SOFIA Spot (SSPOT) Users Guide

SCI-US-REP-SW08-2018

Date: 10-14-2014
Revision: D

AFRC
Armstrong Flight Research Center
Edwards, CA 93523

ARC
Ames Research Center
Moffett Field, CA 94035

German Space Agency, DLR
Deutsches Zentrum für Luft und
Raumfahrt

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

REVISION HISTORY

REV	DATE	DESCRIPTION
-	TBD	Initial Release
A	5/18/2012	Cycle 1, Added FORCAST Grism and Grism_XD
B	3/08/2013	Cycle 2, FORCAST Grism and Grism_XD Slits rotated 90 degree
C	9/09/2014	Added Cycle 3, Added FIFI-LS, EXES, custom map for FIFI
		Added downloading correct versions of SSpot
		Added Customize AOR Summary Table
		Added finding Help Resources, regerence to Observer Handbook
D	10/14/2015	Added Cycle 4, HAWC_PLUS and FPI_PLUS
		Added handling Mac Installation instruction for OS X 10.8 and up
		Added explanation of total estimated time and awarded time
		Non-Sidereal Visilization is suppported
		Added explanation to Guide Star

SSpot Users Guide
SCI-US-REP-SW08-2018

Version 2.9.0

Lan Lin, *USRA-SOFIA*
Thomas Lau, USRA-SOFIA
William Vacca, *USRA-SOFIA*
R. Y. Shuping, *SSI/USRA-SOFIA*

SOFIA Science Center
Universities Space Research Association
Moffett Field, California   USA

http://www.sofia.usra.edu/

Table of Contents

SSpot Users Guide
SCI-US-REP-SW08-2018

Version 2.6.0

1. INTRODUCTION

Welcome to SOFIA Spot (SSpot) – the tool for phase II SOFIA observation planning. The SSpot software is available for download from the SOFIA DCS website:

 http://dcs.sofia.usra.edu

SSpot is based on Spot-common, a framework that was used to develop the Spitzer Spot and Herschel Spot software, and so has a similar look and feel to these other versions of Spot. Since SOFIA is an airborne observatory and not a satellite, some parameters and concepts found in these other versions of Spot are not applicable.

SSpot is intended for use primarily by the SOFIA observing community (general investigators, GIs) to plan their observations. The GIs will use SSpot to specify the values of the parameters relevant to their proposed observations with each SOFIA instrument and visualize the proposed observations on an image of the target field. The set of parameters for any given observing mode and instrument configuration comprise an Astronomical Observing Template (AOT); the completed template with the specified values is known as an Astronomical Observation Request (AOR).

2. SUPPORTED AOTS

SSpot supports the following AOTs:
>   FORCAST:
>>   IMAGING
>>   GRISM
>>   GRISM_XD (Not available in Cycle 4)
>   GREAT:
>>   Single_Point (PSW | BSW)
>>   Raster_Mapping (RASTERMAP_PSW| RASTERMAP_BSW)
>>   OTF_Mapping (OTFMAP_PSW| OTFMAP_BSW)
>   FLITECAM:
>>   IMAGING
>>   GRISM
>   EXES:
>>   HIGH_MED
>>   MEDIUM
>>   HIGH_LOW
>>   LOW
>   FIFI-LS:

VERIFY THAT THIS IS THE CORRECT REVISION BEFORE USE

SYMMETRIC_CHOP
ASYMMETRIC_CHOP
BRIGHT_OBJECT
SPECTRAL_SCAN
HAWC_PLUS: (new in Cycle 4)
CHOP_NOD (TOTAL_INTENSITY, C2N)
CHOP_SCAN(TOTAL_INTENSITY, OTFMAP)
POL_NOD (PLLARIZATION, C2N
FPI_PLUS: (new in Cycle 4)
IMAGING

3. KNOWN ISSUES

- SSpot currently does not support overlays for orbital elements. This will be added in a future release.
- Note that because SOFIA is an airborne observatory and not a satellite or ground-based observatory, some AOT parameters cannot be specified until the AOR is flight planned.

4. DOWNLOAD AND INSTALL

1. Navigate to http://dcs.sofia.usra.edu/ and click on "Download" for the appropriate platform.

2. Decide which version of SSpot to download. Due to the incompatible setting of certain parameters for a given instrument between cycles, you need to download the correct version of SSpot in order to edit the AORs for a given cycle. For example, if you are editing Cycle 4 AORs, download the Cycle 4 SSpot. If you need to edit the cycle 3 AORs, download the Cycle 3 SSpot. This is due to the nature of the SOFIA instruments being upgraded between cycles. For example, certain filters in the previous cycles are replaced with new filters in the future cycles.

3. Install SSpot:
   ◦ For Mac, double click the downloaded disk image (.dmg) and drag the "sspot" folder to your local hard drive (usually the Applications folder); If you are running Moutain Lion (OS X 10.8) and up, and receive "file damaged" error during the installation, it does not mean that the dmg file is damaged. You just need to lower the security settings temporally to install SSpot. After that, return your security settings back to normal. Here is what you do: Launch System Prefrefence -> Security and Privacy -> General, and select Allow applications downloaded from Anywhere. Return the security setting to normal afterwards.
   ◦ For Windows, double click the downloaded installer (.exe) and follow the instructions;
   ◦ For Linux, in the install directory, type "chmod +x sspot_1_2_0.sh" and hit return. Then type the command "./sspot_1_2_0.sh" .

5. QUICK START

For quick start, refer to the SSpot_pocket_guide.pdf that is packaged with the installer.

6. RUNNING SSPOT

6.1.   SSpot Main Screen

SSpot uses several icons as shorthand for commonly used functions that are also available under the Menus. They are shown in the following figure.

Figure: The menus and icon bar on the SSpot main screen provide access to the various functions within Spot.

From left to right the icons are:

read in AORs/targets from a file

save AORs/targets to a file

undo last action

The next three AOR icons become active once you have defined AORs:

delete the current AOR

modify the current AOR

make a copy of the current AOR

The four bull's-eye icons are for manipulating targets:

new target

delete target

modify target

show the current target list

6.2.   Creating New AORs without a Proposal or an Observing Plan

To create a new AOR, use the menu Observation->[Instrument]. SSpot will create an AOR populated with default values defined in the AOT. You can edit and visualize the AORs, then save them to a local disk. Since the AORs don't have a valid proposal ID associated with them, SSpot will not upload them to the SOFIA DCS database at the SSC.

6.3.   Creating AORs from an Observing Plan

You can also create AORs from an existing observing plan in the SOFIA Data Cycle System. If you already have a saved .aor file that was created from the proposal you submitted and has a valid proposal ID, you can work on it by opening the file from SSpot. You only need to log in to the DCS when you want to upload these AORs to the DCS server.

To start, search for your obsplan with the obsplan ID that you received when you submitted your proposal. The Obsplan ID is the same as your proposal ID. Open the ObsPlan Chooser using "File->Download AORs from DCS…" The quickest way is to enter your ObsPlan ID (also known as proposal ID, program ID) in the lower left "Get Obs Plan" panel's ObsPlanID input field and press the "Get Plan" button. You will be prompted to log in to your dcs account in order to search your observing plan. The login email and password are the ones you registered with DCS. You have permission to see the details of only your own proposal; you will get a "Permission Denied" message if you enter a proposal ID that is not yours.
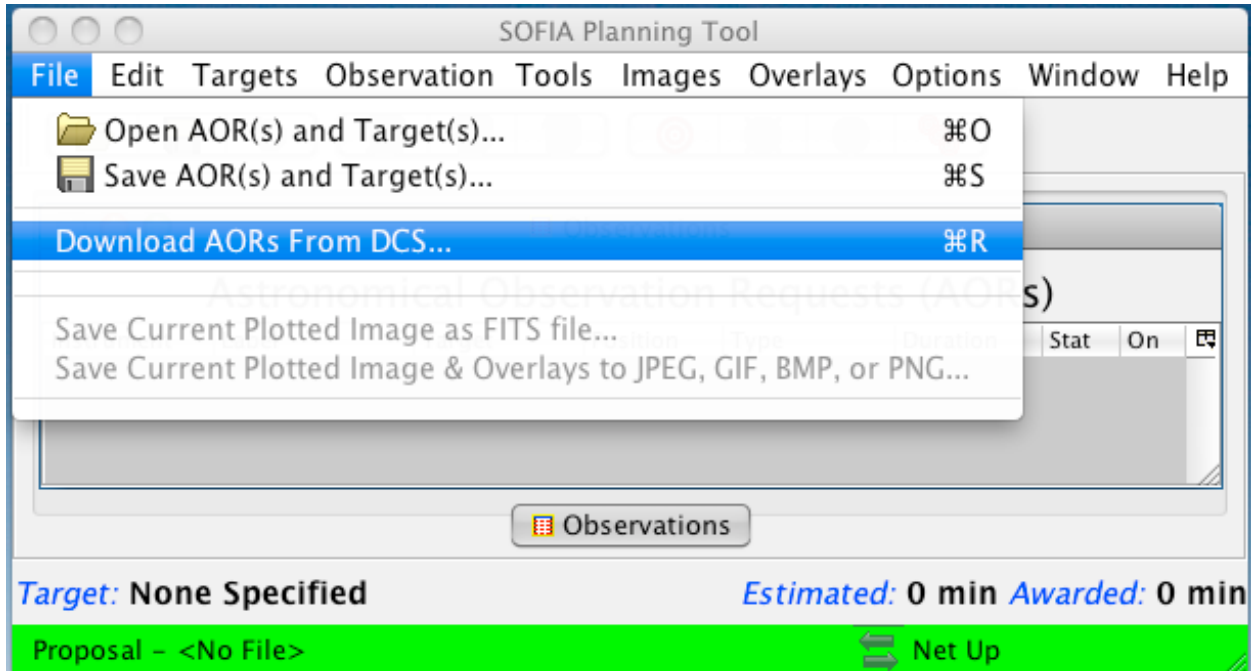
Open the tree on the right side of the chooser panel to see the details of the plan, click on the top-most node labeled "Proposal", then click on the "Accept" button. (The "Accept" button will only be enabled after you click on the "Proposal" node.)
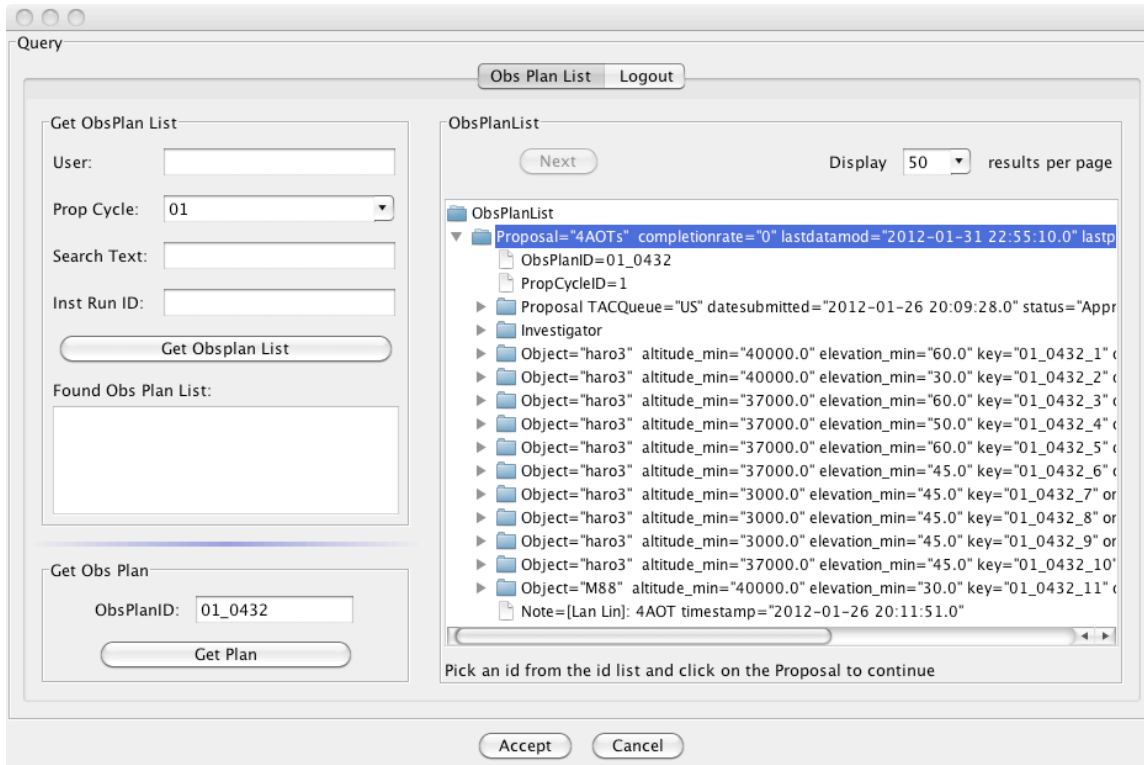

If this is the first time you are accessing your observing plan, or if you have not previously uploaded any AORs from SSpot, you will receive a message indicating that there are no AORs associated with the obsplan and confirming that you would like to create new AORs. Upon clicking "yes" a set of AORs will be created from your obsplan and displayed in the summary table.

After you have saved your AORs and uploaded them successfully to the DCS obsplan database,

subsequent uses of the chooser will retrieve this set of AORs and automatically populate the AORs summary table.
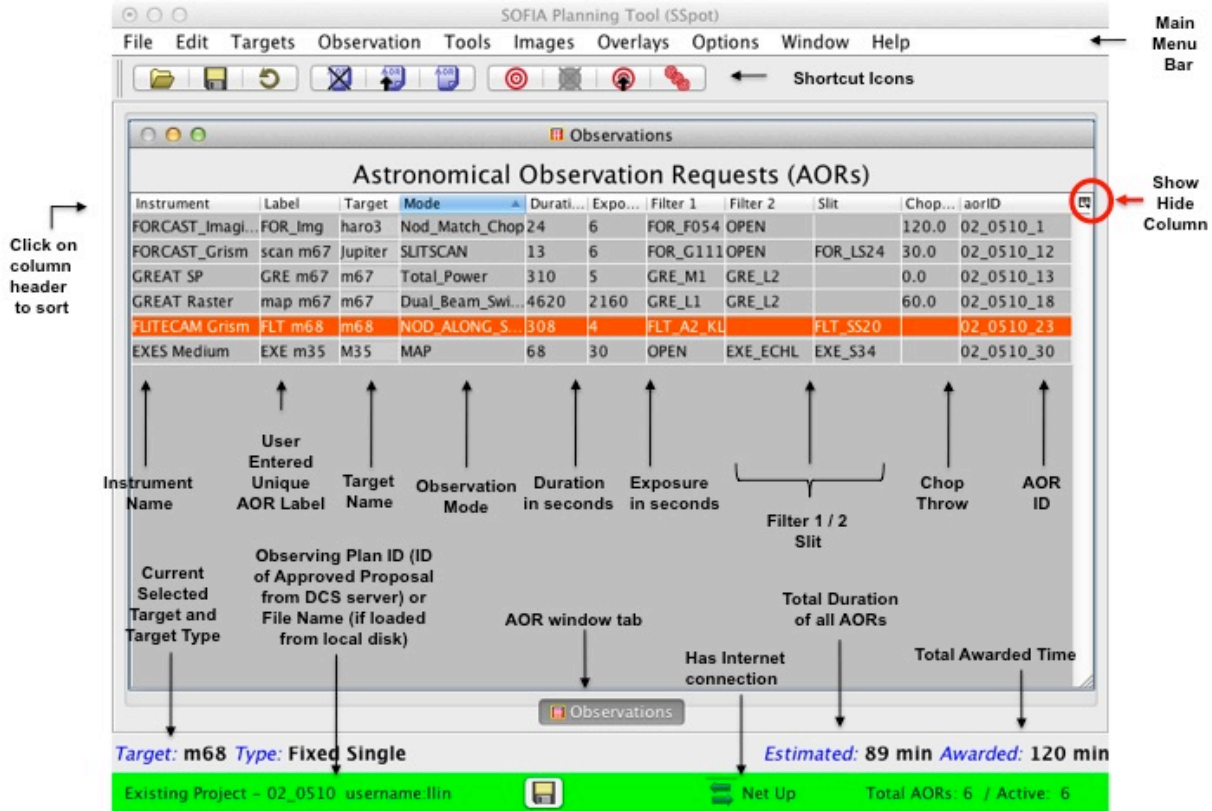
6.4. Estimated Total Time

You may notice that the "*Estimated*" time and "*Awarded*" time in the status bar in the main window do not match. The overhead for each AOR is recalculated using the extra information you fill out in the AOR editor window during phase 2, so it is more accurate. You are not required to make the estimated time under the awarded time in order to submit the AORs. You can contact your support scientists if you have questions.

6.5. Customize the columns in the Summary Table

You can show and hide any columns in the AORs Summary Table by clicking on the icon above the scroll bar in the table's header, indicated by the red circle in the figure above. You selections will be saved as part of your preferences. To see all columns, simply click on the icon and select "Reset Table to Factory Setting".
You can rearrange the columns by dragging the column header around.

You can also sort the table columns.

6.6.   Adding New AORs

You can add new AORs to the list of AORs created from your proposal with the "Observation->[Instrument]" menu. SSpot creates an AOR populated with default values defined in the AOT. Alternatively, you can select an AOR from the list, and duplicate it using the Copy AOR function. You can also create a large number of new AORs by using the AOR replication tool in the "Tools" menu. The newly created AORs will be assigned unique IDs when you save this set and upload them to the DCS server.

6.7.   Editing AORs

You can work on only one AORs at a time. (To work on a different AOR, you must close the one you are currently working on.) Double clicking on an AOR, will bring up an AOR editor window appears. You can edit the filters, nod type, and exposure time and any the fields that are available and editable (not grayed out). After editing, click on the OK button for your changes to take effect. If you want to work on a set of AORs from a different *.aor file saved on a local disk or downloaded from the DCS database, you need to clear the current AOR summary table using the "Edit->delete All AORs" option first, then load the new set of AORs into SSpot using the "File->Open" or "File->Download AORs from DCS" options.
Only AORs that have a state of "new" or "problem" can be modified. AORs that are "done", "pending", or "approved" cannot be modified or deleted. However, SSpot will allow you to open them in the detailed AOR dialog, view them, change values, and visualize them. However, SSpot will not allow you to upload any modifications to the DCS database, and will simply discard any changes when you close the editing window. In other words, you can change the values and view them, but these changes will not be saved. Note that you can also duplicate an AOR that is not editable; the duplicated AORs will be in a "new" state thus is fully editable.

○ ○ ○   FORCAST_Imaging

Unique AOR Label: 01_0432_22-NPC

Target: **haro3** *Type:* **Fixed Single**
161.343375, 55.960389 Equ J2000   *or*   10h45m22.41s, +55d57m37.4s Equ J2000

New Target   Modify Target...   Target List...

Observing Condition   Aquisition/Tracking

FORCAST

Exposure Time (sec) 100.000

Cycles   22

SW
- ○ FOR_F064
- ○ FOR_F066
- ○ FOR_F077
- ○ FOR_F111
- ○ FOR_F197
- ○ FOR_F242
- ◉ NONE

LW
- ○ FOR_F315
- ◉ FOR_F336
- ○ FOR_F348
- ○ FOR_F371
- ○ NONE

Chop / Nod

Chop/Nod Style   Nod Per Chop ▲▼

Chop Type   Sym ▲▼

Chop Throw (arcsec)   210.000

Chop Angle Coordinate   Array ▲▼

Set Chop Angle Ranges

Chop Angle (deg) 90.000

Nod Throw (arcsec)   210.000

Nod Angle Coordinate   Array ▲▼

Nod Angle (deg)   180.000

Example Rotation Angle (deg) 15.000

Dither Pattern
◉ No   ○ Yes   Set Dither Pattern

Observation Est...   Comments...   Open Visibility Tool...   Proposal Info...

(?)   Cancel   Apply   OK

Edit Targets: You must use the TargetList to add/modify/delete a target. To open the TargetList editor, you can use the menu "Targets->Target List" or click on the "Target List" button in the AOR editor window.

Starting Cycle 4, SSpot automatically adds Guide Stars to each AOR whenever a new target is created or an existing target is modified. The GIs do not need to worry about the Guide Stars, they are for the SOFIA telescope operators to set up the telescope during operation.

Edit Dither Positions: The dither control panel is opened via the "set dither pattern" button. A list of offset positions will be automatically generated according to a specified pattern but all of them can be edited. **Make sure the first point in the pattern remains at 0,0.** Note that in the FORCAST C2NC2 node, the off position does not dither

For FIFI-LS, you can load a customized map positions in some modes. The example map position definition file is included in the downloaded installer.

Delete AORs: You can delete an AOR by selecting one in the summary table and click on the delete icon or use the menu "Edit->delete all AORs". The latter command will clear the AOR summary table. You can "Undo" the deletions as long as they are not deleted by the "delete all AORs" command.

6.8.   Visualize AOR

To visualize an AOR:
1. Select an AOR from the summary table.
2. Select a background image from one of the archives available from the menu "Images->xxx" (2MASS and MSX images are good choices for testing).   Wise catalog is added starting cycle 3 provided by IPAC.
    * If you want to use the haro3 fits file image as background, click on "Images->FITS File Image…" and then select haro3.fits.
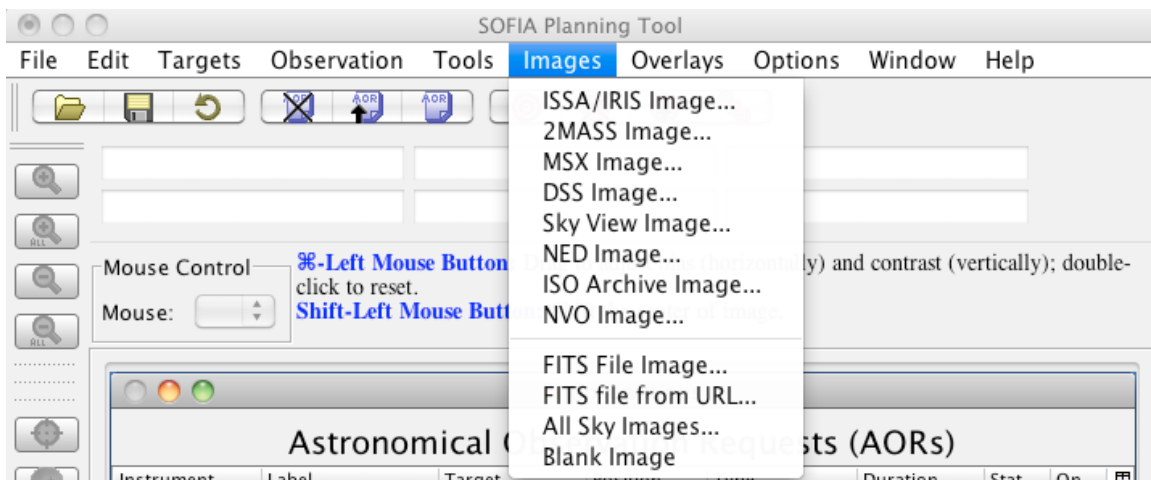
- Select overlays: After you select a background image, the image will be presented in an overlay window. Use the menu "Overlays->Current AOR…" to visualize your AOR on the background. *Overlays for non-sidereal objects are not supported at this time.*

The image manipulation and overlay icons will appear on the left-hand side of Spot whenever you display images. Click on the icons to activate them. The magnifying glass icons are for zooming your images in or out. This icon [⊕] zooms in the current image, and this one [⊖] zooms out. These icons, [⊕ ALL] and [⊖ ALL], apply the zoom to all the images stacked in the active frame (if you have only one image per frame, the ALL buttons will not be active). The crosshair icon [⊕] centers the current target in the middle of the current image frame.

In addition, a number of overlay options are now available from this tool bar:

    [icon] overlays the current fixed target position on an image;
    [icon] draws a coordinate grid on the image;
    [icon] extracts a flux slice between two points on the image;
    [icon] computes statistics in either a circular or rectangular area on the image;
    [icon] crops the image;
    [icon] allows you to determine the distance between two points on an image;
   [icon] allows you to add marks on an image and create your own catalog;

provides a pulldown menu from which you can select other images to overlay on the current image.

To see the effects of changes made to an open AOR, click the "Apply" button. The overlay will be refreshed with your latest modifications to the AOR.

Below is an example showing a FORCAST TPC in Nod Match Chop, and with a chop throw of 100 arcsec, chop angle 45 (no dither).
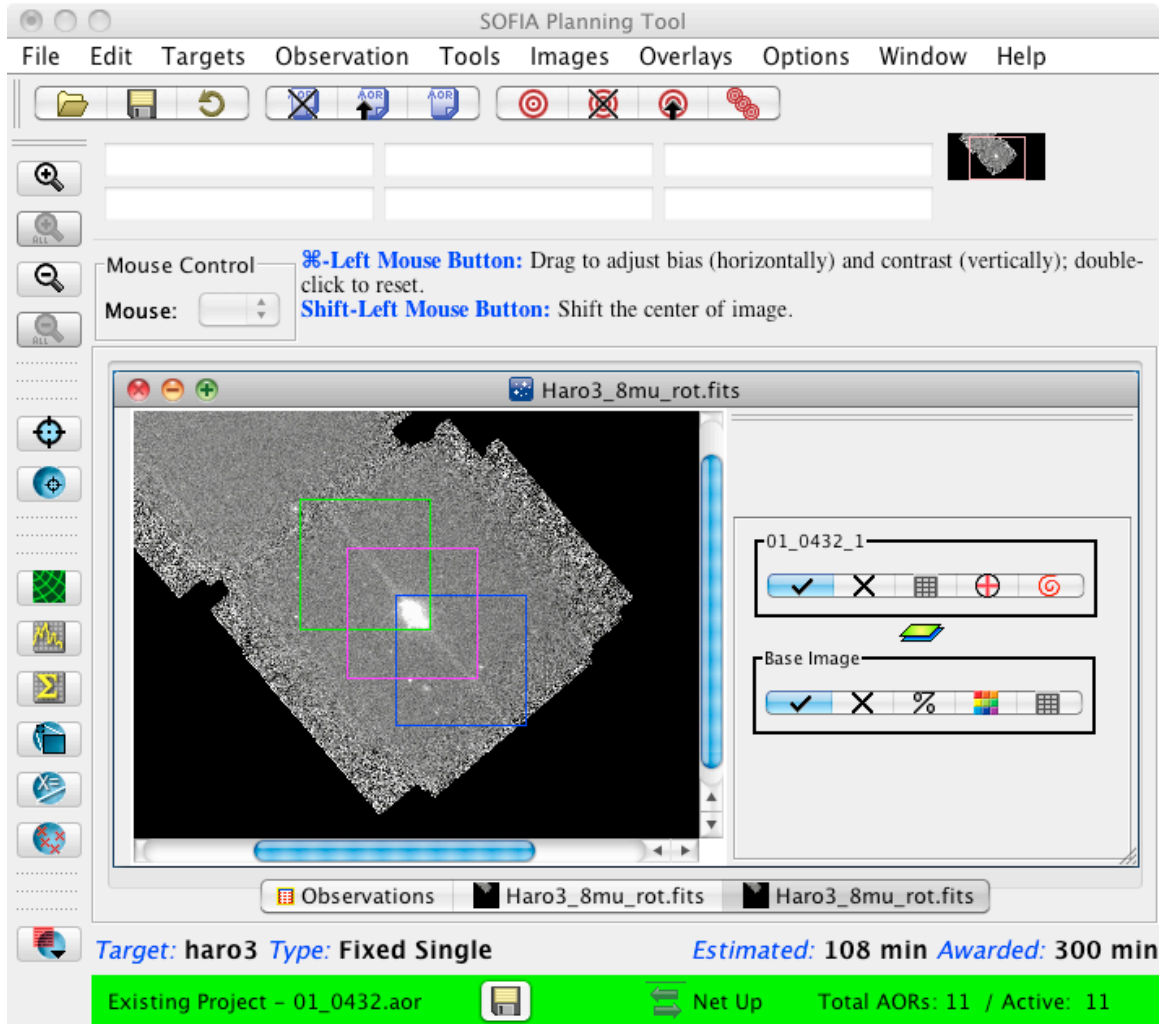
Animate the sequence of the overlays: Click on the control window the icon that looks like a table. The Overlay control window will appear that displays all the position of this AOR.
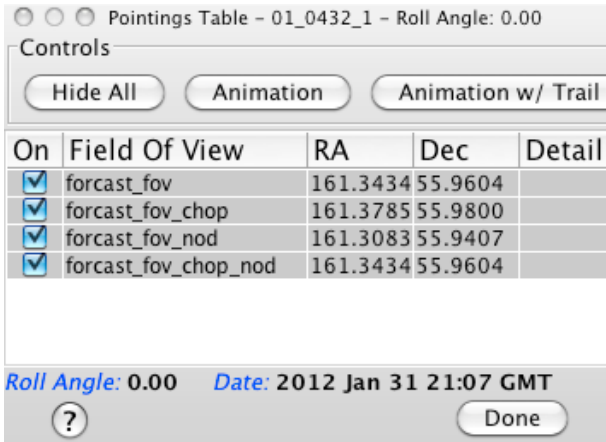
Show or hide beams: If you want to only see a specific beam, for example only the A beam in a FORCAST imaging sequence, click on the icon that has the cross inside a circle on the overlay control panel. Select the beams you want to see and de-select the ones you want to hide.
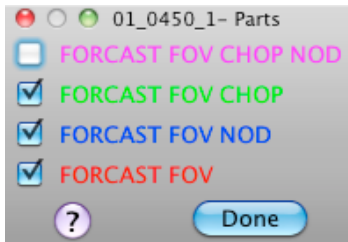
6.9. Save and Upload AORs

Use the File->save to save the AORs to local disk and upload to the SOFIA DCS. If the total duration exceeds the awarded time, SSpot will issue a warning that you must confirm. You can see the total duration and awarded time on the bottom of the AORs summary table. A pop-up window will appear indicating that the AORs have been successfully uploaded.

6.10. Help Information

You can click on question mark in any window bring up a help dialog. Additional information on how to use any science instrument and mode are provided by the SOFIA science team, Refer to the "Observer's Handbook" provided for each cycle.://www.sofia.usra.edu

7. BUG REPORTS AND FEATURE REQUESTS

All feature requests and bug reports should be sent to:

sofia_help@sofia.usra.edu

In your bug report, please describe as much details as possible so we can reproduce the bug, including (if applicable):
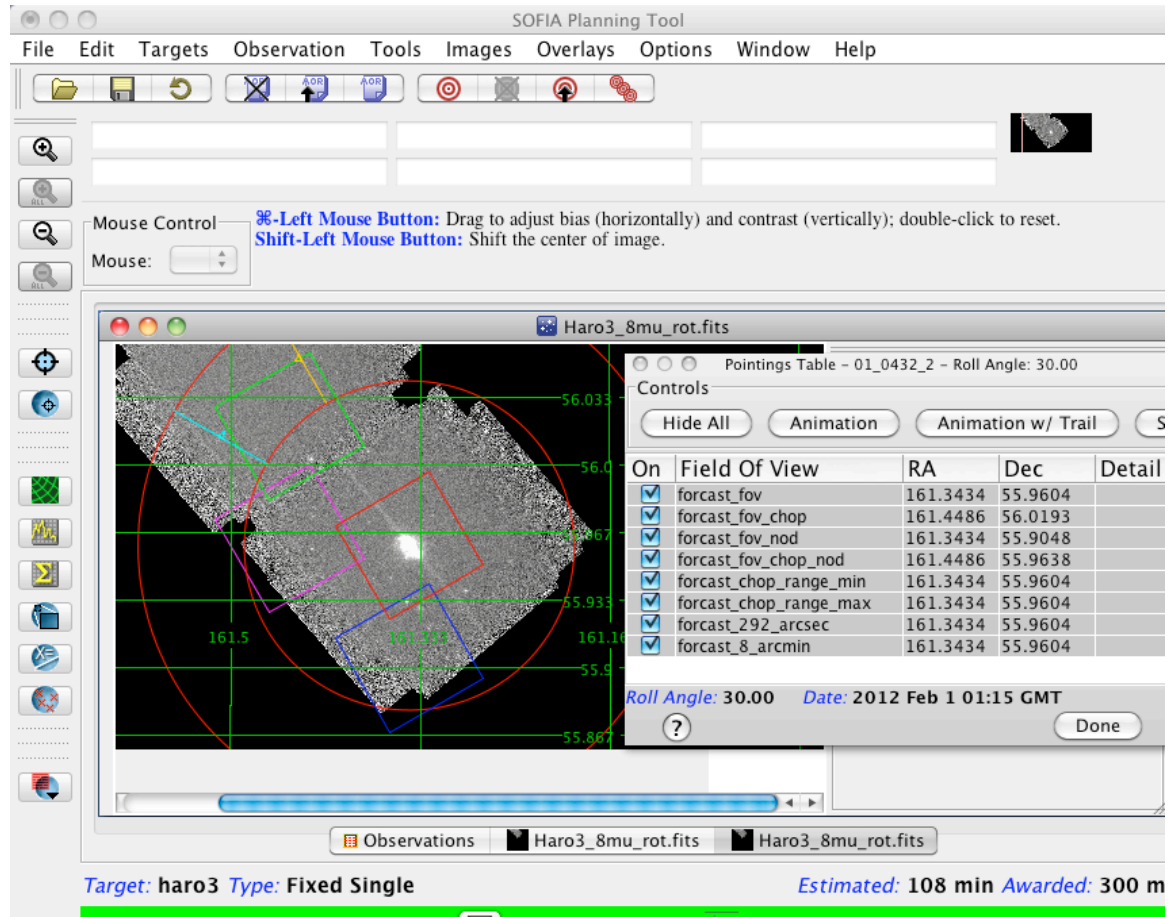- Proposal ID, and AOR ID;
- *.aor file that you saved;
- actions that led to the error.
- operating systems and version, such as Mac 10.6, windows 7, etc.

APPENDIX A.   SAMPLE AORS

The file "sample_aors.aor" (included in the installed folder) includes 6 AOTs with an array of modes and configurations. A few overlays are included here for reference:

01_0432_2, FORCAST Imaging, C2NC2

Overlay of 01_0432_2. When the chop throw is > 292 arcsec, you must specify the range for the chopping secondary. The specified min and max ranges are drawn as two lines.

01_0432_3, FLITECAM Imaging, stare with dither

01_0432_10, GREAT 4-point Raster Map with Beam Switching

Chop throw 90 arcsec, chop angle 60 deg, step size 40 arcsec, number of steps is 2 in lat and lon, filter L1a, repeat 5.