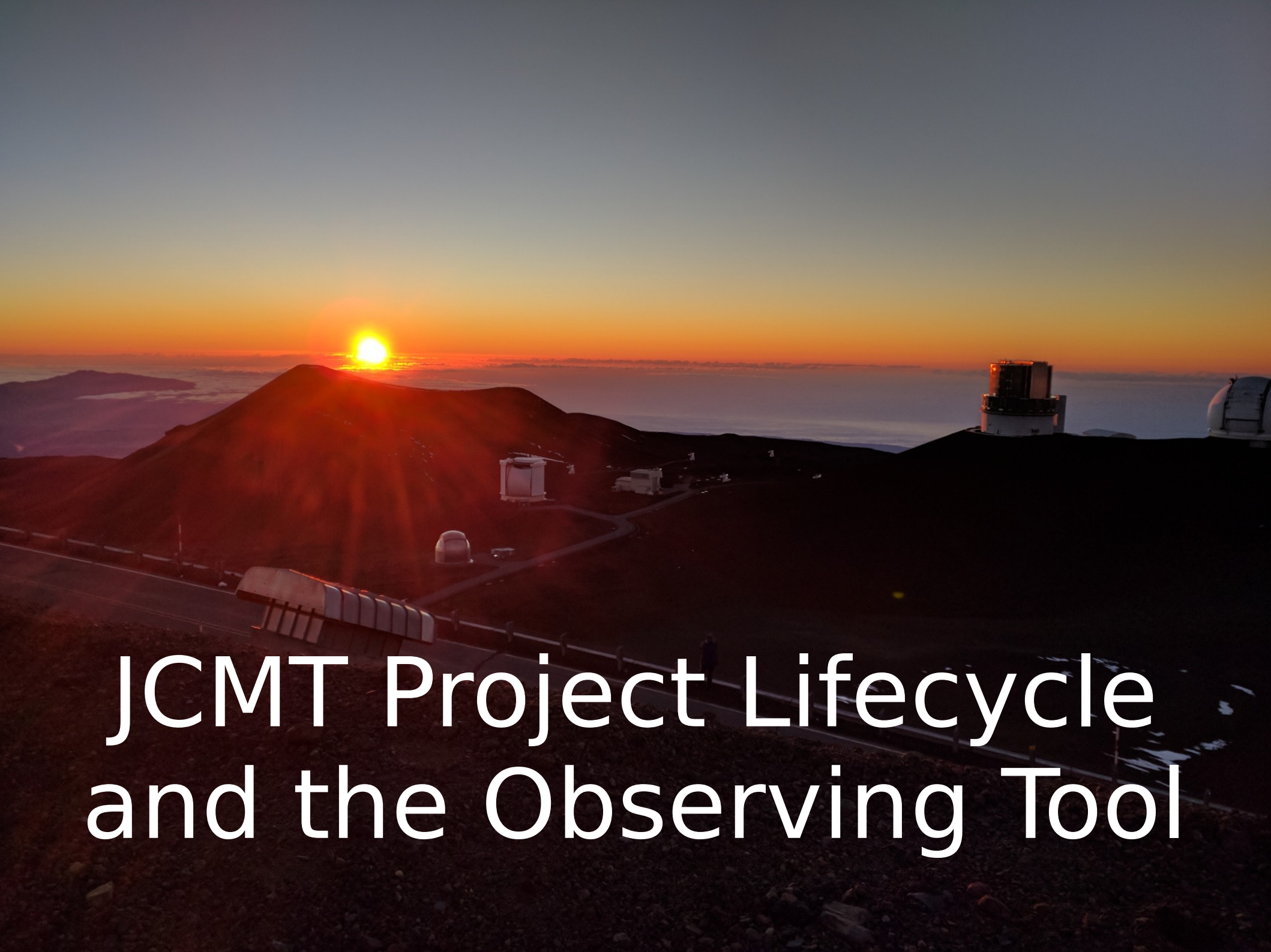


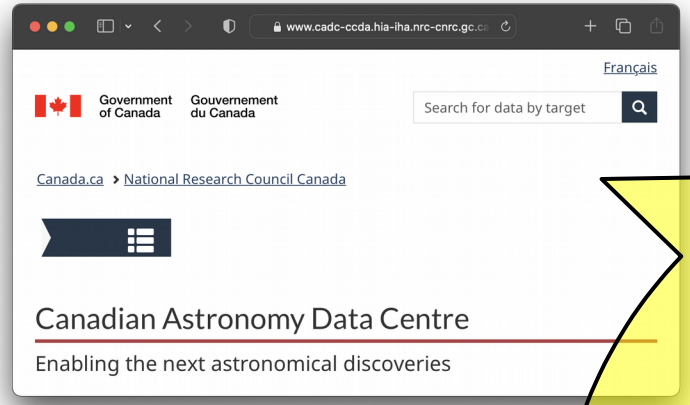
# JCMT Project Lifecycle and the Observing Tool

# Overview

- JCMT project lifecycle.
  - Proposals, observing and accessing data.
- The observing tool.
  - Libraries.
  - Position editor.
  - Frequency editor.
  - Observing modes.
- Interactive tutorial.

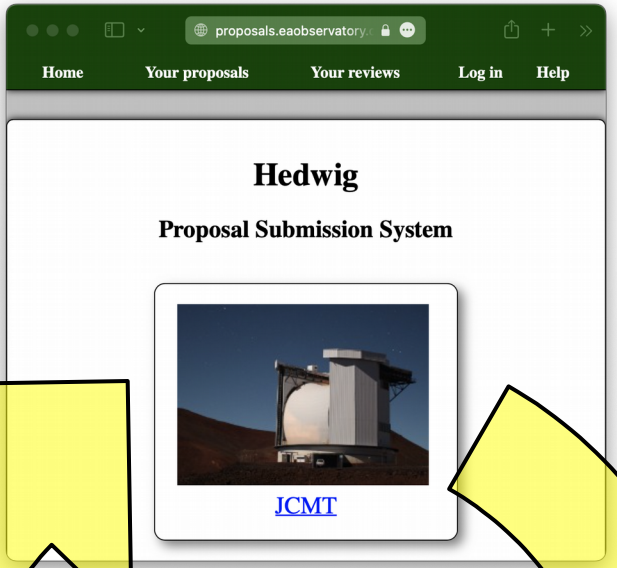
*project lifecycle*

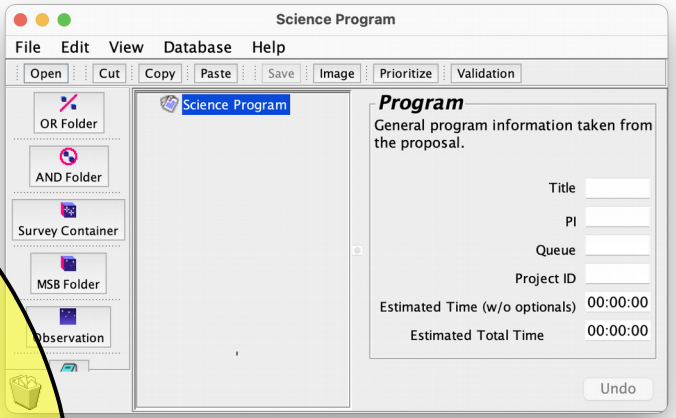
CADC

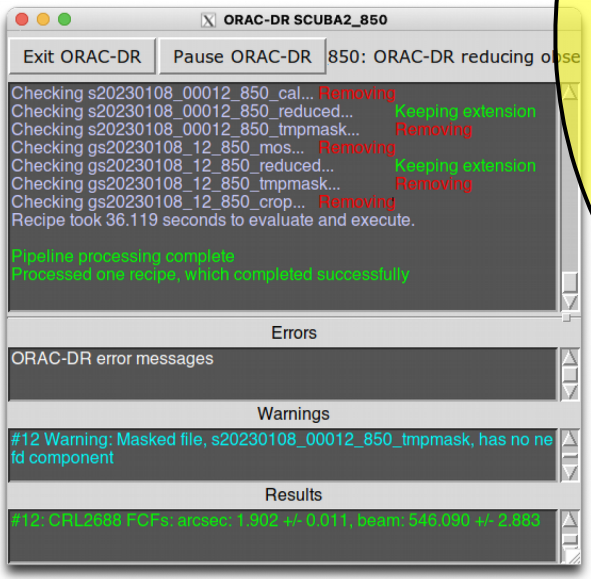



Hedwig

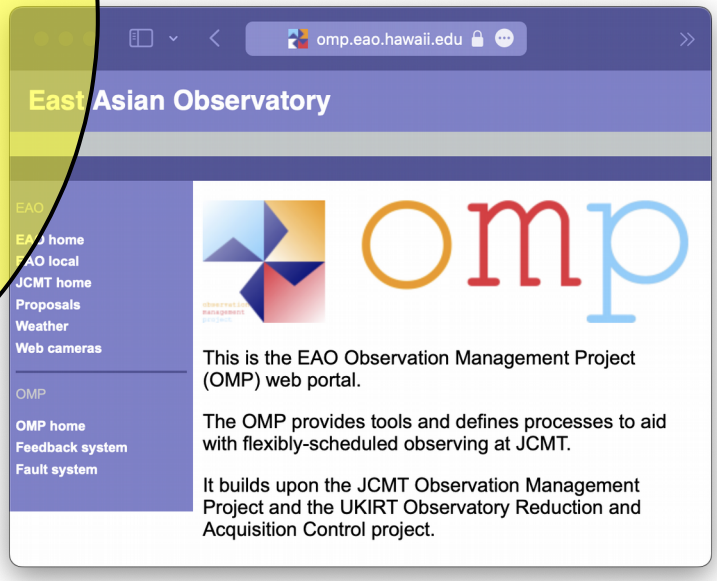
OT



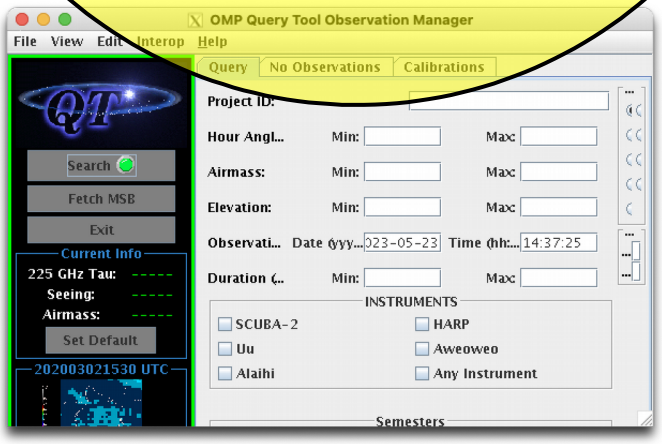




ORAC-DR




OMP




QT

# Proposal submission

- Proposals submitted via Hedwig.
  - 2 calls per year:
    - '**A**' semester: *February* – *July*, call ~ September
    - '**B**' semester: *August* – *January*, call ~ March
  - Urgent proposals at any time.
- Approval by Time Allocation Committee.
  - Process includes:
    - Technical assessment by JCMT staff.
    - External reviews.
  - OMP projects created for approved proposals.

# MSB preparation

- Observer prepares MSBs:
  - Uses the Observing Tool.
  - Uploads MSBs to the OMP.
- Observatory assigns a "*Friend of Project*".
  - Checks MSBs before activation.
  - Assists with data quality assessment and reduction.

**MSB**: *"Minimum schedulable block"*

- Smallest useful observing unit.
- One or more observations.
- Typically 30 – 60 minutes.
- Always observed in its entirety.

# Observing

- Telescope operator selects MSBs using the Query Tool, based on:
  - Weather conditions.
  - Source availability.
  - Instrument availability.
  - TAC-assigned priority.
- Project members notified via “flex”.
- Observing logs available in the OMP.
  - Can include a quality flag and comments.

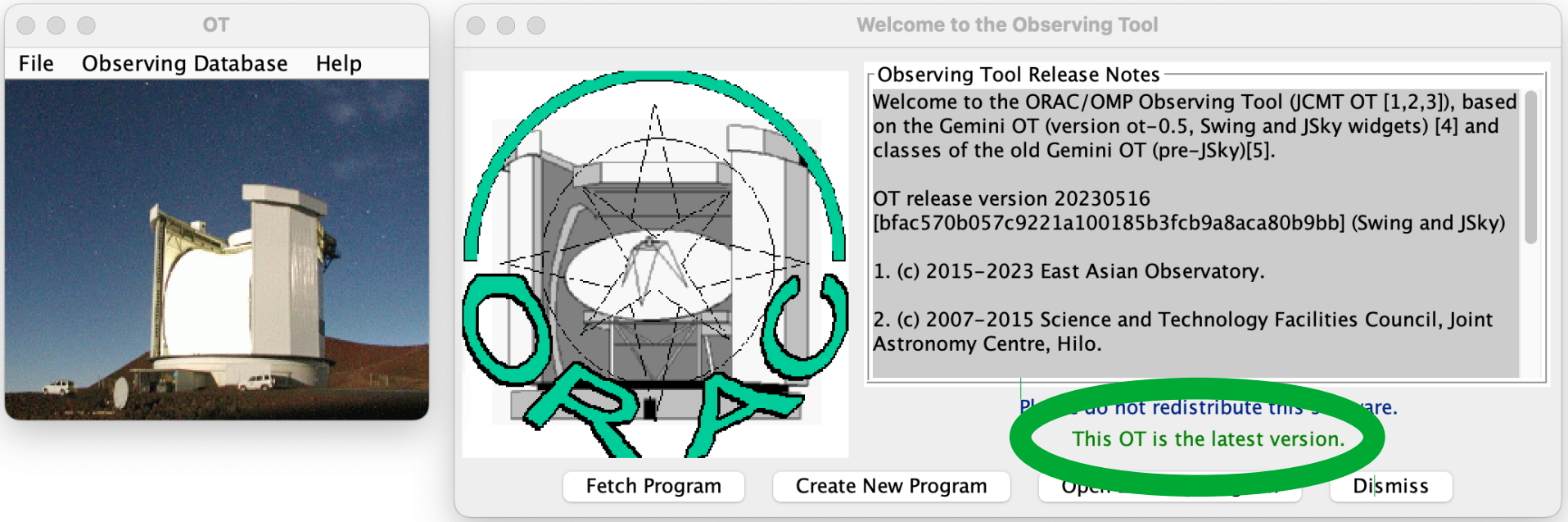
# Data uploaded to CADC

- Raw data uploaded continuously.
  - May be available from 4 hours after end of observation.
  - Cal. level 0: *“Raw instrumental”*
- Pipeline processing at EAO.
  - Processing starts the afternoon following observation.
  - Reduced data available as soon as ready.
  - Cal. level 2: *“Calibrated”*
- Data become public.
  - 1 year after end of semester in which observed.

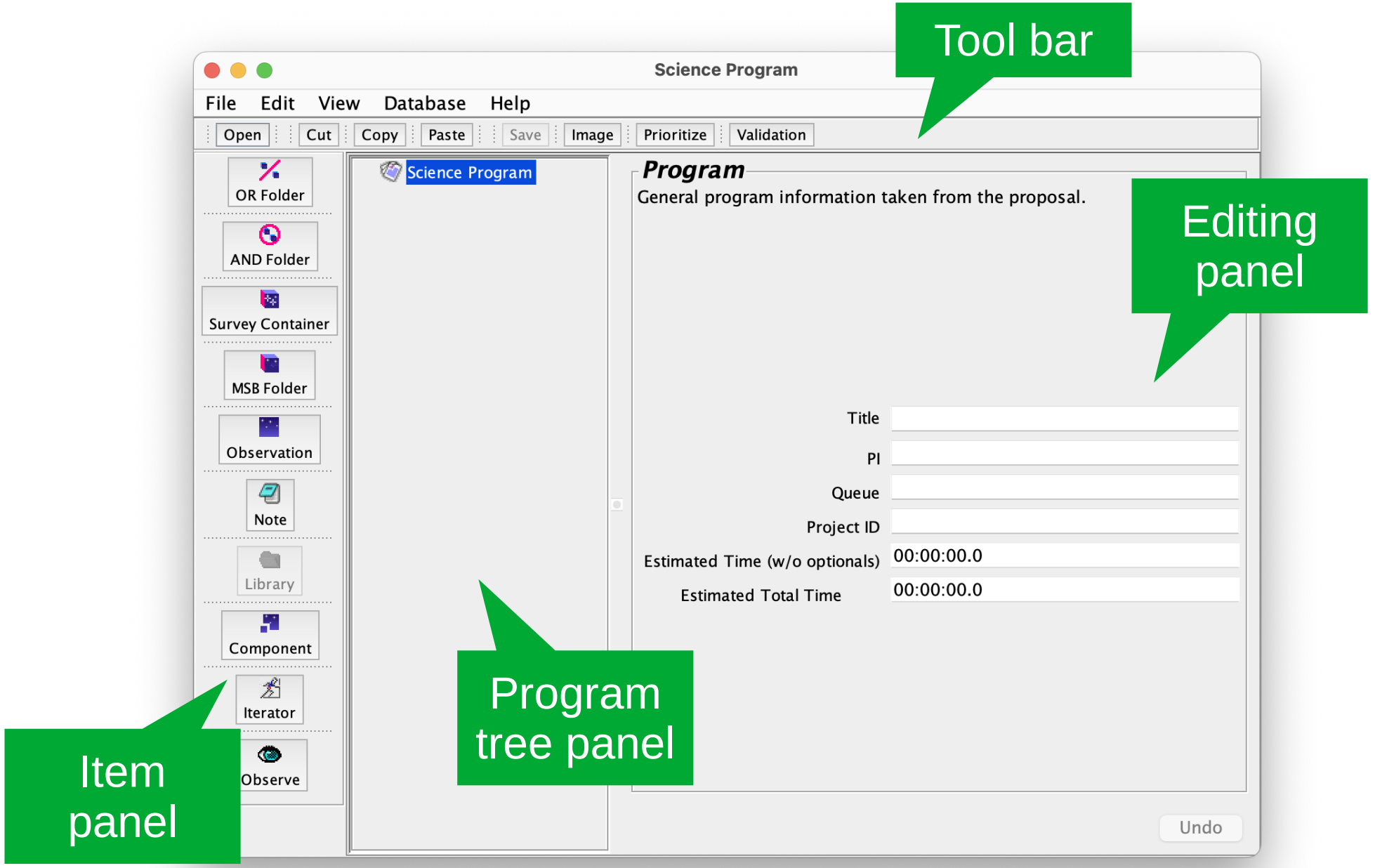
*the observing tool*

# Starting the OT

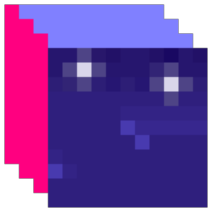
```
% wget https://ftp.eao.hawaii.edu/ot/jcmtot.jar
% java -jar jcmtot.jar
```



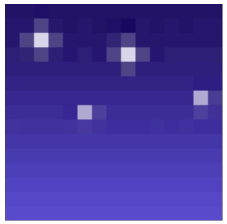
# The program window



# Program items

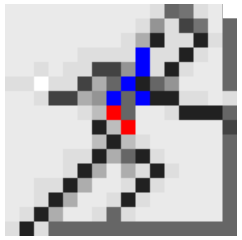


MSB

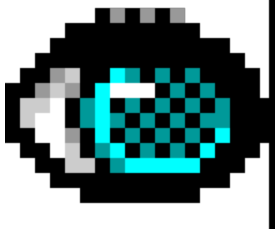


Observation

Component
- configuration



Iterator
- modifies observation as part of sequence

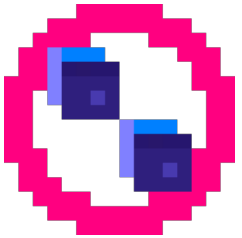


“Eye”
- triggers taking data

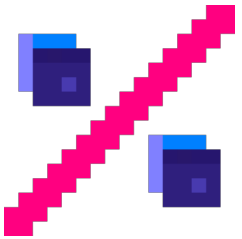
Note

Survey container

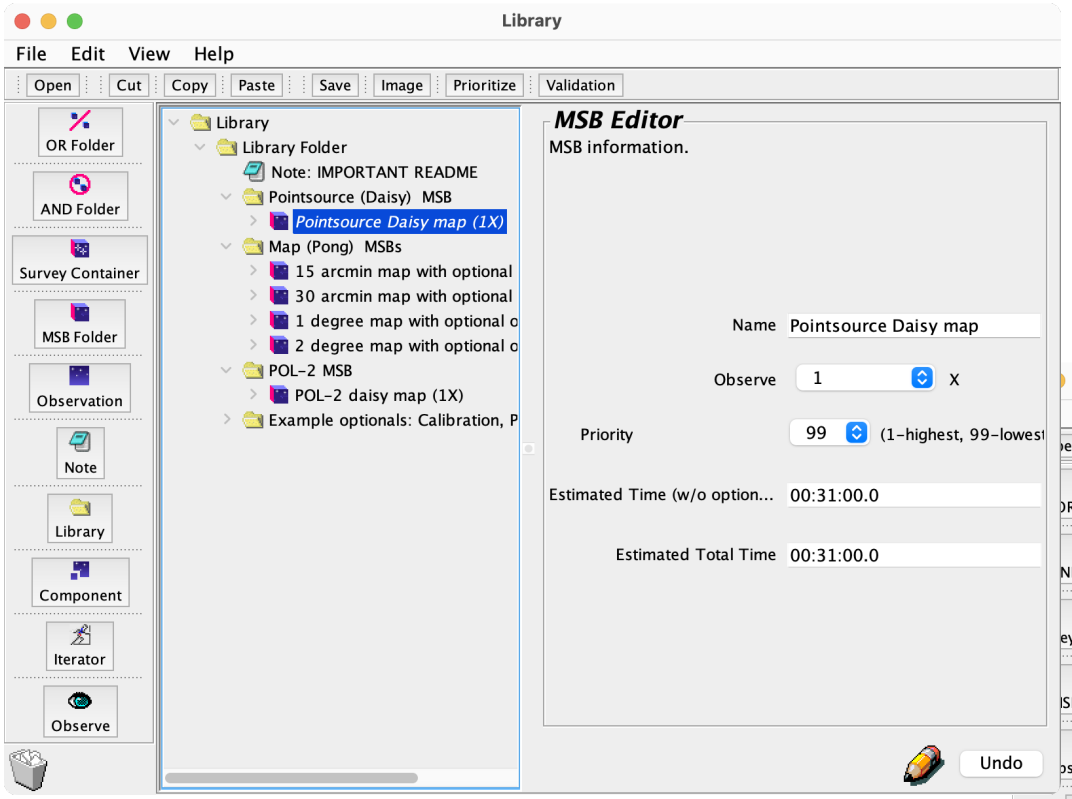
And folder



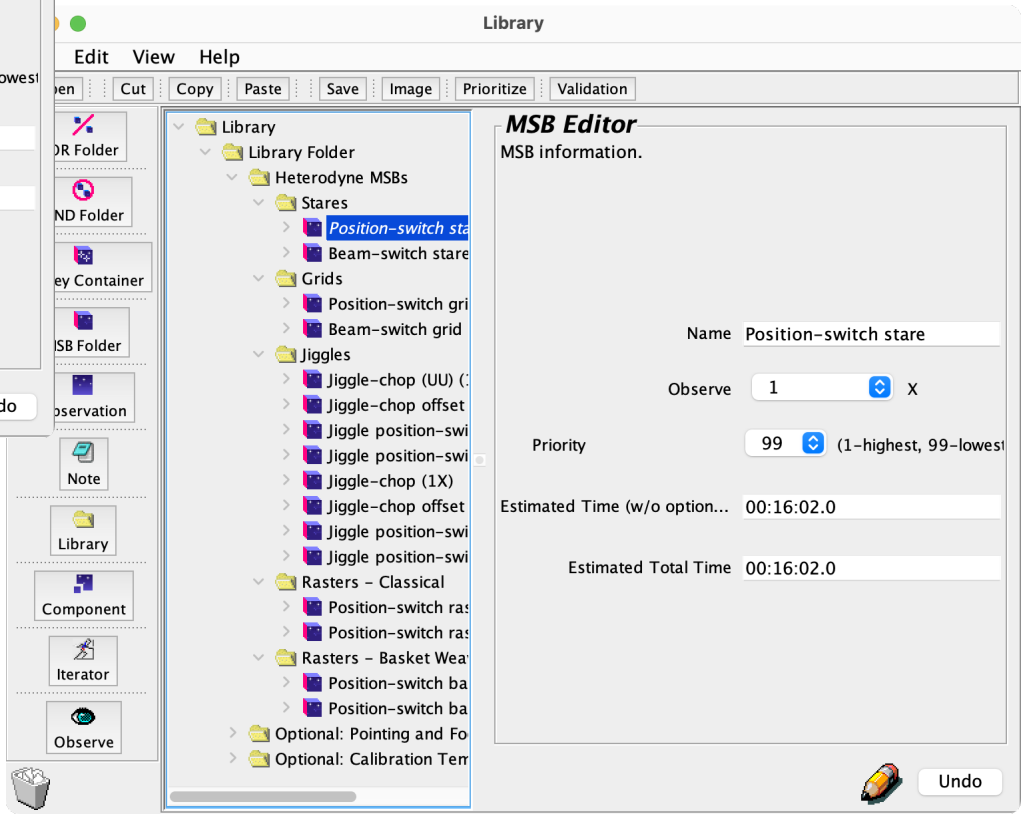
Or folder



# MSB libraries

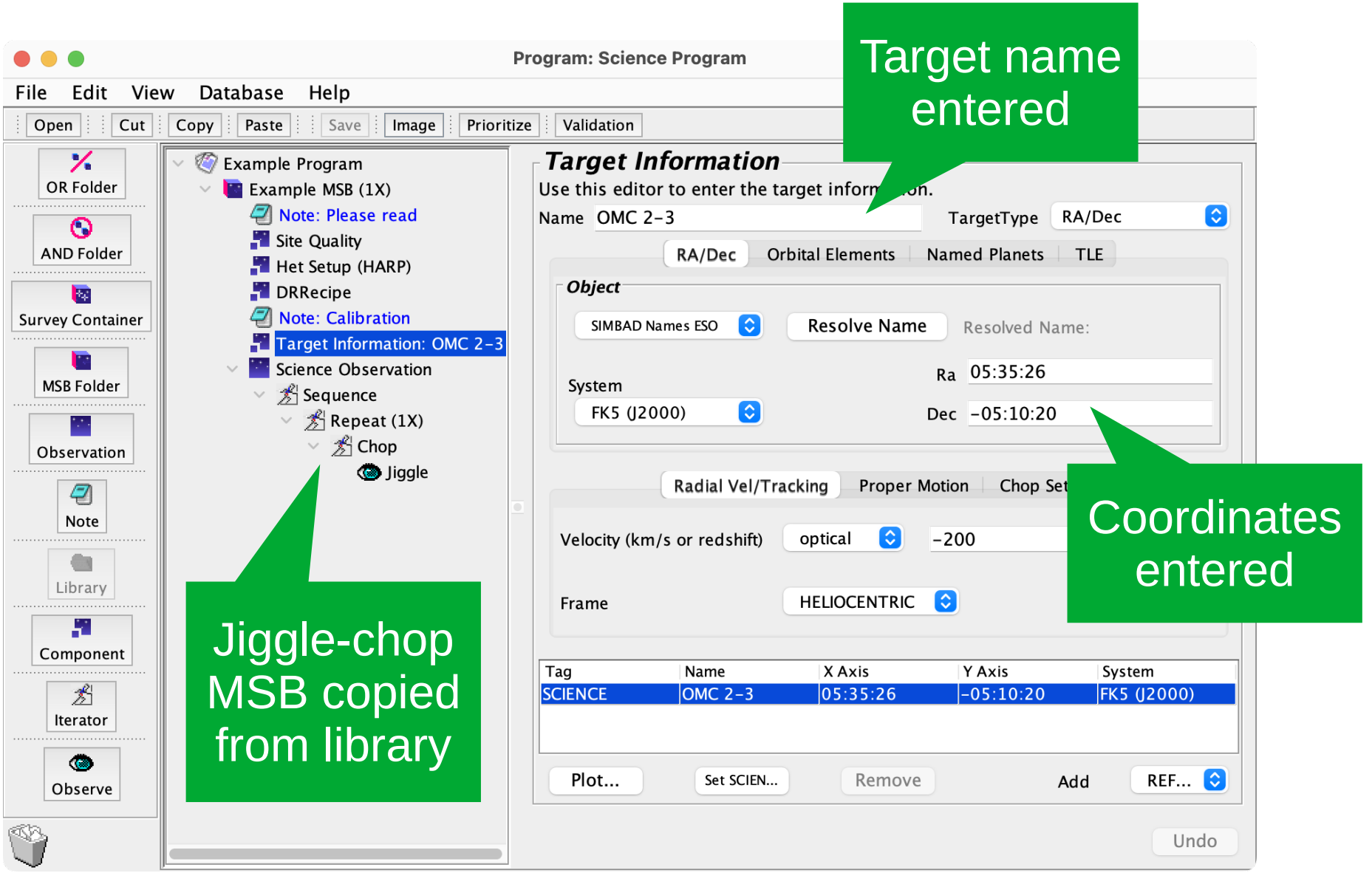



SCUBA-2

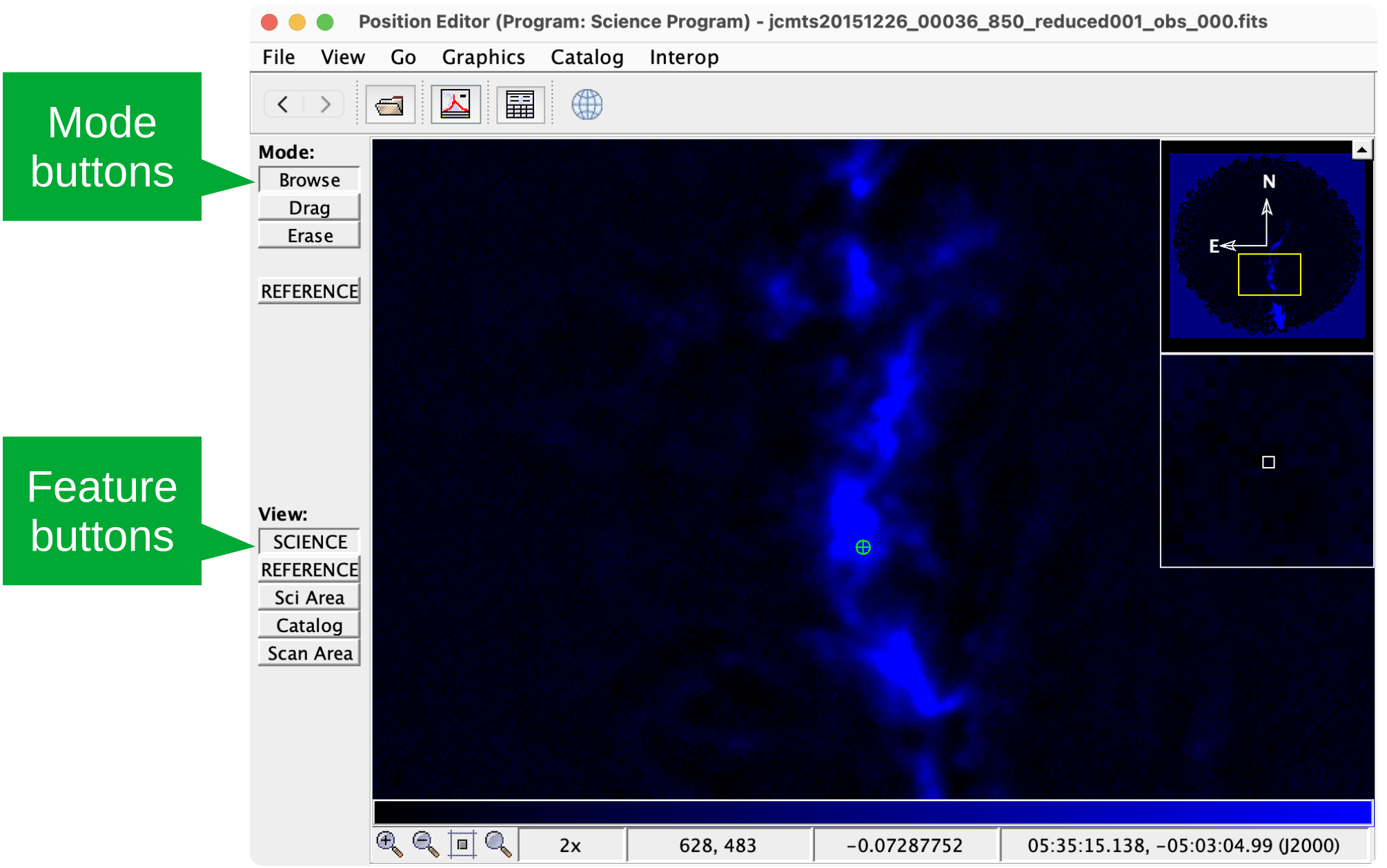



ACSIS

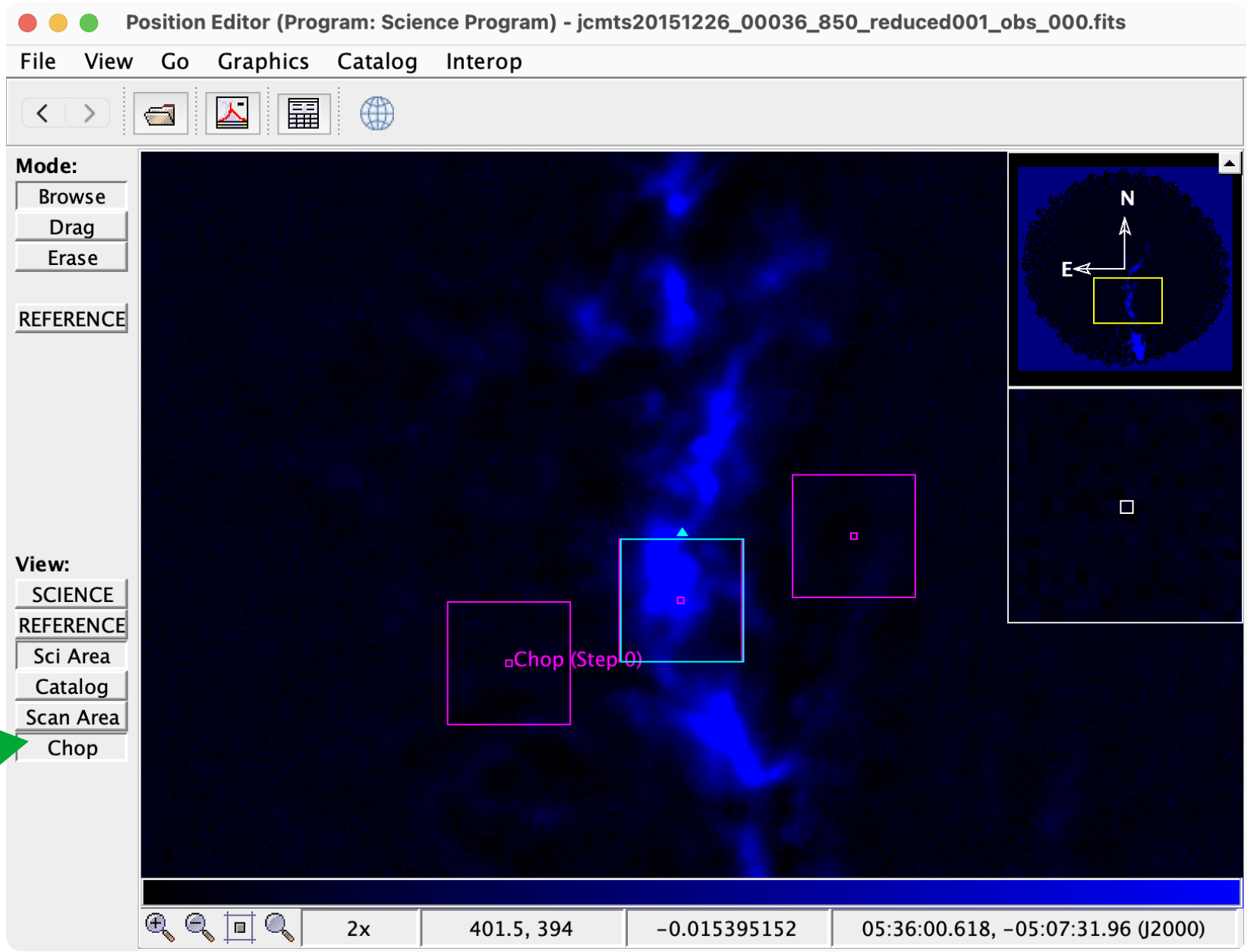
# An example MSB



# The position editor

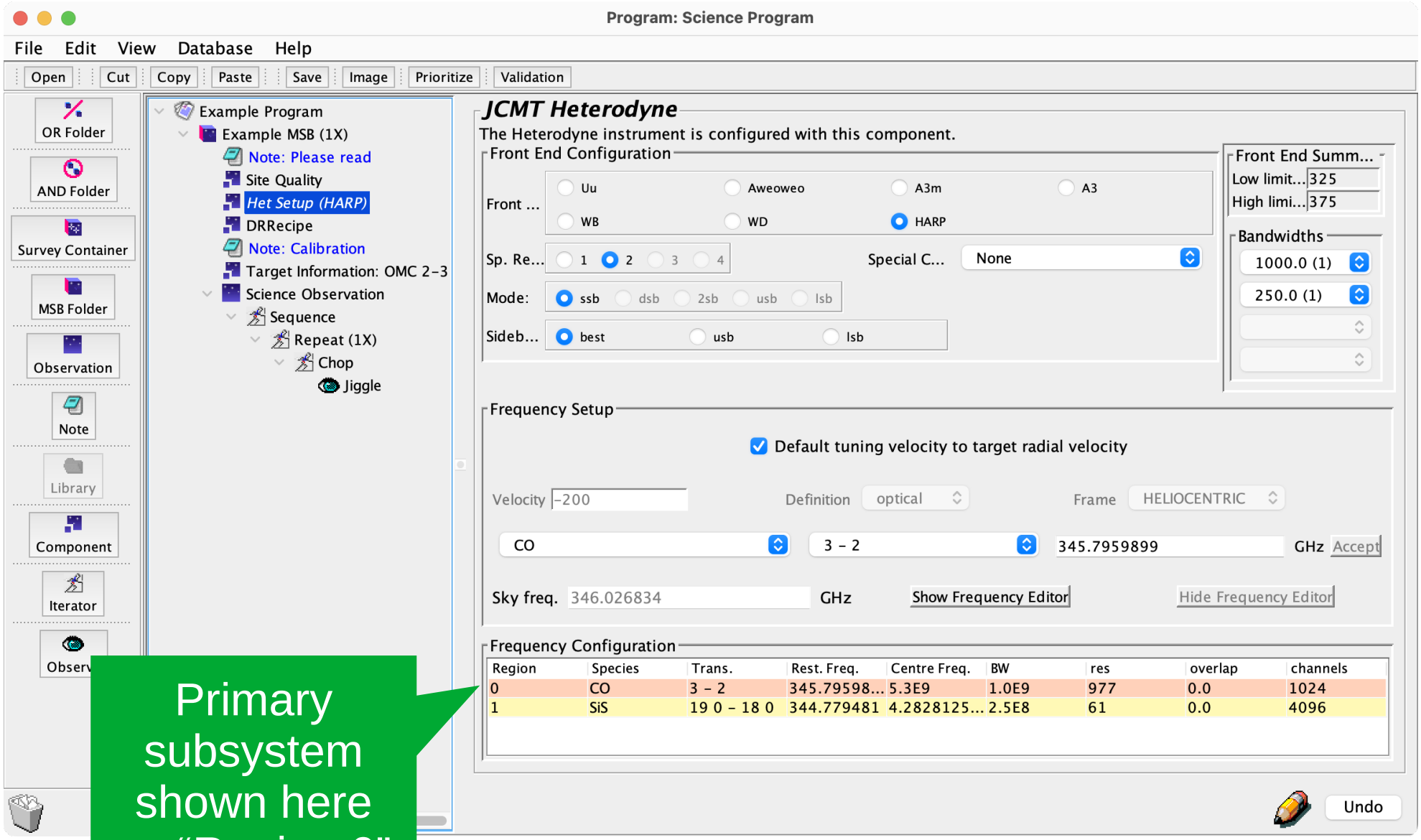


# The position editor — chop

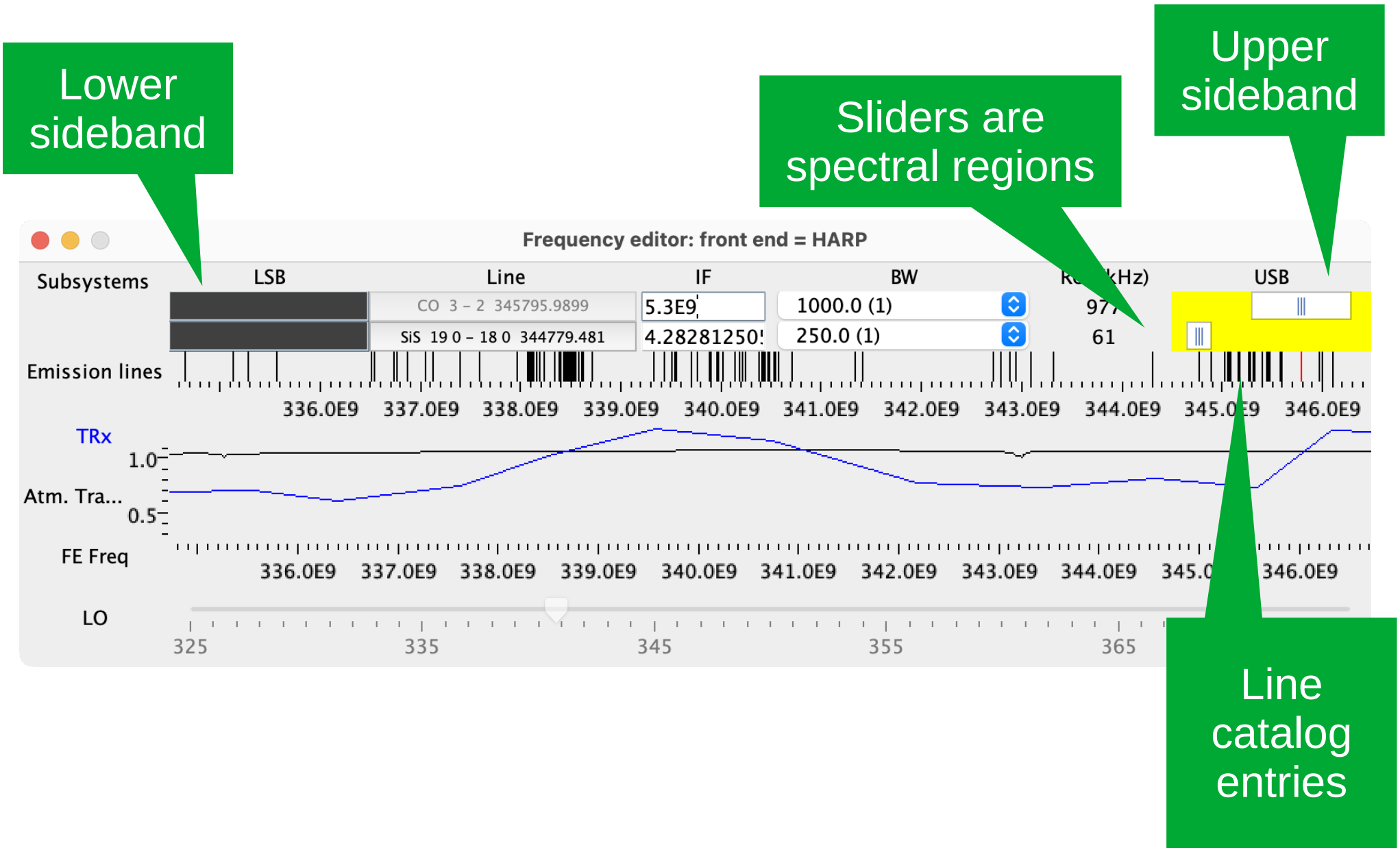



Now selecting the chop iterator

# Heterodyne setup



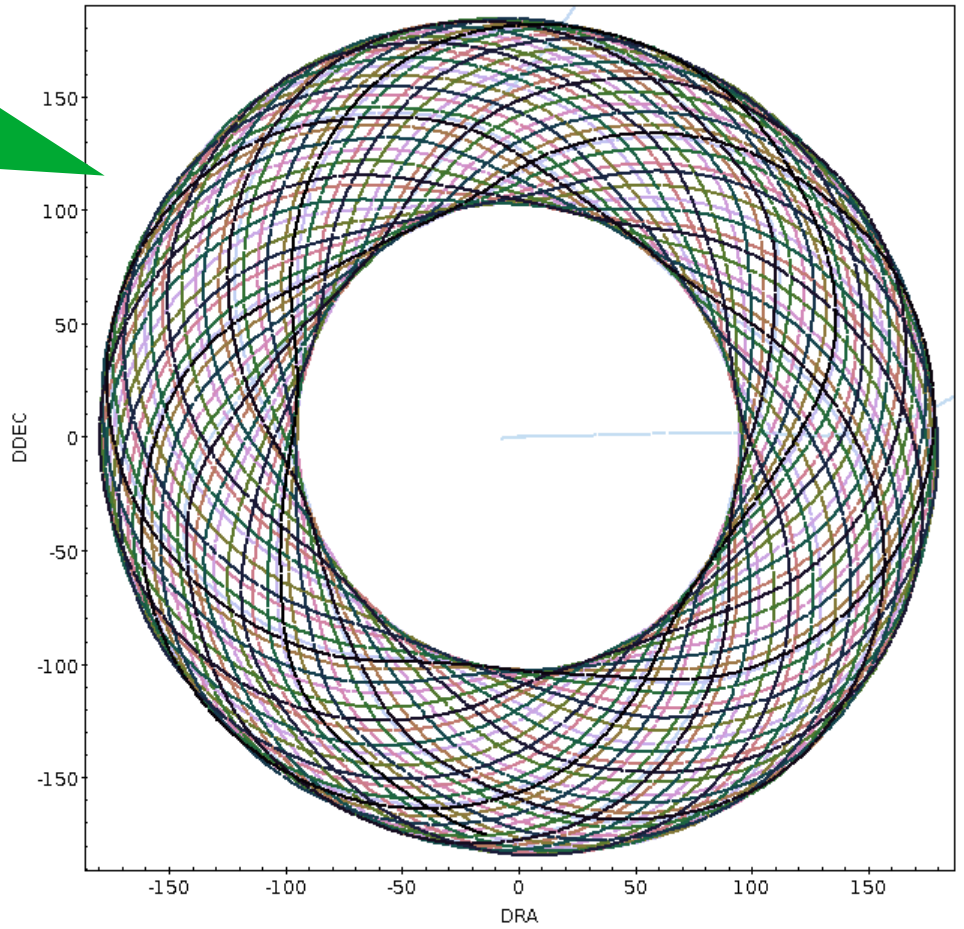
# The frequency editor



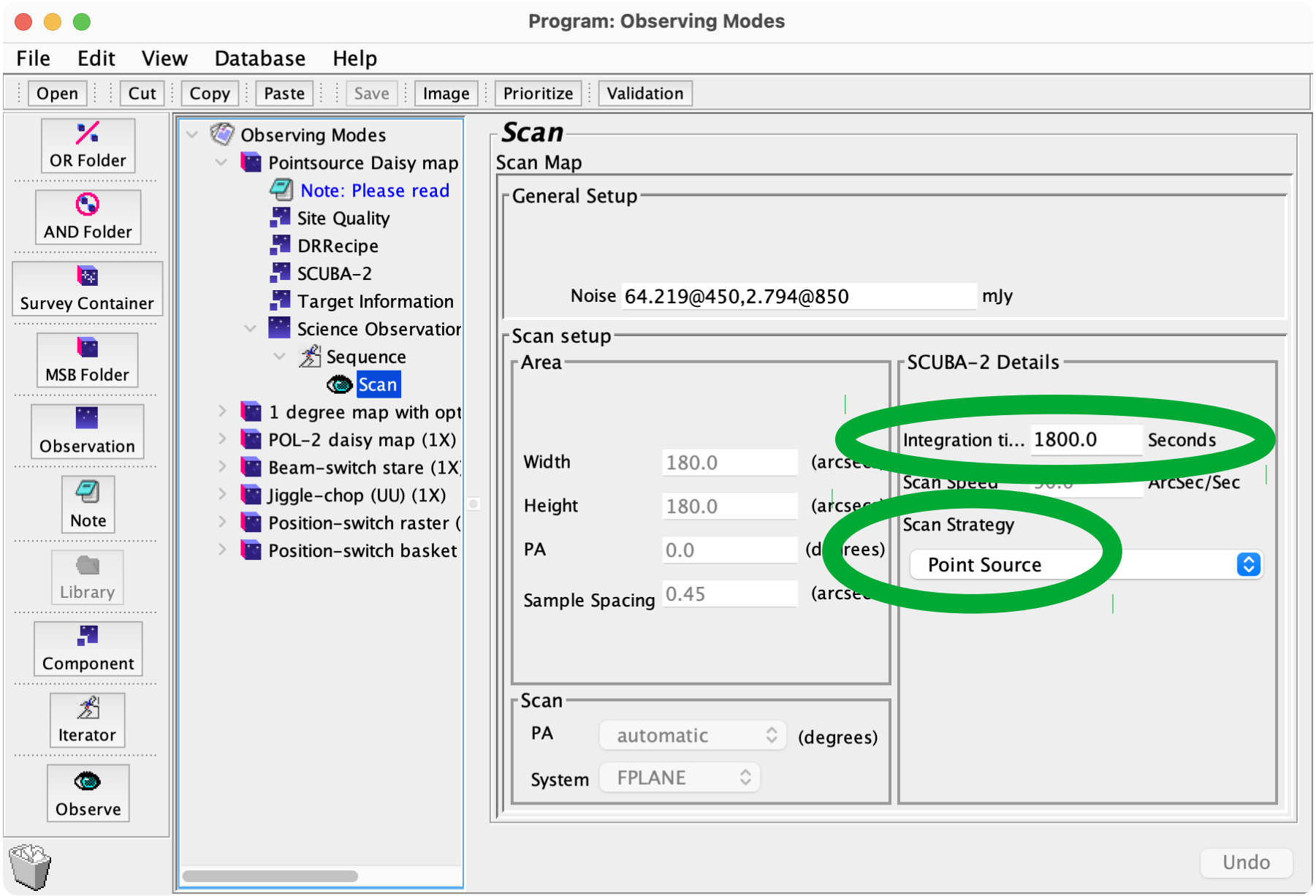
*observing modes*

# SCUBA-2 daisy

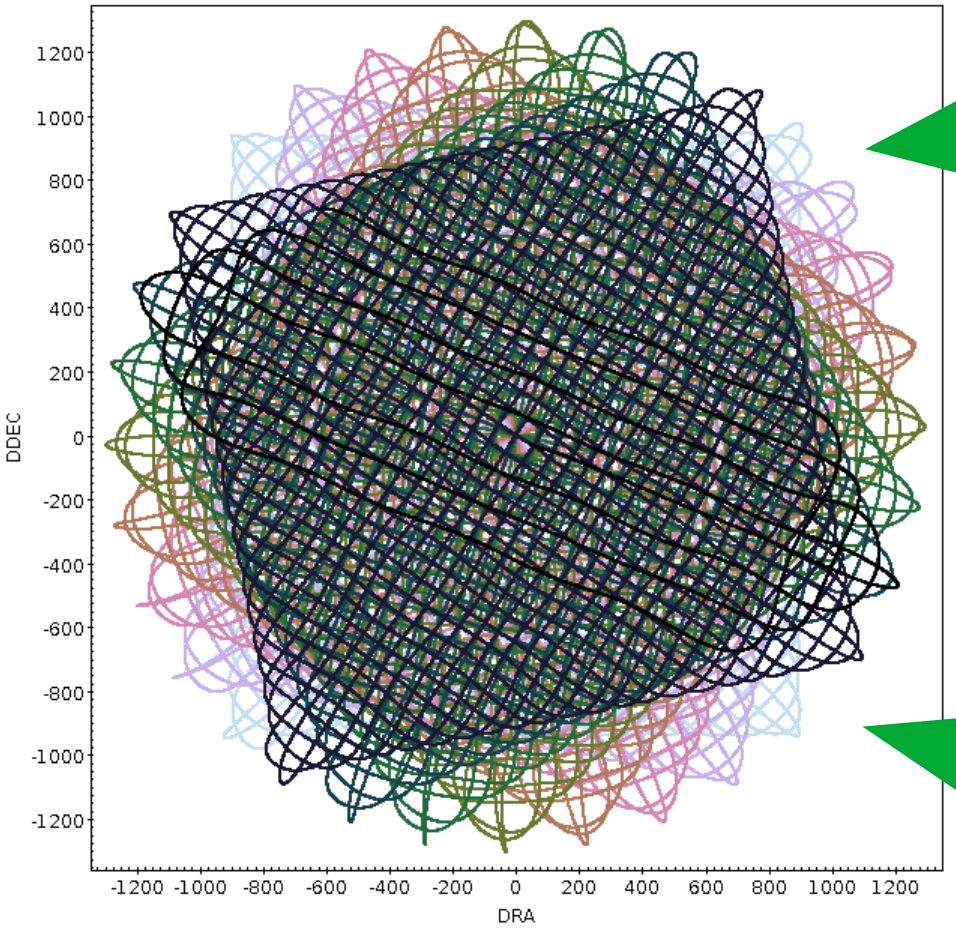
Fixed size giving ~3′ coverage



# SCUBA-2 daisy MSB



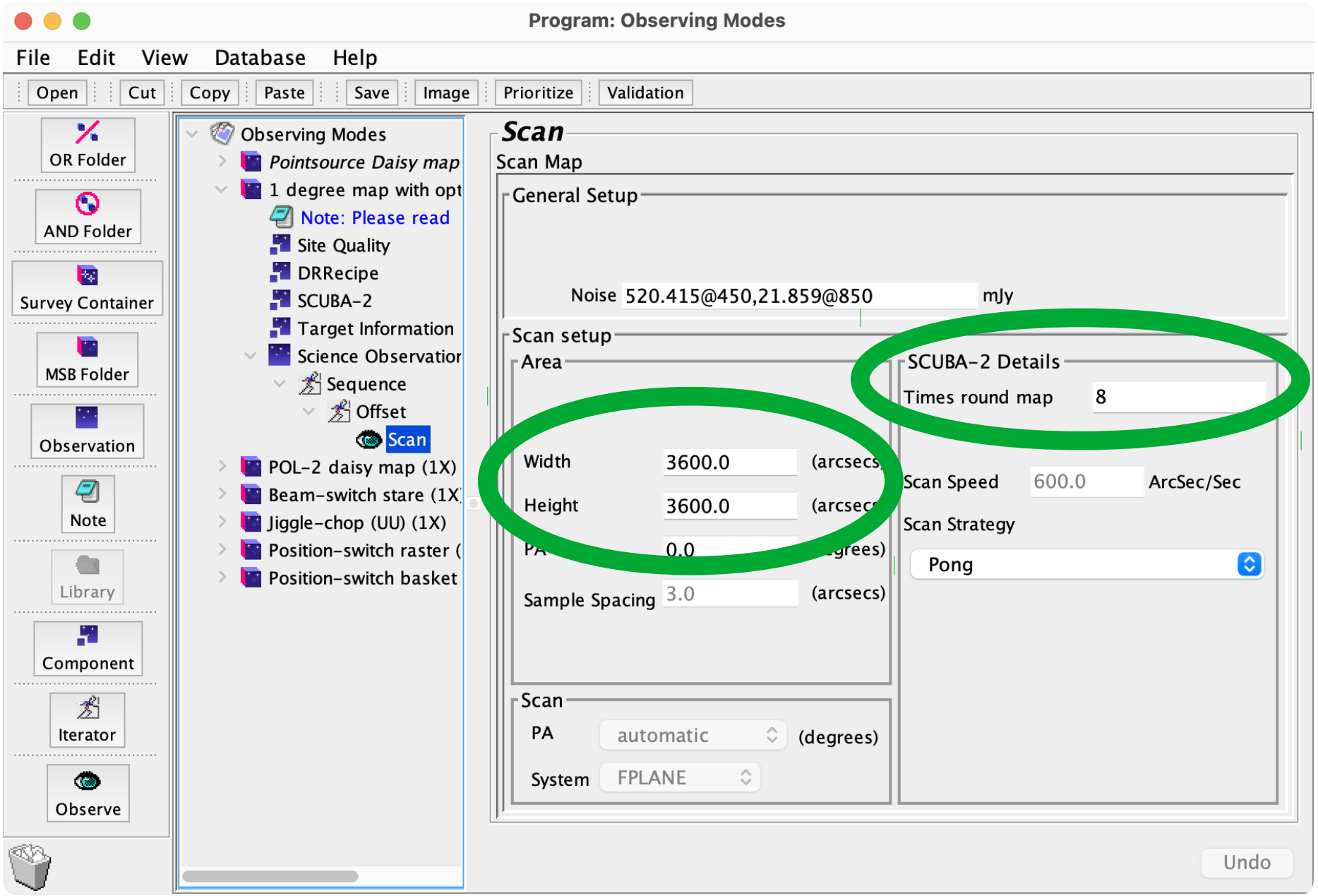
# SCUBA-2 pong



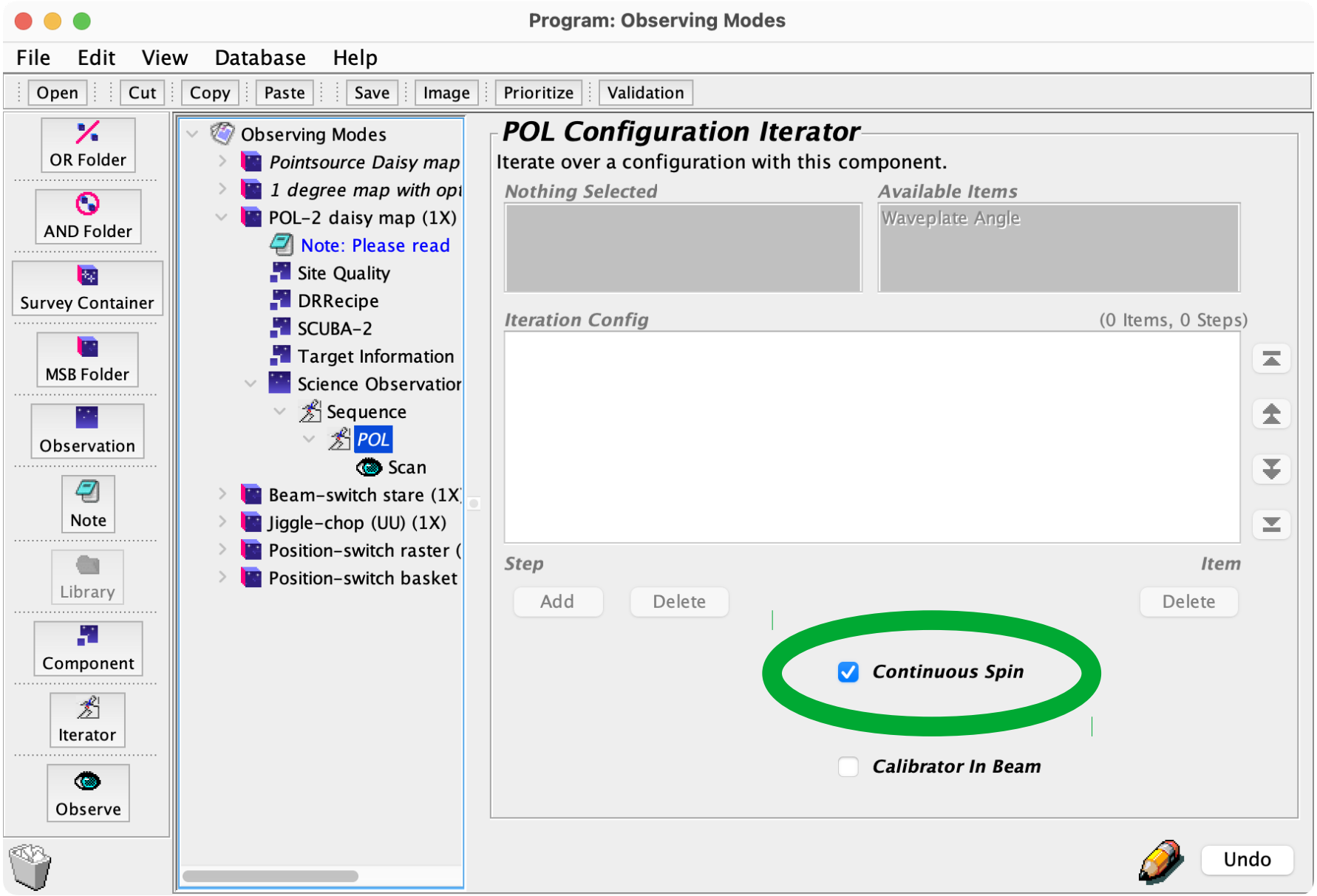

Pong pattern repeated at a number of angles

Sizes available: 15′, 30′, (45′), 1° , 2°

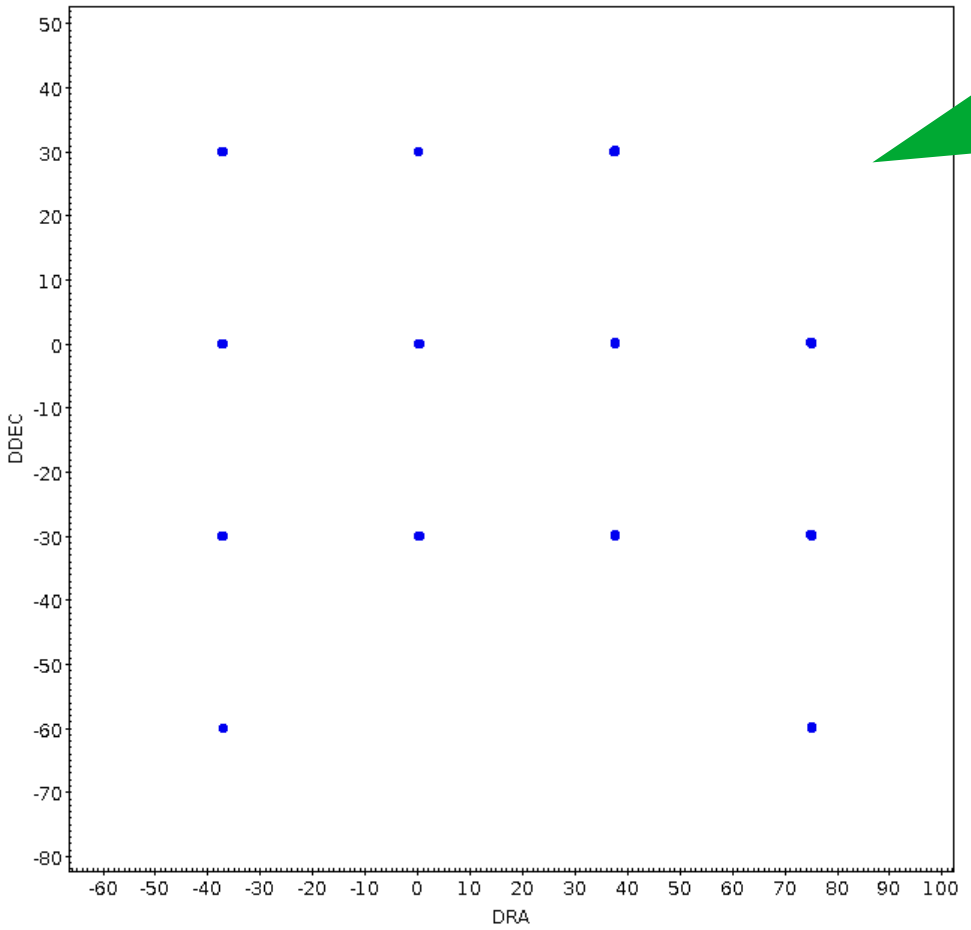
# SCUBA-2 pong MSB



# SCUBA-2 + POL-2

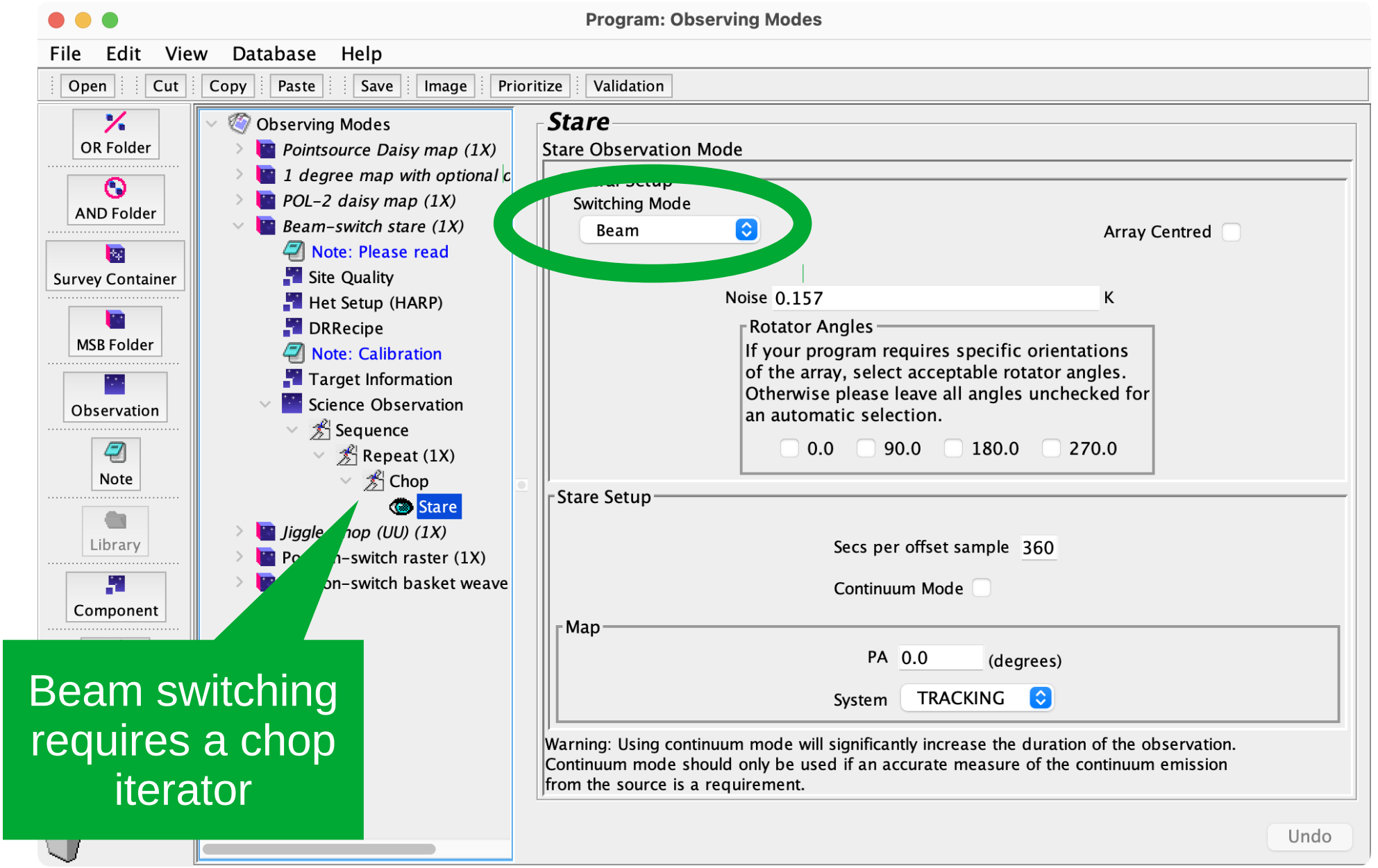

Program: Observing Modes
File
Edit
View
Database
Help
Open
Cut
Copy
Paste
Save
Image
Prioritize
Validation
OR Folder
AND Folder
Survey Container
MSB Folder
Observation
Note
Library
Component
Iterator
Observe
Observing Modes
Pointsource Daisy map
1 degree map with opt
POL-2 daisy map (1X)
Note: Please read
Site Quality
DRRecipe
SCUBA-2
Target Information
Science Observatior
Sequence
POL
Scan
Beam-switch stare (1X
Jiggle-chop (UU) (1X)
Position-switch raster (
Position-switch basket
POL Configuration Iterator
Iterate over a configuration with this component.
Nothing Selected
Available Items
Waveplate Angle
Iteration Config
(0 Items, 0 Steps)
Step
Item
Add
Delete
Delete
Continuous Spin
Calibrator In Beam
Undo

# HARP stare



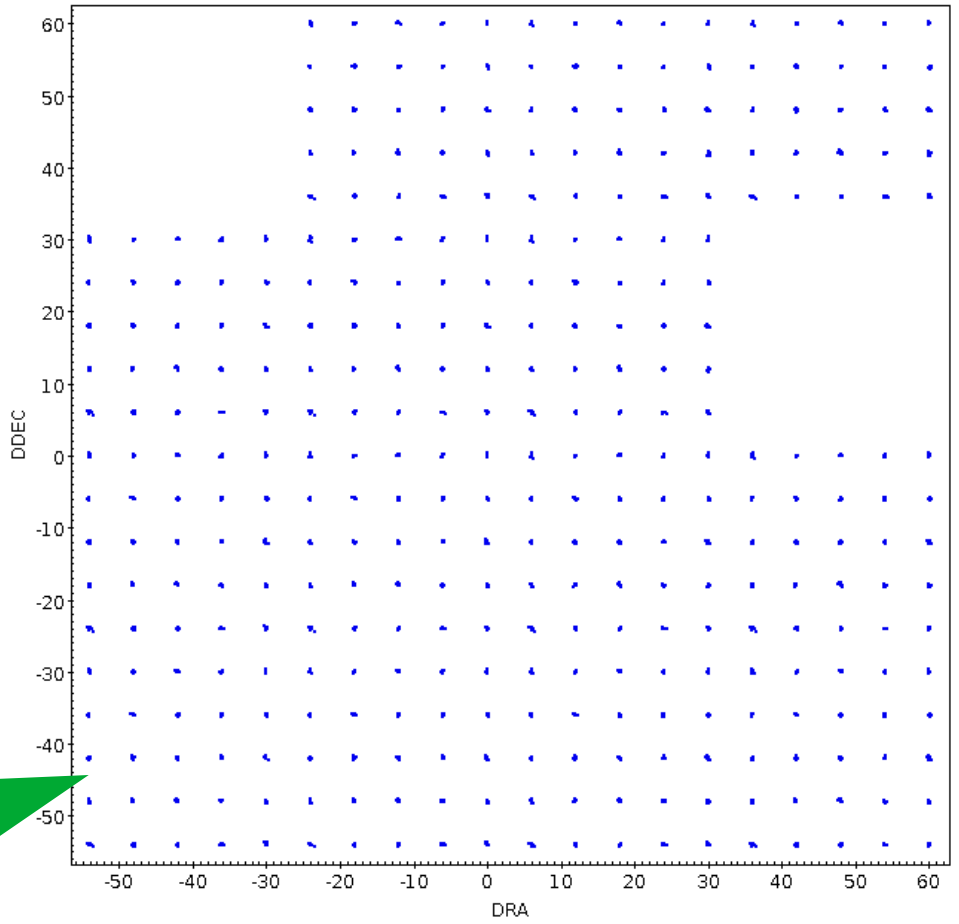

Under-sampled with 14″ beam

# HARP stare MSB



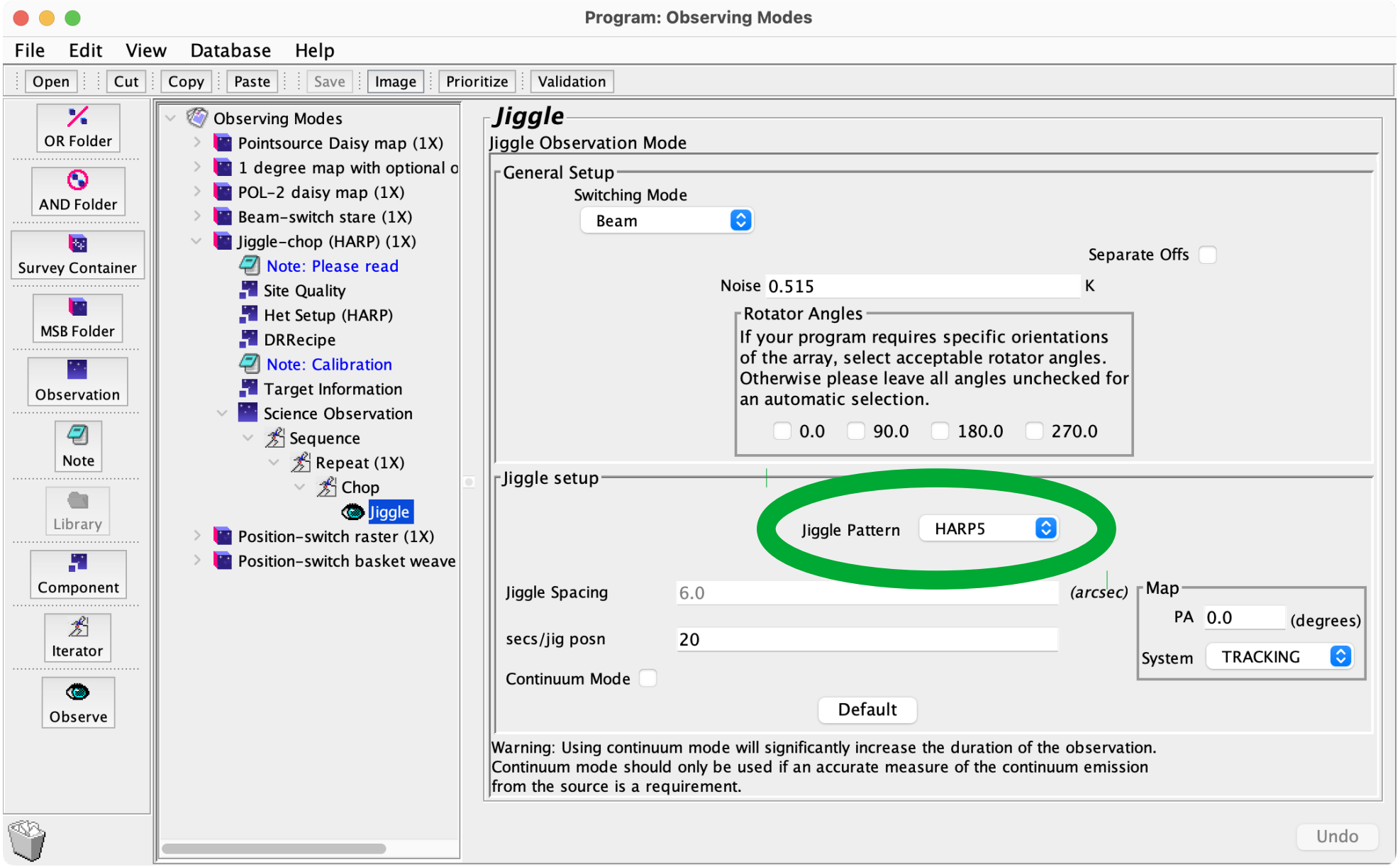

Beam switching requires a chop iterator

# HARP-5 jiggle

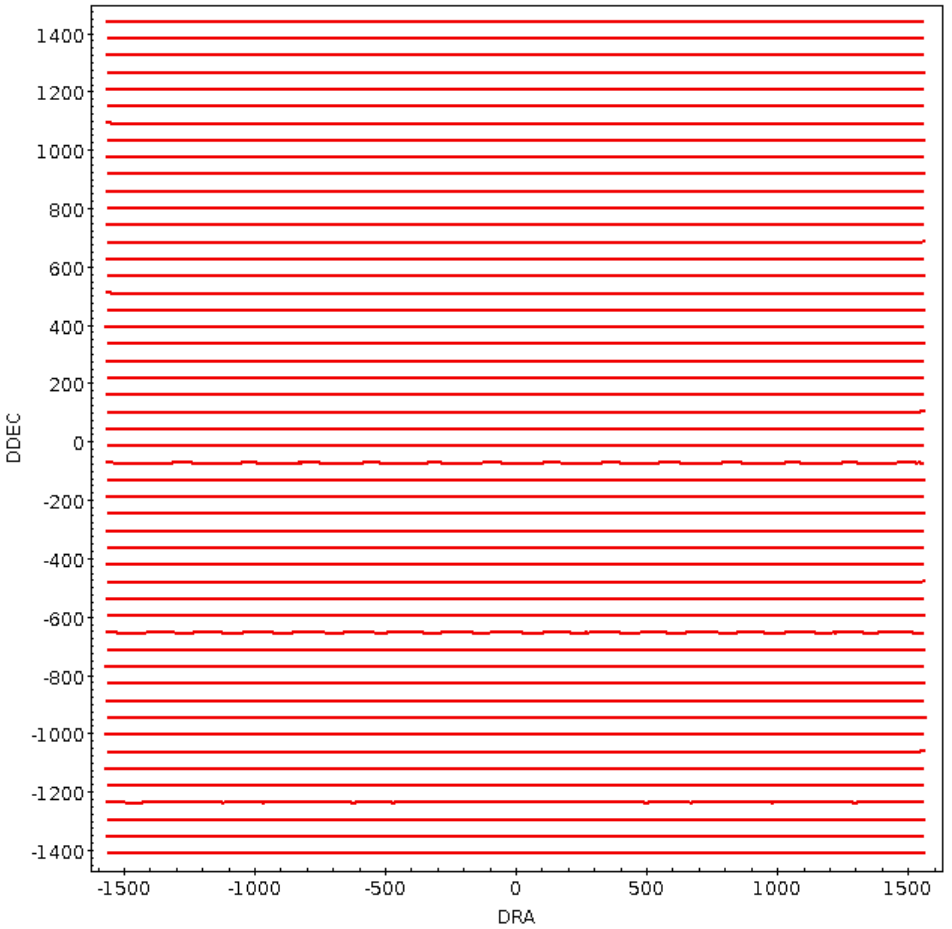



Beam moved to fill in pattern

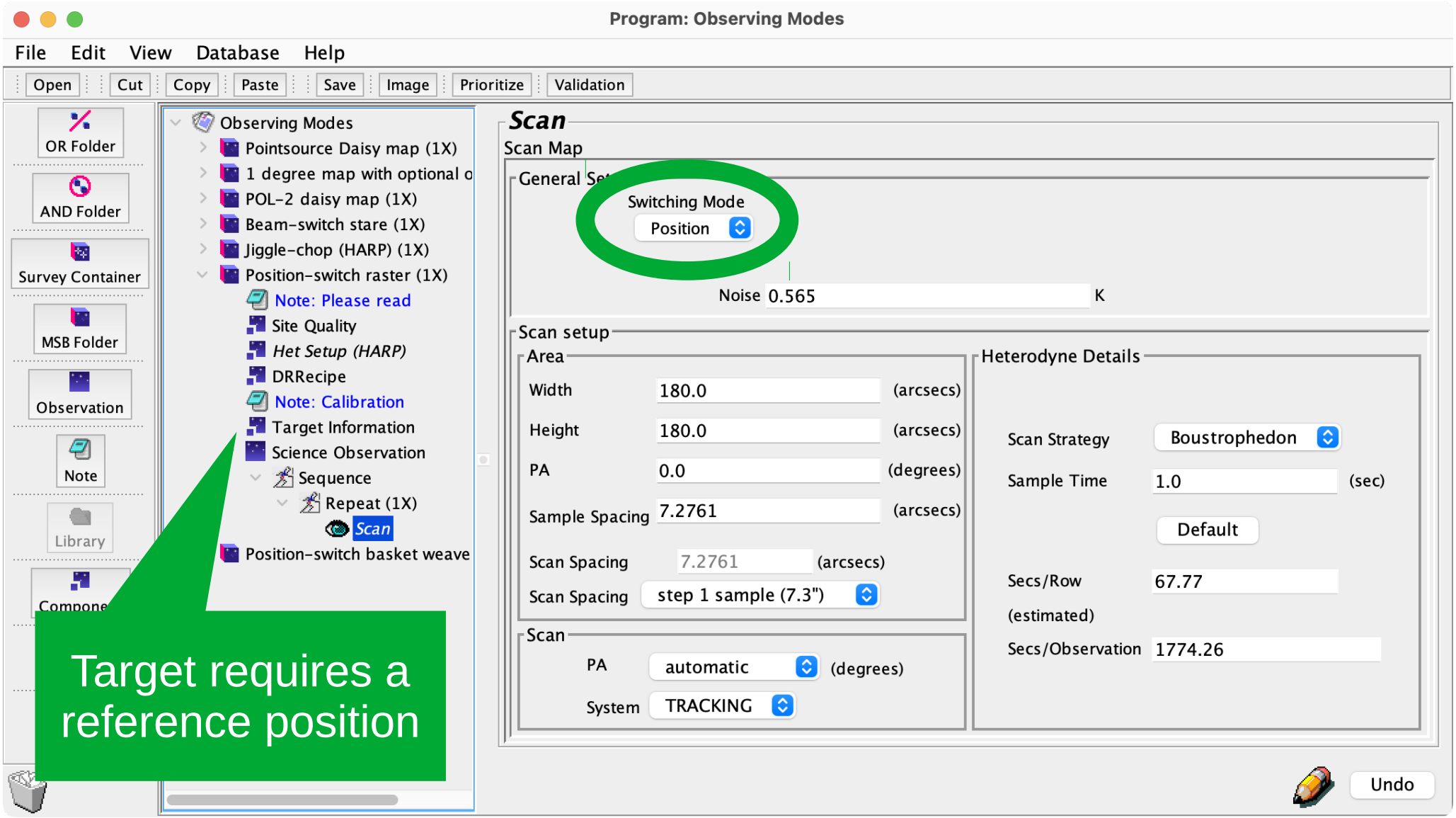
# HARP-5 jiggle MSB



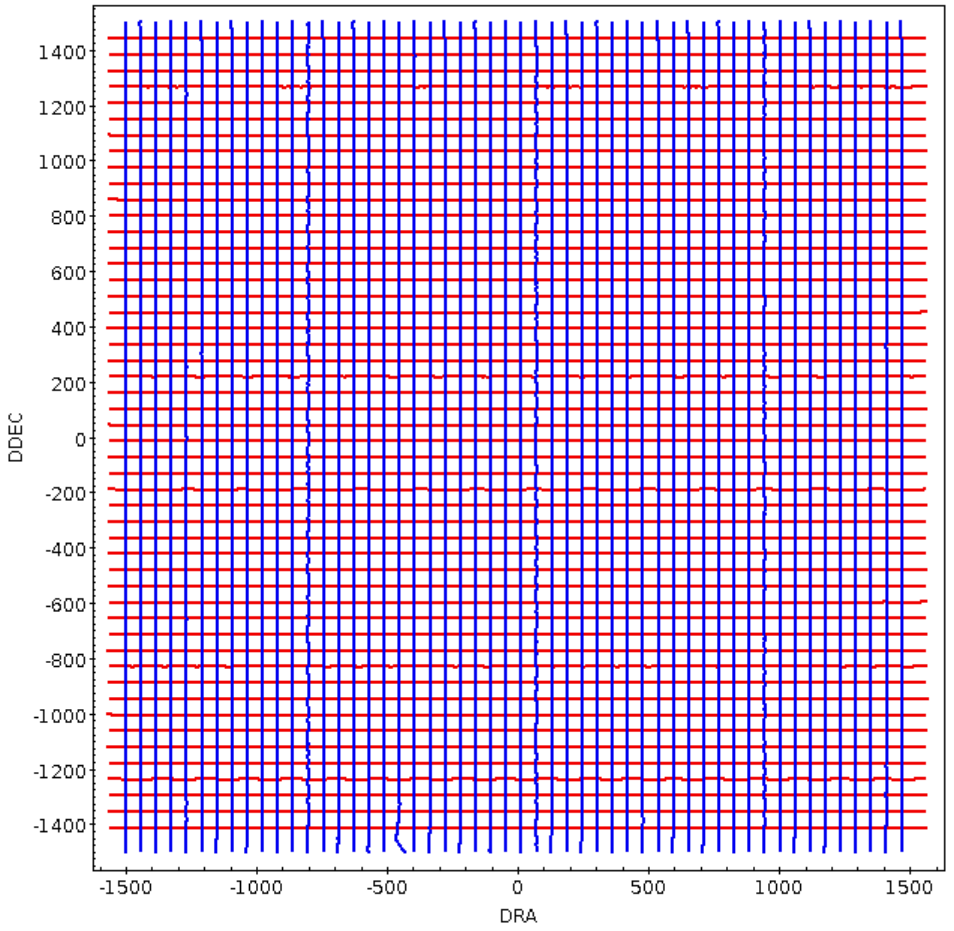
# Raster


1400
1200
1000
800
600
400
200
0
-200
-400
-600
-800
-1000
-1200
-1400
DDEC
-1500
-1000
-500
0
500
1000
1500
DRA

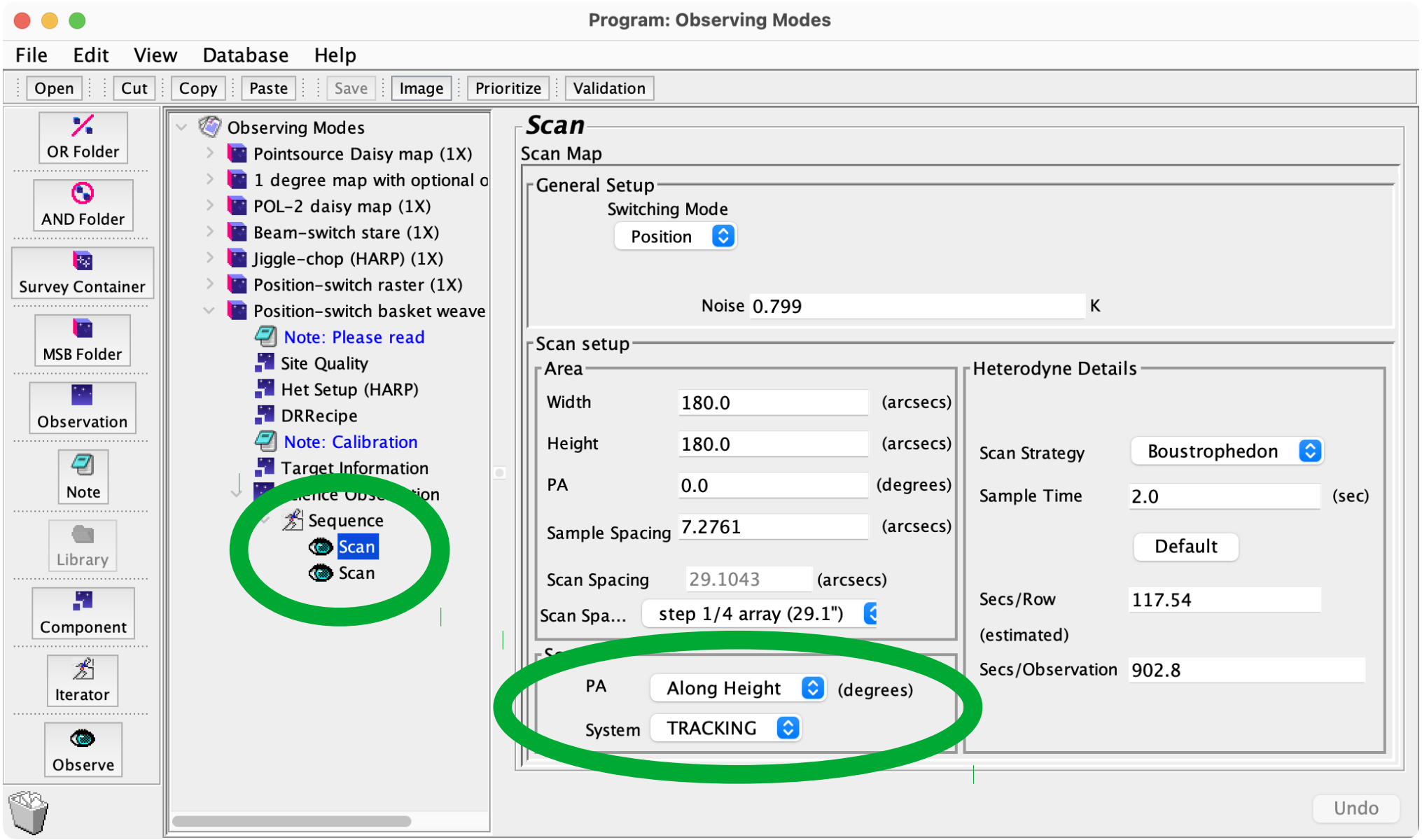
# Raster MSB


Program: Observing Modes
File Edit View Database Help
Open Cut Copy Paste Save Image Prioritize Validation
OR Folder
AND Folder
Survey Container
MSB Folder
Observation
Note
Library
Observing Modes
Pointsource Daisy map (1X)
1 degree map with optional o
POL-2 daisy map (1X)
Beam-switch stare (1X)
Jiggle-chop (HARP) (1X)
Position-switch raster (1X)
Note: Please read
Site Quality
Het Setup (HARP)
DRRecipe
Note: Calibration
Target Information
Science Observation
Sequence
Repeat (1X)
Scan
Position-switch basket weave
Scan
Scan Map
General
Switching Mode
Position
Noise 0.565 K
Scan setup
Area
Width 180.0 (arcsecs)
Height 180.0 (arcsecs)
PA 0.0 (degrees)
Sample Spacing 7.2761 (arcsecs)
Scan Spacing 7.2761 (arcsecs)
Scan Spacing step 1 sample (7.3")
Scan
PA automatic (degrees)
System TRACKING
Heterodyne Details
Scan Strategy Boustrophedon
Sample Time 1.0 (sec)
Default
Secs/Row 67.77
(estimated)
Secs/Observation 1774.26
Undo
Target requires a reference position

# Raster: basket-weave



# Basket-weave MSB



common pitfalls

# Pitfalls — software

- Must use Oracle's version of Java.
  - OpenJDK can appear to work at first but problems often occur.
- Sometimes edits only saved on key-press.
  - Information pasted into the OT (e.g. notes) may not be saved.
- OMP automatically updates programs.
  - E.g. observe counters decreased when observed.
  - Always start by fetching from the OMP.

# Pitfalls — targets

- Target name vs MSB title:
  - Target name: ideally standard name, shown in archive.
  - MSB title: for your own identification of the MSB.
- Check distance to reference positions:
  - Large distances (> 1°) increase overheads.
  - Worst effect when slew is in azimuth at high elevation.
- Position editor:
  - Only plots the component selected in tree.
    - Need to check for offset positions.
  - Only certain FITS formats / projections are supported.

# Pitfalls — observing

- Observe counter vs Repeat iterator:
  - MSB observe counter: do MSB multiple times.
  - Repeat iterator: extends duration of a single MSB but may increase overheads.
  - Often more efficient to extend the integration time directly.
- Duration of MSBs:
  - Typically 40 minutes for SCUBA-2.
  - Heterodyne MSBs can be longer, but >> 1 hour becomes hard to schedule during the night.
- Sampling:
  - Aim for adequate (Nyquist) sampling.
  - Data can be smoothed or downsampled later to increase S/N.

*tutorial*

# Tutorial

https://www.eaobservatory.org/JCMT/user-tutorials/ot-2023/

https://ftp.eao.hawaii.edu/jcmt/usersmeetings/2023-London/tutorial_ot.tar.gz

1) Getting started.
2) Organizing programs.
3) Understanding the validator.