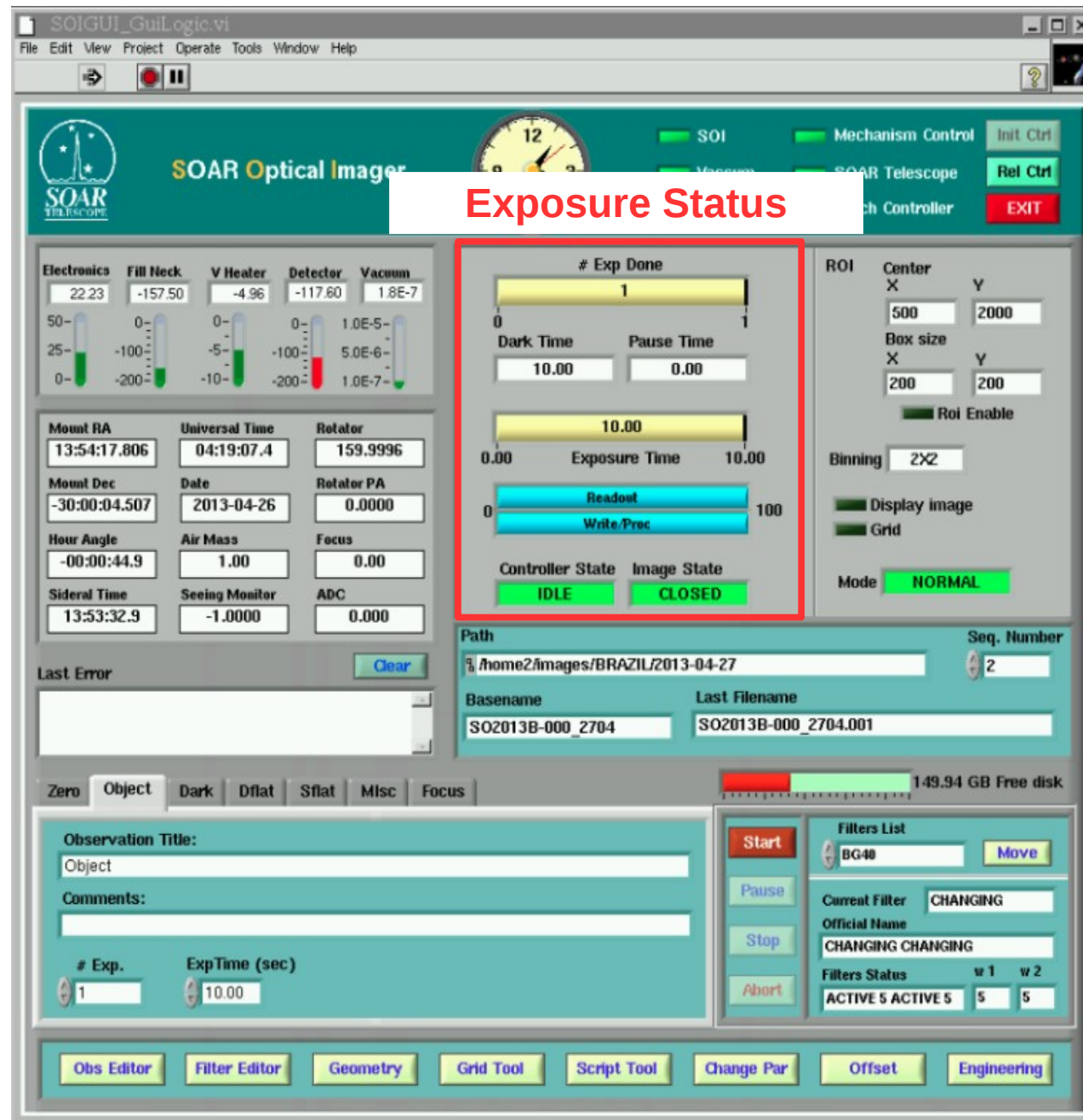


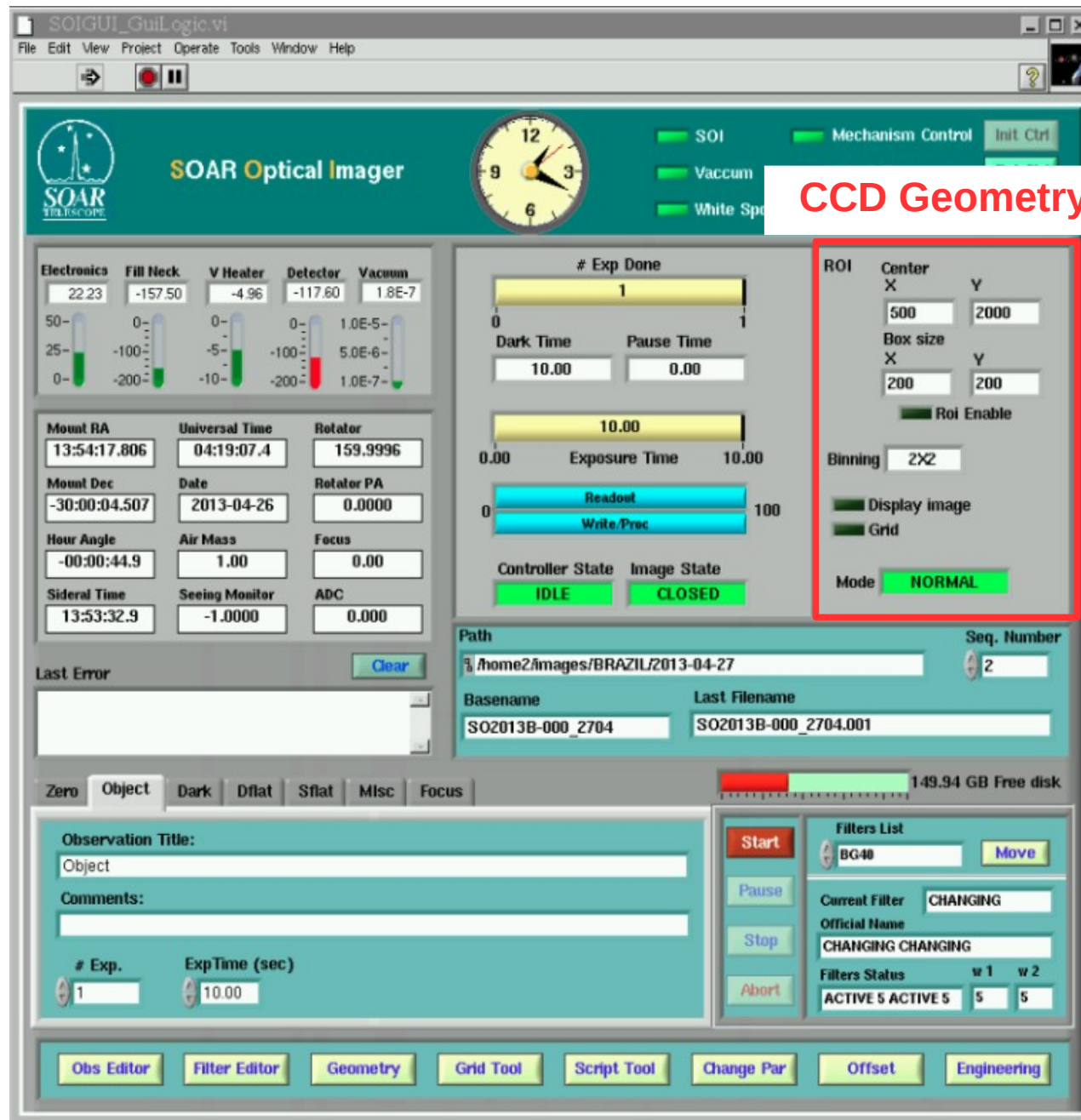


- 1) Open a terminal and create a directory for the night's data.
E.g. **mkdir /home2/images/NOAO/2015-10-15**
- 2) Modify the Basename to follow the preferred nomenclature, which is SOI_ProgramID, e.g. **SOI2015B0221**



Telescope Control System (TCS)

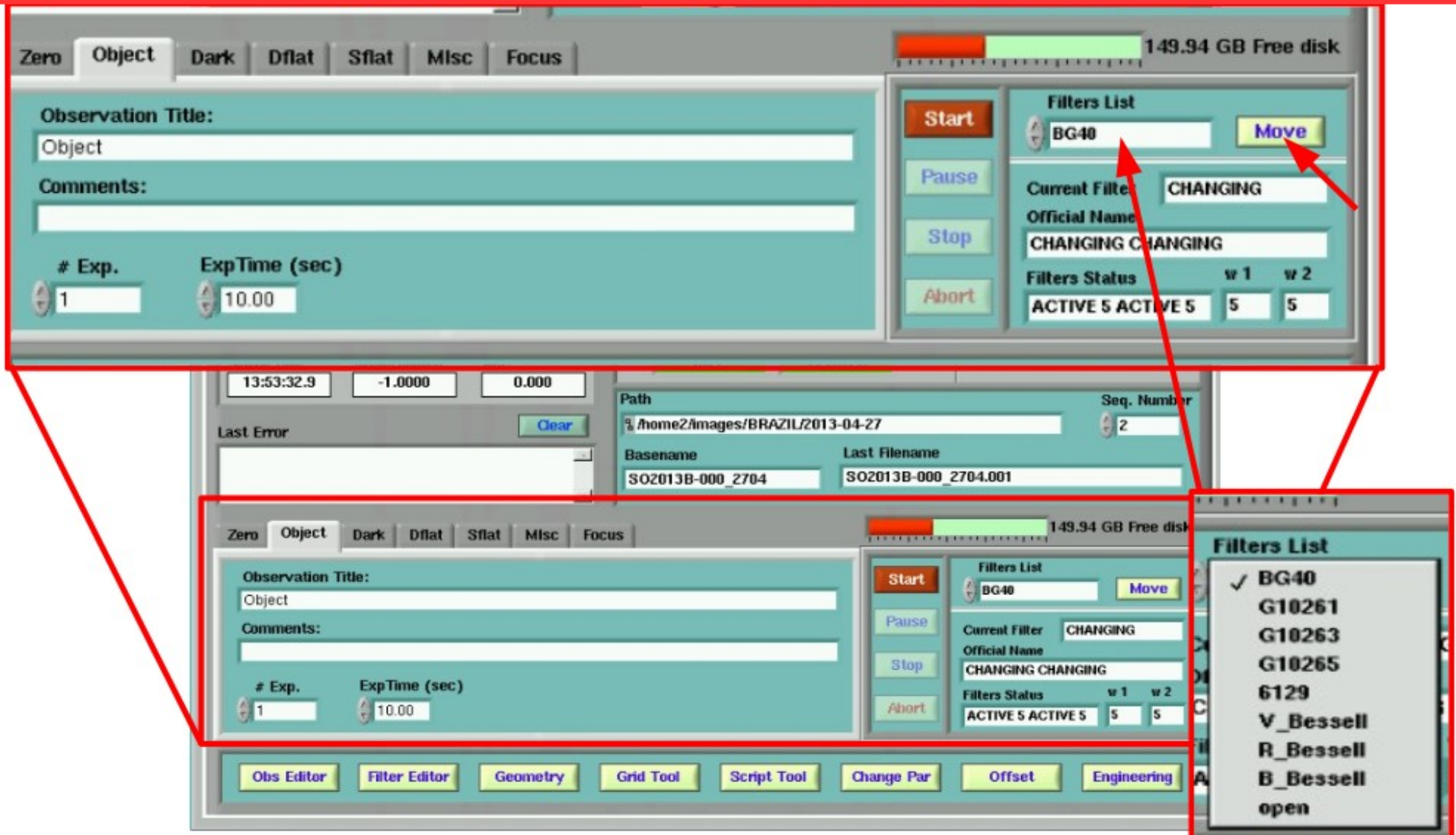




CCD Geometry

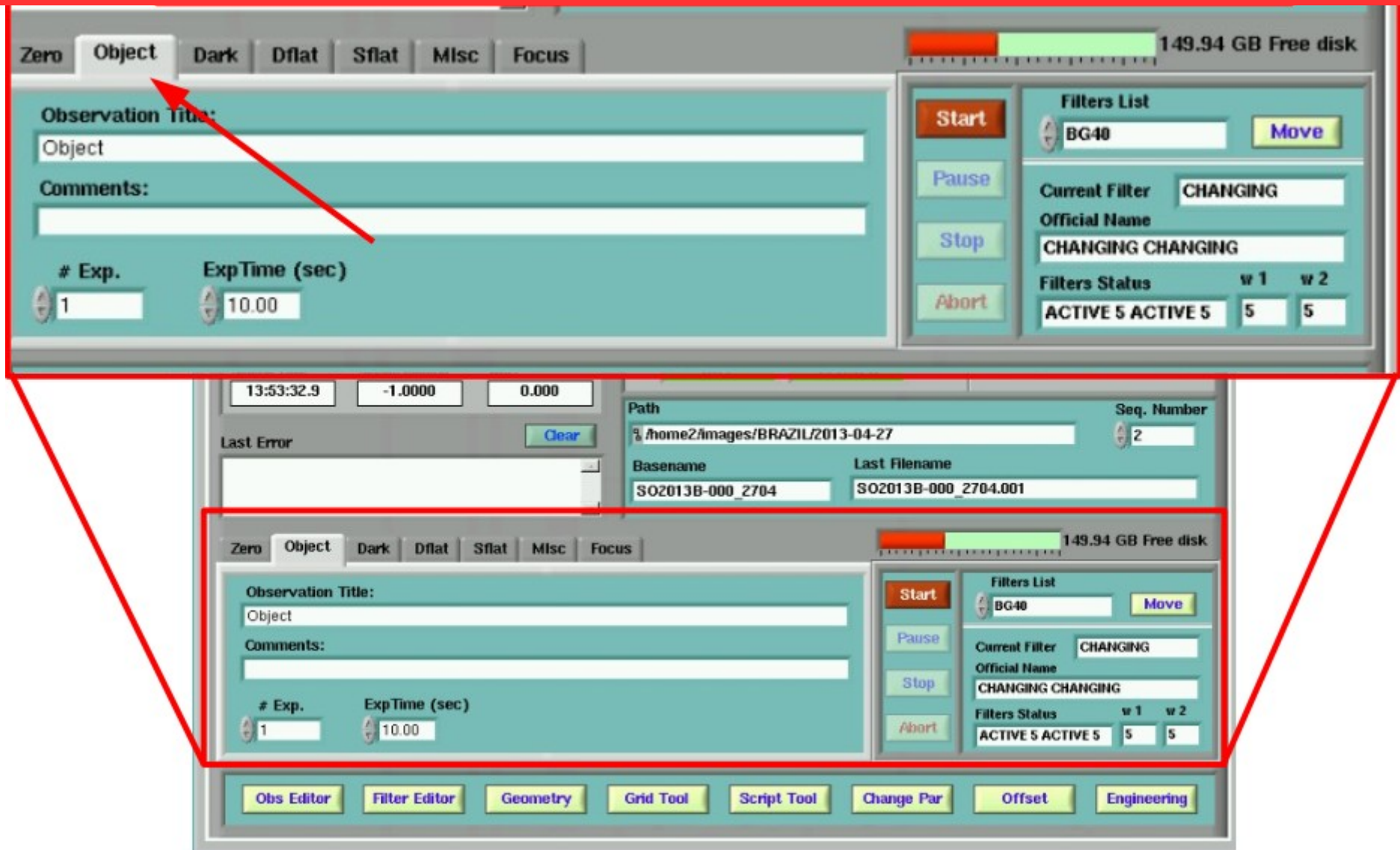
In order to change a filter:

- 1) Select any one of the filters by clicking inside the box "Filter List", shown below
- 2) Once the filter has been selected, click on the "Move" button (otherwise no filter change will take place!)

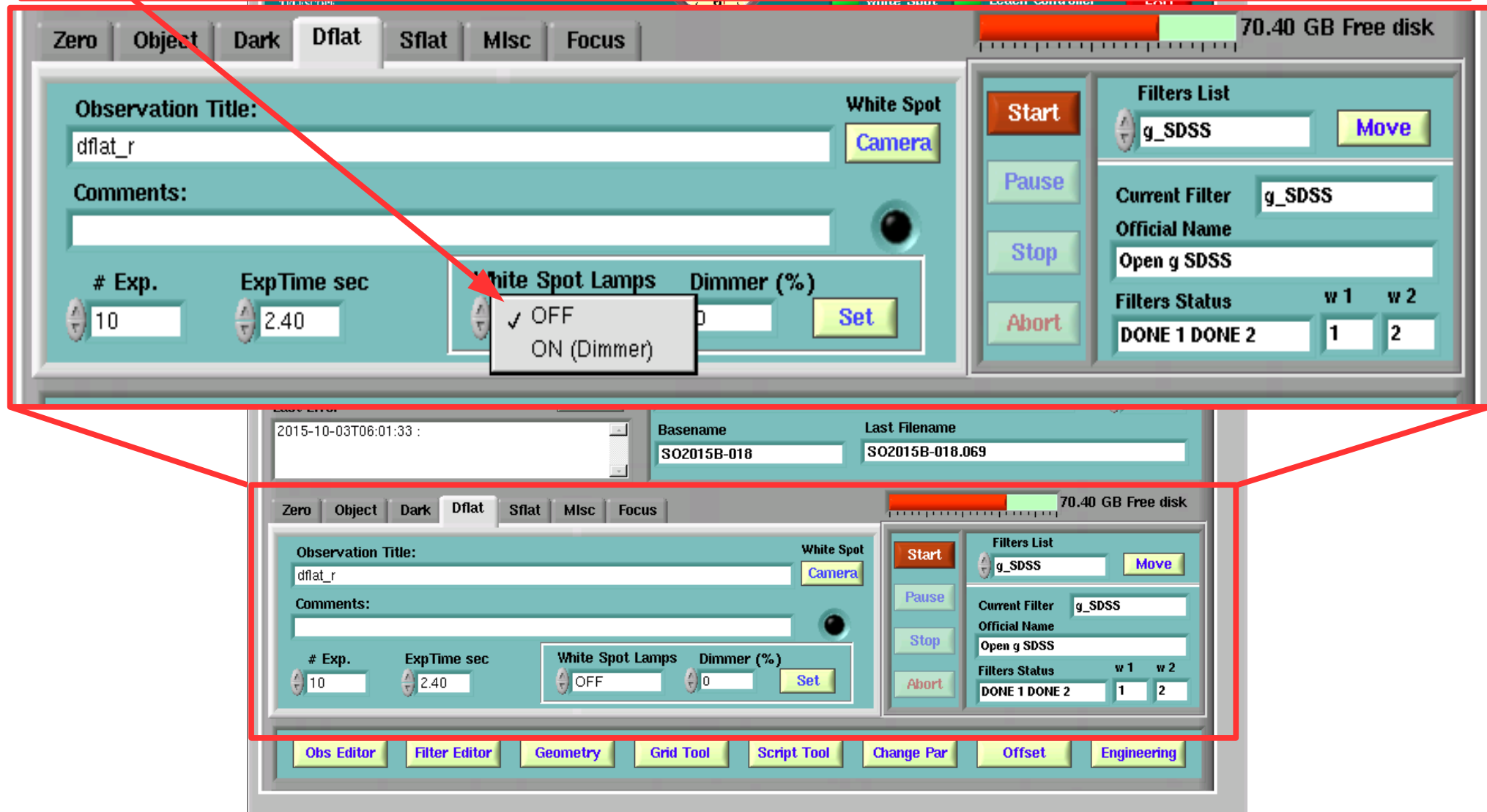


Selecting the image type: OBJECT, BIAS, FLAT, DARK

Select the appropriate tab depending on the exposure type. This information will go into the image header keyword **OBSTYPE**.



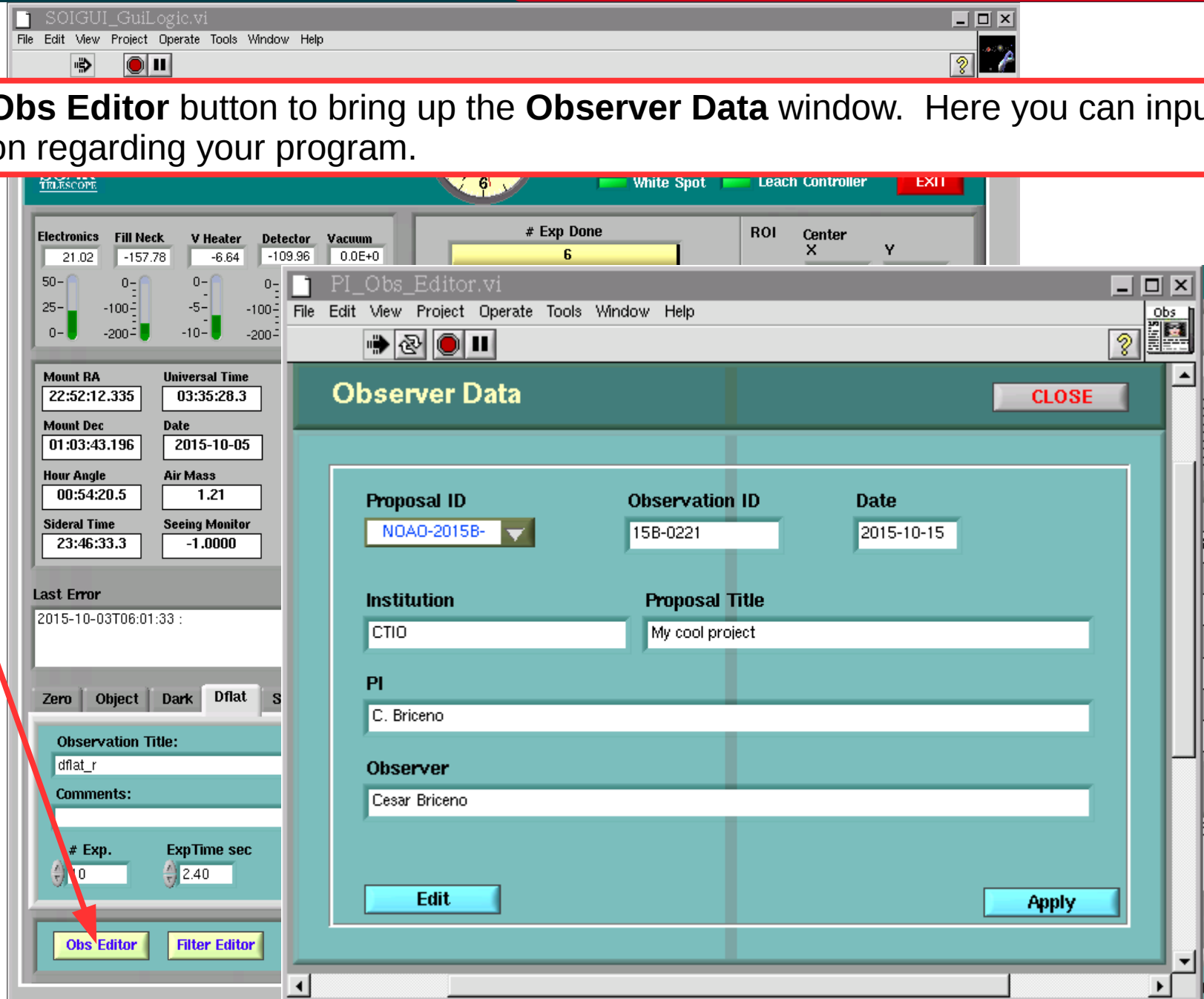
In the **Dflat** tab turn ON and OFF the Dome Flat lamps, and control their intensity. Click on the “**ON (Dimmer)**” option to turn the lamps on. Then indicate the intensity you want in the “**Dimmer (%)**” box (the SOI web page has the required intensities and exposure times to obtain dome flats with ~20000 ADUs), and finally click on the **SET** button.



Input the Observer information before you start

Adapted by César Briceño from L. Fraga's guide

Click on the **Obs Editor** button to bring up the **Observer Data** window. Here you can input the information regarding your program.



Click on the **Proposal ID** box to bring up the list of observing programs. If you don't find yours listed don't panic, you can add it to the list. See the next slides to find out how to do so

Assuming your program is listed, simply fill in each of the boxes: **Observation ID**, **Date**, **Institution**, **Proposal Title**, **PI** and **Observer**, and then click on the blue **Apply** button.

The screenshot shows the SOI GUI with the 'Obs Editor' window open. The window has a menu bar (File, Edit, View, Project, Operate, Tools, Window, Help) and a toolbar with icons for running, pausing, and help. The main area is divided into several sections:

- Mount RA:** 22:52:12.335
- Universal Time:** 03:35:28.3
- Rotator:** 160.0
- Mount Dec:** 01:03:43.196
- Date:** 2015-10-05
- Rotator P:** 140.0
- Hour Angle:** 00:54:20.5
- Air Mass:** 1.21
- Focus:** -167
- Sidereal Time:** 23:46:33.3
- Seeing Monitor:** -1.0000
- ADC:** 0.0
- Last Error:** 2015-10-03T06:01:33 :
- Buttons:** Zero, Object, Dark, Dflat, Sflat, M
- Observation Title:** dflat_r
- Comments:**
- # Exp.:** 10
- ExpTime sec:** 2.40
- Buttons:** Obs Editor, Filter Editor, Geometry, Grid Tool, Script Tool, Change Par, Offset, Engineering

The 'Obs Editor' window is a modal dialog with a 'CLOSE' button at the top right. It contains a list of Proposal IDs on the left, with 'NOAO-2015B-0221' selected. The form fields are as follows:

- Observation ID:** 15B-0221
- Date:** 2015-10-15
- Institution:** CTIO
- Proposal Title:** My cool project
- PI:** C. Briceño
- Observer:** Cesar Briceño
- Buttons:** Edit, Apply

If your program was not listed, click on the blue **Edit** button at the lower left corner of the **Observer Data** window

The screenshot shows a LabVIEW interface window titled "PI_Obs_Editor.vi". The window has a menu bar (File, Edit, View, Project, Operate, Tools, Window, Help) and a toolbar with icons for running, saving, and pausing. The main area is titled "Observer Data" and contains a form with the following fields:

- Proposal ID:** A dropdown menu showing "NOAO-2015B-".
- Observation ID:** A text field containing "15B-0221".
- Date:** A text field containing "2015-10-15".
- Institution:** A text field containing "CTIO".
- Proposal Title:** A text field containing "My cool project".
- PI:** A text field containing "C. Briceño".
- Observer:** A text field containing "Cesar Briceño".

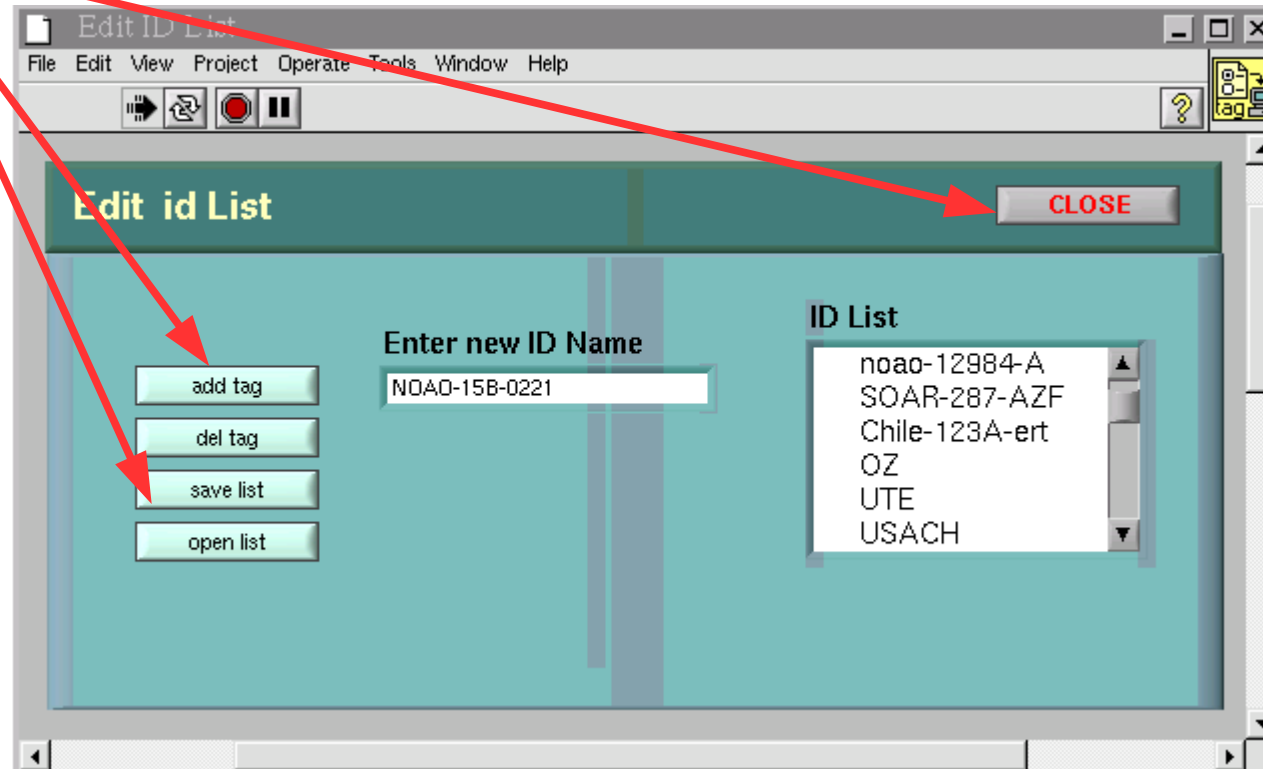
At the bottom of the form, there are two buttons: a blue "Edit" button on the left and a blue "Apply" button on the right. A red arrow points from the text box above to the "Edit" button. A "CLOSE" button is located in the top right corner of the form area.

This will bring up the **Observer Editor** window. Here, click on the **Edit Proposal ID list** button

The screenshot shows the 'Observer Editor' window with a title bar 'PI_EditObsData.vi'. The window contains a 'Proposal ID' list on the left, a 'Label Name' list below it, and a 'NOAO-2015B-0221 Data' form in the center. The 'Proposal ID' list includes: 2010B-0415, 2011A-0648, 2010A-0476, NOAO-2012A-008, SO2013B-004, SO2014A-025, and NOAO-2015B-0221 (highlighted). The 'Label Name' list includes: Proposal Title, PI, Observer, Phone, email, Date, and Observation ID. The 'NOAO-2015B-0221 Data' form has fields for: Observation ID (15B-0221), Date (2015-10-15), Institution (CTIO), Proposal Title (My cool project), PI (C. Briceño), Observer (Cesar Briceño), and email (cbricen@ctio.noao.edu). On the right side of the form are buttons: ENTER, add, delete, and apply. At the bottom of the window are two buttons: 'Edit Label Name list' and 'Edit Proposal ID list'. A red arrow points from the text box to the 'Edit Proposal ID list' button.

NOAO-2015B-0221 Data	
Observation ID	15B-0221
Date	2015-10-15
Institution	CTIO
Proposal Title	My cool project
PI	C. Briceño
Observer	Cesar Briceño
email	cbricen@ctio.noao.edu

1) You will now be in the **Edit ID List** window. Here write your proposal ID in the **“Enter new ID Name”** box, then click on the **“add tag”** button, and then on the **“save list”** button. Now your proposal ID will appear in the list if you go down the menu at right. When done, click on the **CLOSE** button.



Now, back in the **Observer Editor** window:

- 1) Add the Observation ID by selecting it on the **Label Name** menu and clicking on the “**add**” button at right
- 2) Enter the observation ID info and click **ENTER**.
- 3) Repeat for the other fields: Date, Institution, Proposal Title, PI, Observer, email.
- 4) Once done, click on the “apply” button, and then on the **CLOSE** button.

The screenshot shows the 'Observer Editor' window. On the left, there are two lists: 'Proposal ID' and 'Label Name'. The 'Label Name' list has 'Observation ID' selected. A red arrow points from the 'add' button to the 'Observation ID' in the 'Label Name' list. Another red arrow points from the 'ENTER' button to the 'Observation ID' field in the 'NOAO-2015B-0221 Data' table. A third red arrow points from the 'apply' button to the 'Observation ID' field. A fourth red arrow points from the 'CLOSE' button to the top right of the window. The 'NOAO-2015B-0221 Data' table contains the following information:

NOAO-2015B-0221 Data	
Observation ID	15B-0221
Date	2015-10-15
Institution	CTIO
Proposal Title	My cool project
PI	C. Briceño
Observer	Cesar Briceño
email	cbriceno@ctio.noao.edu

At the bottom of the window, there are two buttons: 'Edit Label Name list' and 'Edit Proposal ID list'.

Back in the **Observer Data** window, close it (**CLOSE** button) and open it again from the main GUI. Now your program should appear in the **Proposal ID menu**, and when you select it, all fields will be correctly populated.

The screenshot shows a LabVIEW window titled "PI_Obs_Editor.vi" with a menu bar (File, Edit, View, Project, Operate, Tools, Window, Help) and a toolbar. The main area is titled "Observer Data" and contains a form with the following fields:

- Proposal ID**: A dropdown menu showing "NOAO-2015B-". A red arrow points to this field.
- Observation ID**: A text field containing "15B-0221".
- Date**: A text field containing "2015-10-15".
- Institution**: A text field containing "CTIO".
- Proposal Title**: A text field containing "My cool project".
- PI**: A text field containing "C. Briceño".
- Observer**: A text field containing "Cesar Briceño".

At the bottom of the form are two buttons: "Edit" and "Apply". A "CLOSE" button is located in the top right corner of the window.

There is a **Filter Editor** you can call up by clicking on the appropriate button in the main GUI. However, you would normally not need to bother with it, since the filter information should have been updated by our Observer Support staff when they changed filters or installed the SOI filter wheel.

Master Database

Filter_ID	Description
s0000	Open
s0001	U_Bessell
s0002	B_Bessell
s0003	V_Bessell
s0004	R_Bessell
s0005	I_Bessell
s0006	u_Stromgren
s0007	v_Stromgren
s0008	b_Stromgren
s0009	y_Stromgren
s0010	u_SDSS

Filter_ID: Description: Pos Wheel: [To Wheel 1](#) [To Wheel 2](#)

Wheel 1

Filter_ID	Description	Pos Wheel
s0000	Open	1
s0002	B_Bessell	2
s0003	V_Bessell	3
s0004	R_Bessell	4
s0005	I_Bessell	5

[Up Row](#) [Down Row](#) [Delete Row](#) [Clear Setup](#) [Save Setup](#)

Wheel 2

Filter_ID	Description	Pos Wheel
s0000	Open	1
s0011	g_SDSS	2
s0012	r_SDSS	3
s0013	i_SDSS	4
s0014	z_SDSS	5

[Up Row](#) [Down Row](#) [Delete Row](#) [Clear Setup](#) [Save Setup](#)

Filter Additions

Nick Name	Filter_ID Wheel 1	Description	Position Wheel 1	Filter_ID Wheel 2	Description	Position Wheel 2
open	s0000	Open	1	s0000	Open	1
B-Bessell	s0002	B_Bessell	2	s0000	Open	1
V-Bessell	s0003	V_Bessell	3	s0000	Open	1
R-Bessell	s0004	R_Bessell	4	s0000	Open	1
I-Bessell	s0005	I_Bessell	5	s0000	Open	1
g-SDSS	s0000	Open	1	s0011	g_SDSS	2
r-SDSS	s0000	Open	1	s0012	r_SDSS	3
i-SDSS	s0000	Open	1	s0013	i_SDSS	4
z-SDSS	s0000	Open	1	s0014	z_SDSS	5

[Up Row](#) [Down Row](#) [Delete Row](#) [Clear Setup](#) [Save Setup](#)

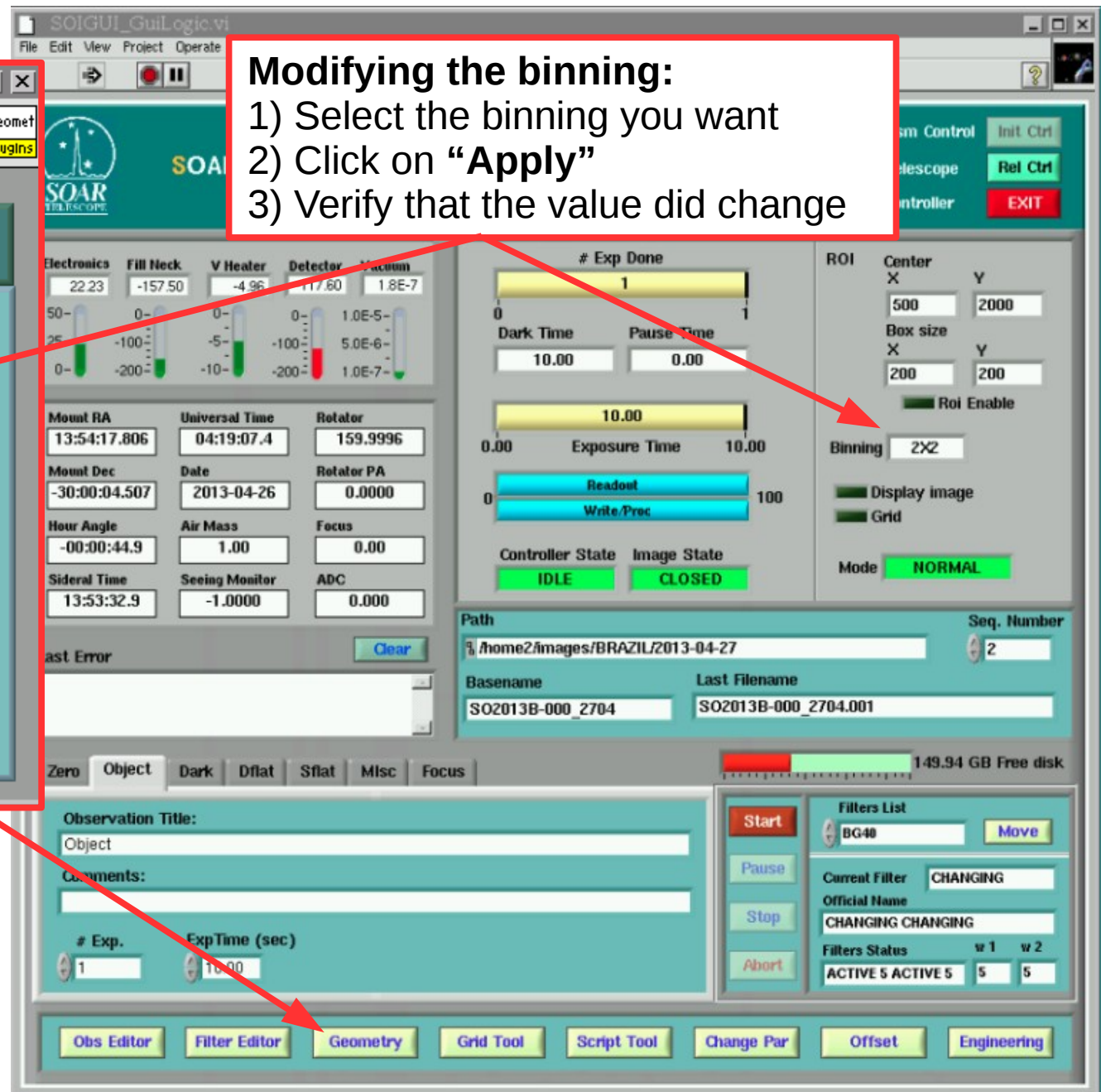
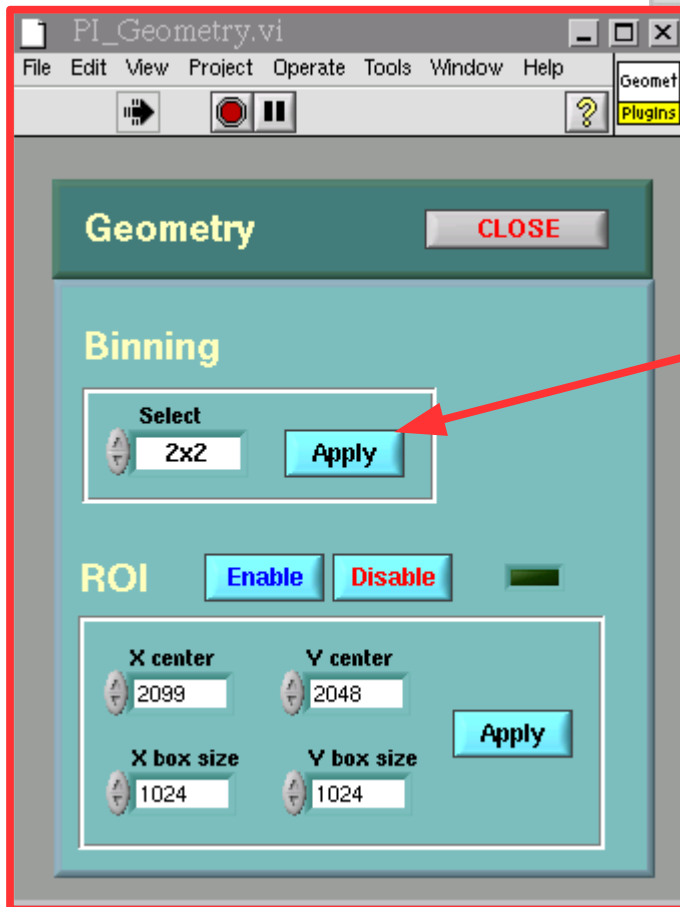
[New Add](#) Nick Name

Right Panel: EXIT, Y 300, Y 200, Seq. Number 310, 10 GB Free disk, Move, Bessell, w1 3 w2 1, Engineering

Bottom Right Icons: FileMgr, terminal, SOI, IRAF, Gimp, gview, www, Engineering

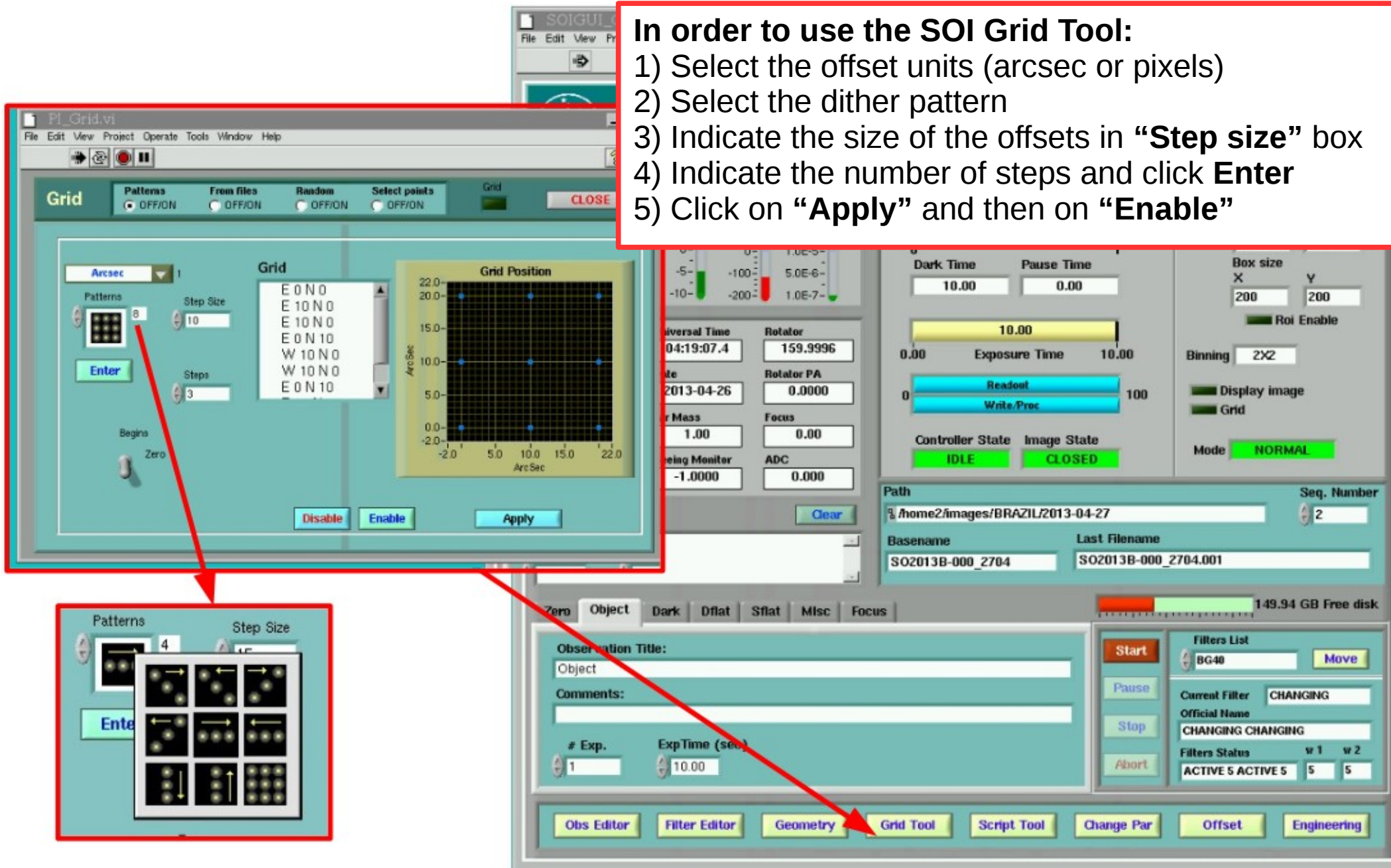
Modifying the binning:

- 1) Select the binning you want
- 2) Click on **"Apply"**
- 3) Verify that the value did change



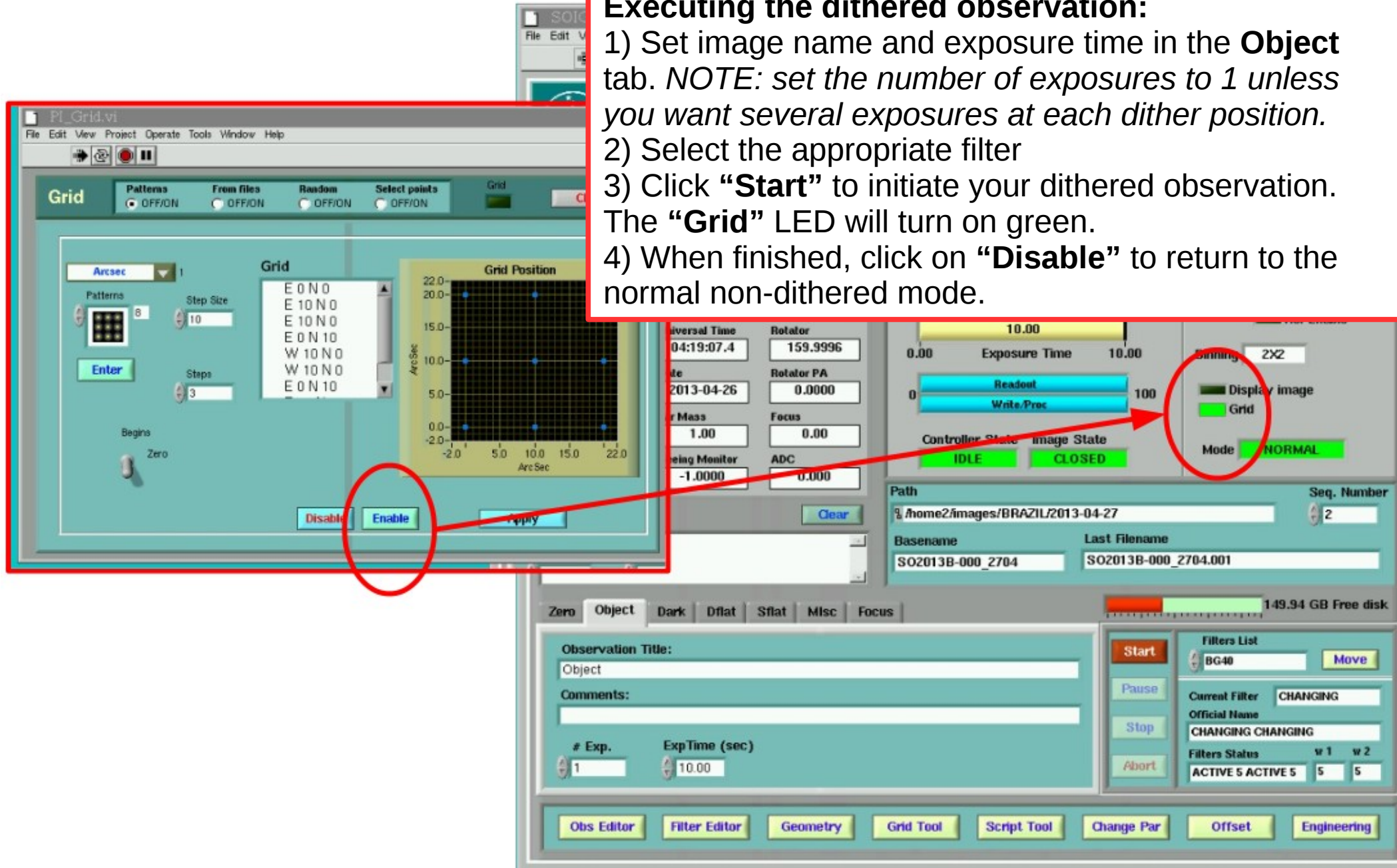
In order to use the SOI Grid Tool:

- 1) Select the offset units (arcsec or pixels)
- 2) Select the dither pattern
- 3) Indicate the size of the offsets in “**Step size**” box
- 4) Indicate the number of steps and click **Enter**
- 5) Click on “**Apply**” and then on “**Enable**”



Executing the dithered observation:

- 1) Set image name and exposure time in the **Object** tab. *NOTE: set the number of exposures to 1 unless you want several exposures at each dither position.*
- 2) Select the appropriate filter
- 3) Click “**Start**” to initiate your dithered observation. The “**Grid**” LED will turn on green.
- 4) When finished, click on “**Disable**” to return to the normal non-dithered mode.



SOI has a scripting tool based on the LuaView scripting language. The best way to prepare your own script is to start with one of the existing ones.

If you have questions, consult with the SOI Support Scientist

The screenshot displays the SOI Scripting tool interface. The main window is titled "SCRIPT_GuiLogic.vi" and contains a "Script (viewer only)" section on the left and a control panel on the right.

Script (viewer only) section:

- Script Availables:** A dropdown menu showing "martin_program.t". Buttons: List, Functions, Edit, Compile.
- Script State:** A green bar indicating "IDLE". Buttons: Run, Pause, Stop, Abort.
- Console:** A large text area for script output.
- Error:** A text area for error messages.

Script content (viewer only):

```
-- Edit the variables below:
ExpTime = "180.00"-- Exposure time for each slice.
basename = "SO08B-015_0104"
Nexp = "1" -- Number of dark frames.
name="SO08B-015_1122"

-- Dont edit anything down here!
Image.Name (name)

filter="g-SDSS"
Image.Obstype("OBJECT")
Image.Time(ExpTime)
Instrument.Filter (filter)
Image.Title("10920, offset 0, filter g-Scss")
Image.Start()

filter="r-SDSS"
Image.Obstype("OBJECT")
Image.Time(ExpTime)
Instrument.Filter (filter)
Image.Title("10920, offset 0, filter r-sdss")
Image.Start()

filter="i-SDSS"
Image.Obstype("OBJECT")
Image.Time(ExpTime)
Instrument.Filter (filter)
Image.Title("10920, offset 0, filter i-sdss")
Image.Start()

east=10
Telescope.OffsetE(east)
Image.Time(ExpTime)
Image.Title("10920, offset 10E, filter i-sdss")
Image.Time(ExpTime)
Image.Start()
```

Main Control Panel:

- Dark Time:** 300.00
- Pause Time:** 0.00
- Box size:** X: 1024, Y: 1024
- Roi Enable:** ☒
- Binning:** 2X2
- Display image:** ☒
- Grid:** ☒
- Mode:** NORMAL
- Path:** /home2/images/BRAZIL/2015-10-02
- Seq. Number:** 70
- Basename:** SO2015B-018
- Last Filename:** SO2015B-018.069
- 70.40 GB Free disk**
- Filters List:** g_SDSS (Current Filter)
- Filters Status:** DONE 1, DONE 2
- Buttons:** Start, Pause, Stop, Abort, Move, Set, Camera, White Spot, Dimmer (%), White Spot Lamps, OFF, ON.

Bottom Bar: Buttons for Entry, Grid Tool, Script Tool, Change Par, Offset, Engineering.

SOI allows you to make telescope offsets using the “**Offset**” window . Simply select offsets in arcsec or in pixels, and then the East/West or Up/Down directions respectively.

Once the appropriate values and directions have been selected, click on the “**Apply**” button to execute the offset

The screenshot displays the SOI (Software for Observing) GUI. The main window is titled "PI_Offset.vi" and features a menu bar (File, Edit, View, Project, Operate, Tools, Window, Help) and a toolbar with icons for running, pausing, and other functions. The "Offset" window is the primary focus, containing three sections:

- Telescope Offset Ra-Dec:** Includes radio buttons for "East" (selected) and "West", a numeric input for "15" (arcsec), radio buttons for "North" (selected) and "South", a numeric input for "0" (arcsec), and an "Apply" button.
- Telescope Offset X-Y:** Includes radio buttons for "Right" (selected) and "Left", a numeric input for "0" (pixels), radio buttons for "Up" (selected) and "Down", a numeric input for "0" (pixels), and an "Apply" button.
- Telescope Focus:** Includes radio buttons for "Abs" (selected) and "Rel", a numeric input for "0" (microns), and an "Apply" button.

To the right of the Offset window, there are several other panels:

- Rotator:** Displays "Rotator" (159.9996), "Rotator PA" (140.0000), "Focus" (-1812.48), and "ADC" (0.000). It includes a "Clear" button.
- Exposure Time:** A slider set to 300.00, with "Readout" and "Write/Proc" buttons.
- Controller State:** Displays "IDLE" and "CLOSED".
- Image State:** Displays "NORMAL".
- Path:** Shows the file path "/home2/images/BRAZIL/2015-10-02" and "Seq. Number" (70).
- Basename:** Displays "SO2015B-018".
- Last Filename:** Displays "SO2015B-018.069".
- White Spot:** Includes a "White Spot Camera" button and a "White Spot Lamps" section with "Dimmer (%)" (0) and a "Set" button.
- Filters List:** Includes a "Start" button, a "Filters List" (g_SDSS), a "Move" button, and a "Current Filter" (g_SDSS).
- Filters Status:** A table showing the status of filters.

At the bottom of the GUI, there is a row of buttons: "Obs Editor", "Filter Editor", "Geometry", "Grid Tool", "Script Tool", "Change Par", "Offset", and "Engineering".

Filters Status		w 1	w 2
DONE 1	DONE 2	1	2

In case IRAF is not running, click on the IRAF icon to start it.



- 1) Open DS9 from the IRAF command line: !ds9 &
- 2) Go to the data directory: cd /home2/images/NOAO/2015-10-15/

The screenshot shows a terminal window on the left and the SAOImage ds9 software window on the right. A red arrow points from the terminal command `!ds9 &` to the ds9 window title bar.

Terminal Window (mscred):

```

mscred> ls
zero.001.fits
mscred> mscdisp zero.001.fits 1 z+
Warning: Cannot open file (unavail.im1.pl)
Warning: Cannot open file (unavail.im2.pl)
Warning: Cannot open file (unavail.im3.pl)
Warning: Cannot open file (unavail.im4.pl)
mscred> inhead zero.001.fits[1]
zero.001.fits[1][568,2048][ushort]: Bias Frame
mscred> inhead zero.001.fits[2]
zero.001.fits[2][568,2048][ushort]: Bias Frame
mscred> inhead zero.001.fits[3]
zero.001.fits[3][568,2048][ushort]: Bias Frame
mscred> inhead zero.001.fits[4]
zero.001.fits[4][568,2048][ushort]: Bias Frame
mscred>

```

SAOImage ds9 Window:

File Edit View Frame Bin Zoom Scale Color Region WCS Analysis Help

File: zero.001.fits

Object: [empty]

Value: 3548.78

WCS: [empty]

Physical X: 2801.500 Y: 1047.500

Image X: 2801.500 Y: 1047.500

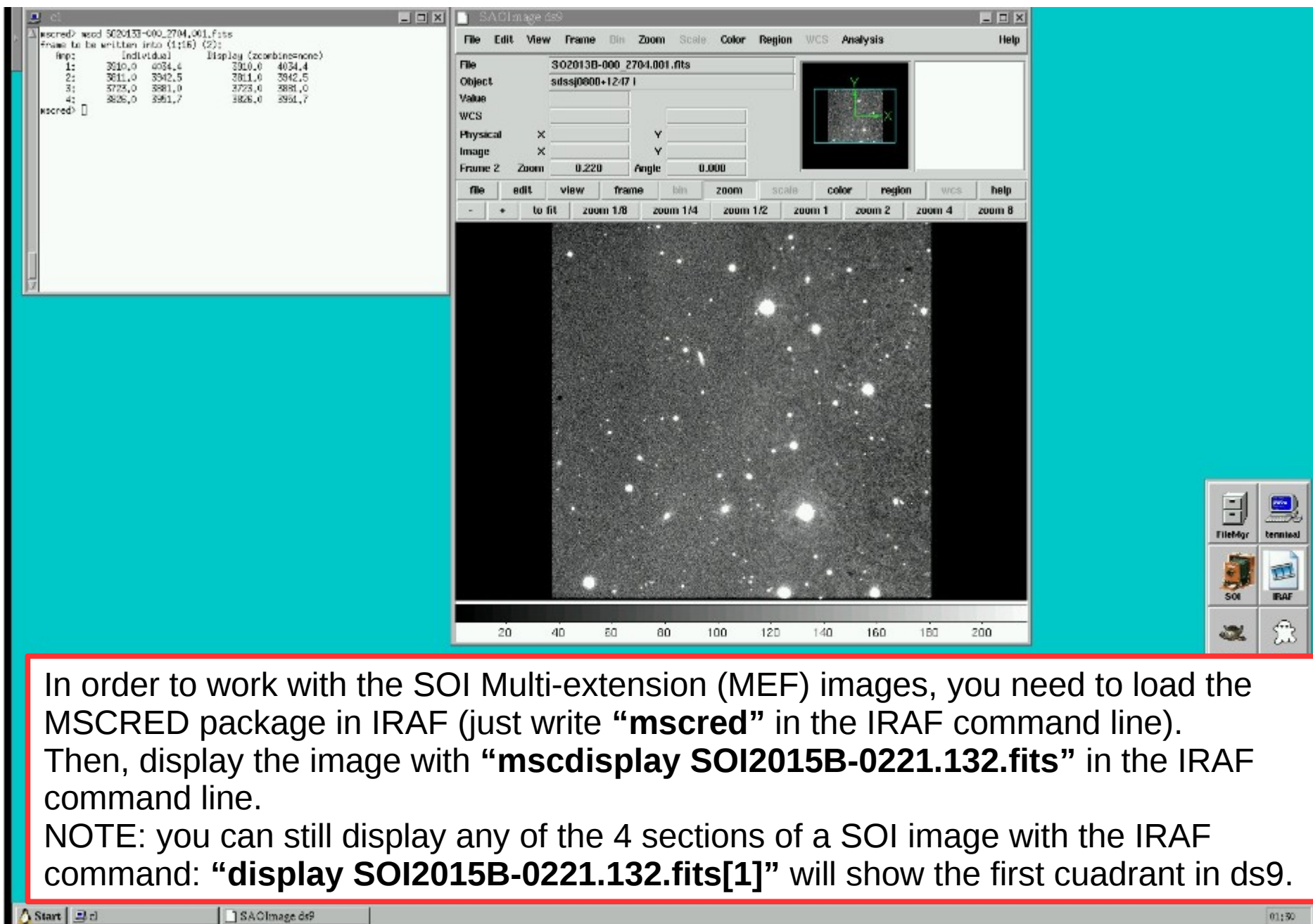
Frame1 Zoom: 0.250 Angle: 0.000

file edit view frame bin zoom scale color region wcs help

center align in out to fit none x y xy 0 degrees 90 degrees 180 degrees 270 degrees

The main window displays a grayscale image of a solar image with a large dark region in the center. A small inset in the top right shows a zoomed-in view of the image.

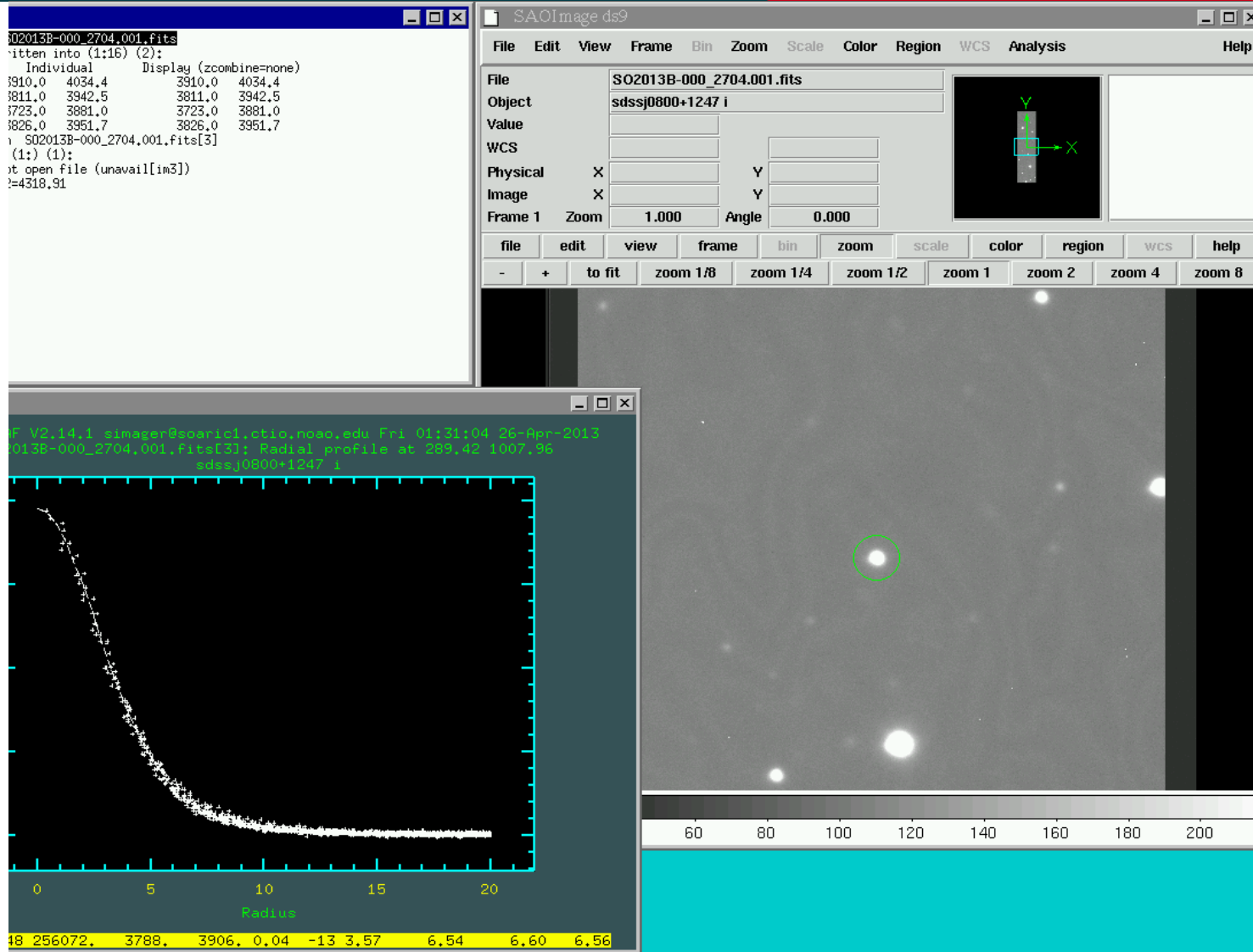
The bottom status bar shows coordinates: 20 40 60 80 100 120 140 160 180 200.



The screenshot shows the IRAF environment with the SOI image display interface. The main window displays a grayscale image of a solar image with a coordinate system overlay. The top panel shows the file name 'SOI2015B-0221.132.fits' and various parameters. The bottom panel shows a zoomed-in view of the image with a coordinate system overlay. The taskbar at the bottom shows the Start button and the SOI and IRAF icons.

In order to work with the SOI Multi-extension (MEF) images, you need to load the MSCRED package in IRAF (just write **"mscred"** in the IRAF command line). Then, display the image with **"mscdisplay SOI2015B-0221.132.fits"** in the IRAF command line.

NOTE: you can still display any of the 4 sections of a SOI image with the IRAF command: **"display SOI2015B-0221.132.fits[1]"** will show the first quadrant in ds9.



- 1) If use MSCDISPLAY, you need the MSCRED version of IMEXAMINE: MSCEXAMINE
- 2) If you display only one section with DISPLAY, then you can use the normal IMEXAMINE routine, either after **"display image.010.fits[1]"** or with **"imexamine image.010.fits[1]"**