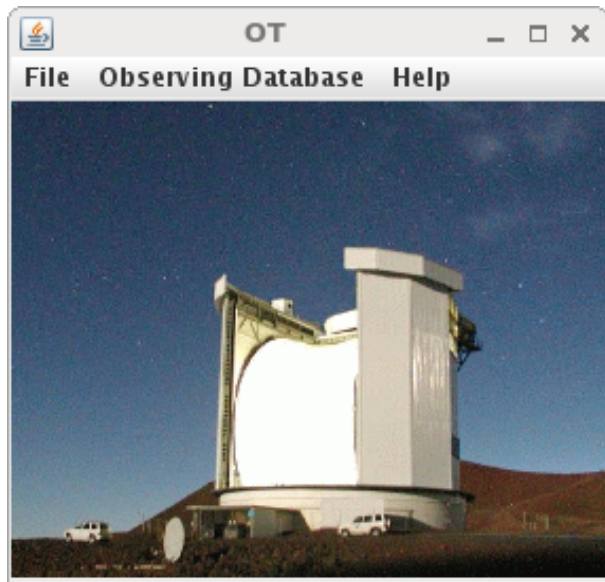


JCMT Observing Tool

Tips and Tricks



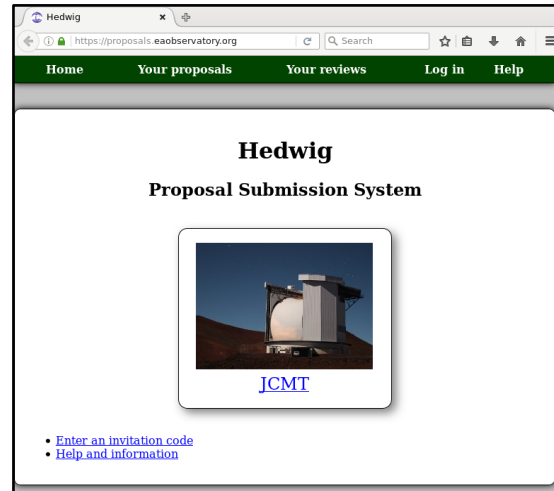
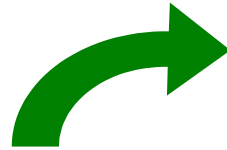
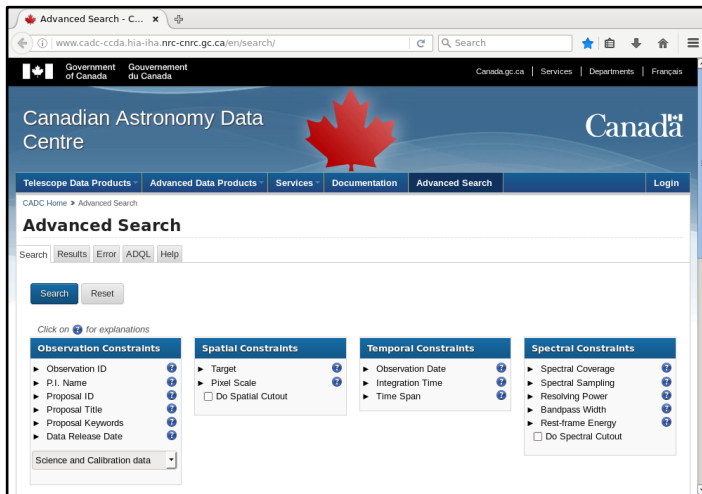
Graham Bell
Scientific Computing Group
East Asian Observatory

JCMT OT tips and tricks

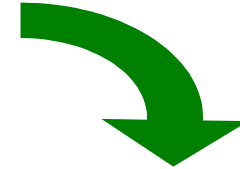
- Aims
 - Simplify science programs.
 - Avoid mistakes, e.g. copy & paste errors.
- Overview
 - Target information.
 - Inheritance.
 - Folders.
 - Survey containers.
 - Validation.

MSB life cycle

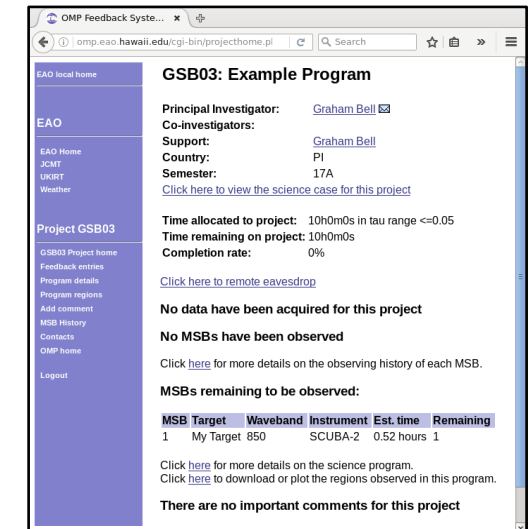
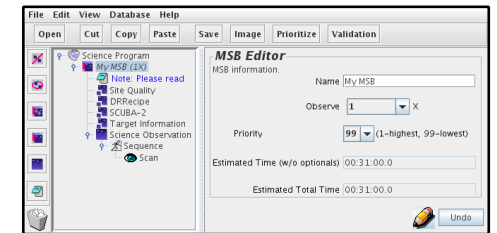
CADC



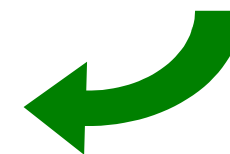
Hedwig



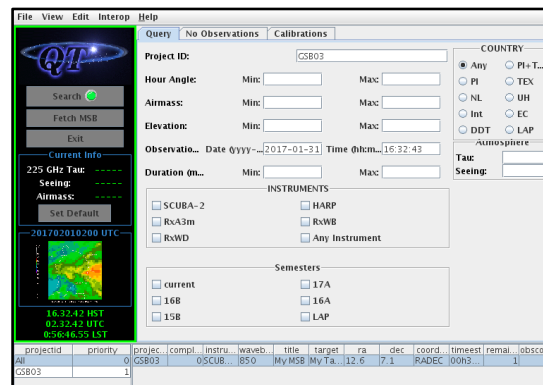
OT



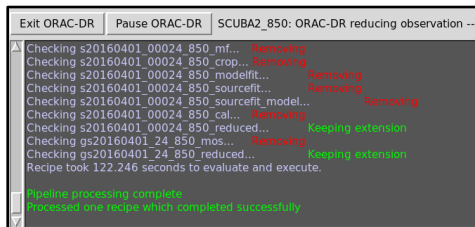
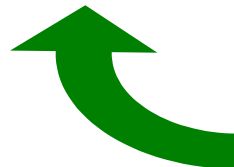
OMP



QT



ORAC-DR



Target information — tips

- Try to give the target's usual name.
 - Use the name you would want to see in the archive.
- Make use of offset iterators.
 - Define locations relative to a fixed target.

Target information and MSB title

The screenshot shows a software interface with a menu bar (File, Edit, View, Database, Help) and a toolbar (Open, Cut, Copy, Paste, Save, Image, Prioritize, Validation). On the left is a tree view of a project structure. A green circle highlights 'Standard: CRL618 (1X)' in the tree, with a green callout box pointing to it. On the right is a 'Target Information' dialog box. A green circle highlights the 'Name' field containing 'CRL618', with a green callout box pointing to it. The dialog box has tabs for 'Target Information', 'Object', 'Radial Vel/Tracking', and 'Proper Motion'. The 'Target Information' tab is active, showing fields for 'Name', 'Tag' (set to 'SCIENCE'), 'TargetType' (set to 'RA/Dec'), 'System' (set to 'FK5 (J2000)'), and 'Velocity (km/s or redshift)' (set to 'radio' and '0.0'). The 'Object' tab shows 'SIMBAD Names ESO' and a 'Resolve Name' button. The 'Radial Vel/Tracking' tab shows 'Frame' (set to 'LSRK'). At the bottom is a table with columns 'Tag', 'Name', 'X Axis', 'Y Axis', and 'System'. The table contains one row with 'SCIENCE', 'CRL618', '04:42:53.672', '+36:06:53.17', and 'FK5 (J2000)'. Below the table are buttons for 'Plot...', 'Set SCIENCE...', 'Remove', 'Add', and 'REFERE...'. An 'Undo' button is at the bottom right.

MSB Title

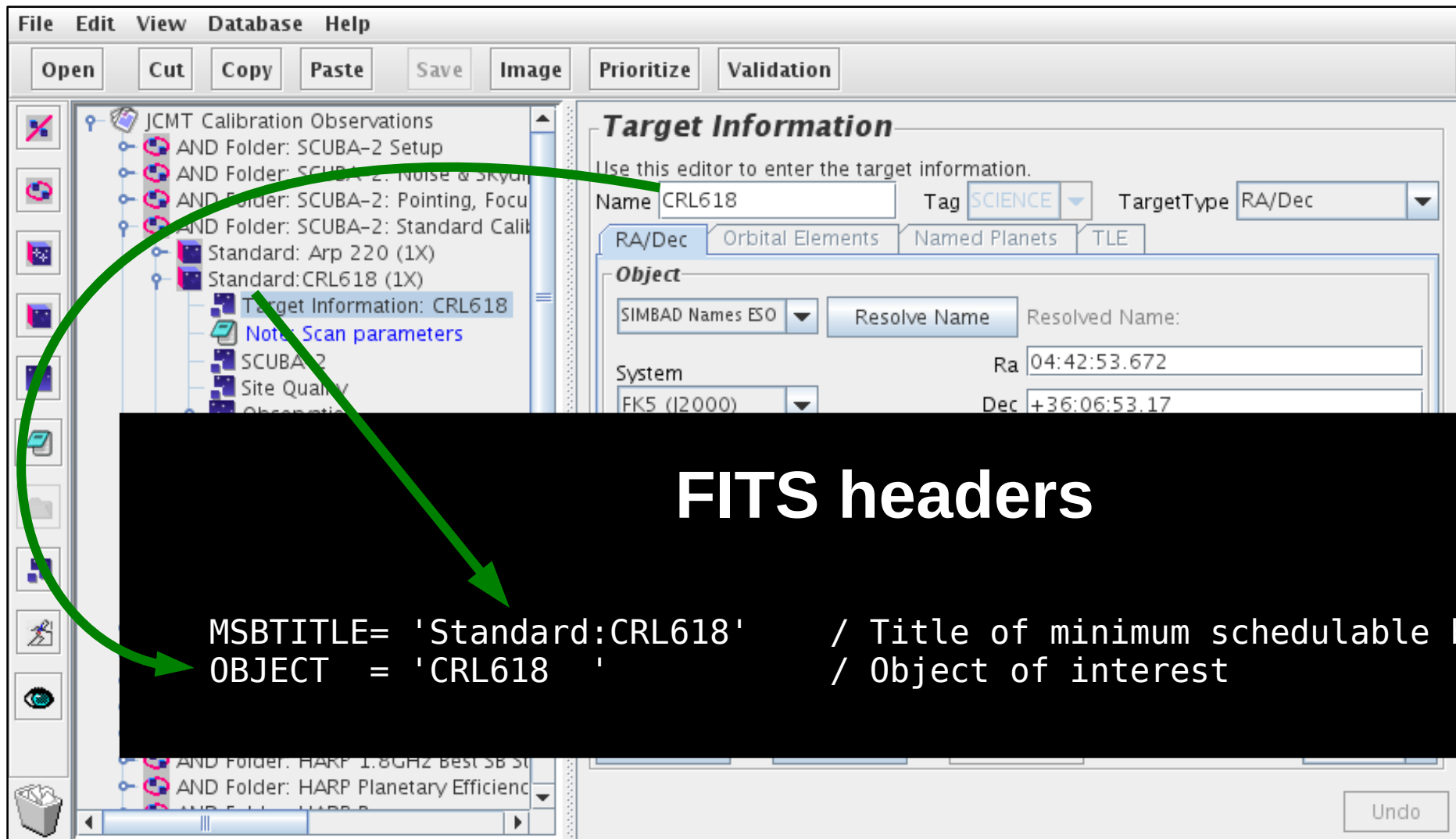
Use this for your own identification of the MSB.

Target Name

Give the name you would wish to see used in the archive.

Tag	Name	X Axis	Y Axis	System
SCIENCE	CRL618	04:42:53.672	+36:06:53.17	FK5 (J2000)

Target information — FITS headers



The screenshot shows the JCMT software interface. The left sidebar lists various observation folders and targets, including 'Standard: CRL618 (1X)'. The main window displays the 'Target Information' editor for CRL618. The 'Name' field is 'CRL618', the 'Tag' is 'SCIENCE', and the 'TargetType' is 'RA/Dec'. The 'Object' section shows 'SIMBAD Names ESO' and a 'Resolve Name' button. The 'System' is 'FK5 (J2000)' and the coordinates are 'Ra 04:42:53.672' and 'Dec +36:06:53.17'. A green arrow points from the 'Target Information: CRL618' entry in the sidebar to a black box containing FITS header information.

FITS headers

```
MSBTITLE= 'Standard:CRL618'      / Title of minimum schedulable block
OBJECT   = 'CRL618'              / Object of interest
```

Target information — CADC

Image Prioritize Validation

Target Information

Use this editor to enter the target information.

Name Tag

RA/Dec Orbital Elements Named Planets

Object

SIMBAD Names ESO Resolve Name

System Ra Dec

Radial Vel/Tracking Chop Settings

Velocity (km/s or redshift) 0.0

Frame

Tag	Name	X Axis
SCIENCE	CRL618	04:42:53.672

Plot... Set SCIENCE... Remove

Canadian Astronomy Data Centre

Telescope Data ProductsAdvanced Data ProductsServicesDocumentation





CADC Home > Advanced Search

Advanced Search

SearchResultsErrorADQLHelp

Download complete query results: VOTableCSVTSV

DownloadShowing 47 rows (47 before filtering).Change ColumnsView in sky

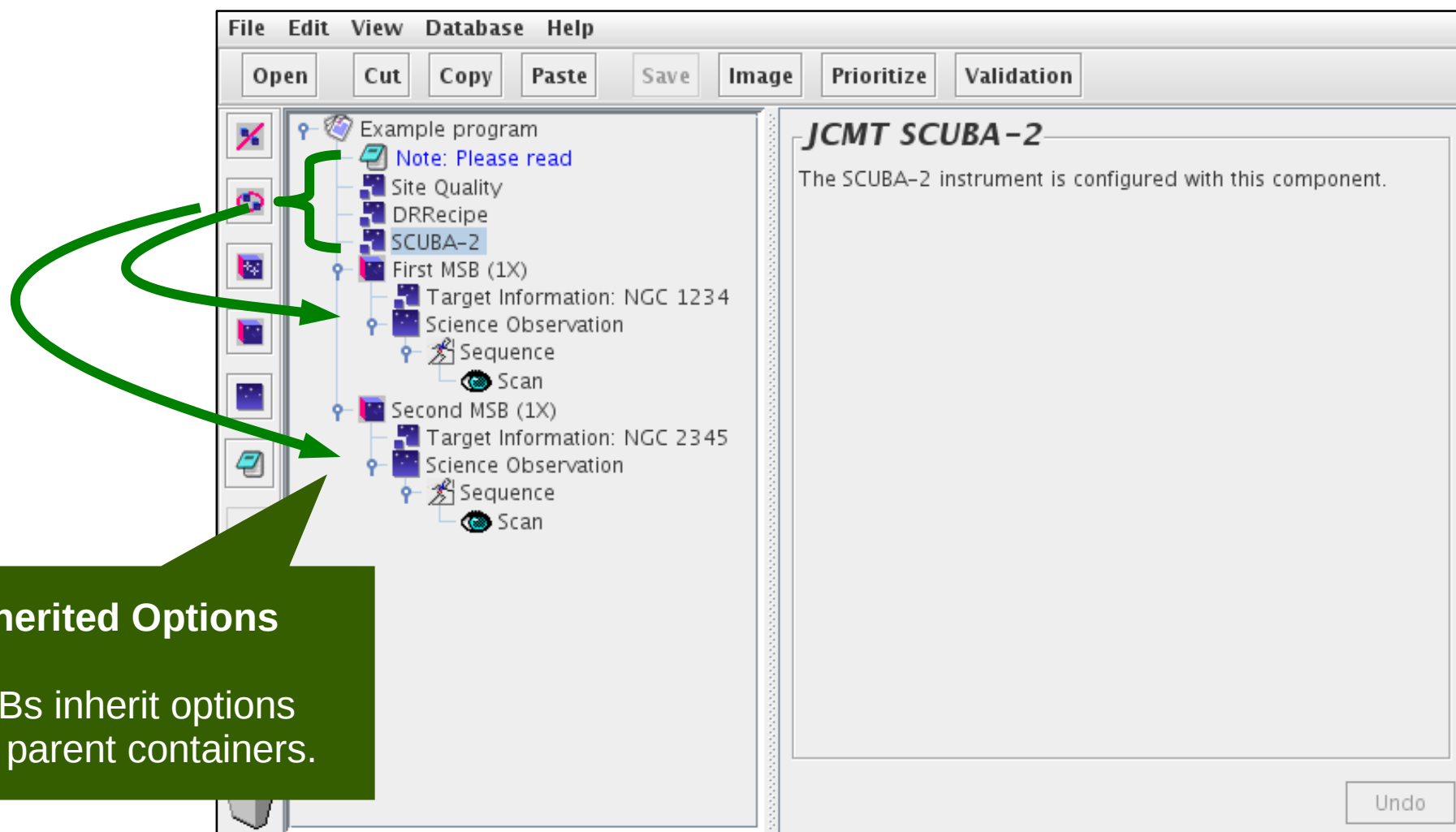
Mark <input type="checkbox"/>	Preview	Target Name	RA (J2000.0)	Dec. (J2000.0)	Proposal ID
Filter:	<input type="text"/>	<input type="text"/>	<input type="text"/> H:M:S ▾	<input type="text"/> D:M:S ▾	<input type="text"/>
<input type="checkbox"/> 	Preview	CRL618	04:42:55.98	+36:07:39.2	JCMTCAL
<input type="checkbox"/> 	Preview	CRL618	04:42:57.34	+36:07:31.2	JCMTCAL
<input type="checkbox"/> 	Preview	CRL618	04:42:55.82	+36:07:46.7	JCMTCAL
<input type="checkbox"/> 	Preview	CRL618	04:42:56.43	+36:07:37.7	JCMTCAL

This is how the observation will appear in the search interface at CADC.

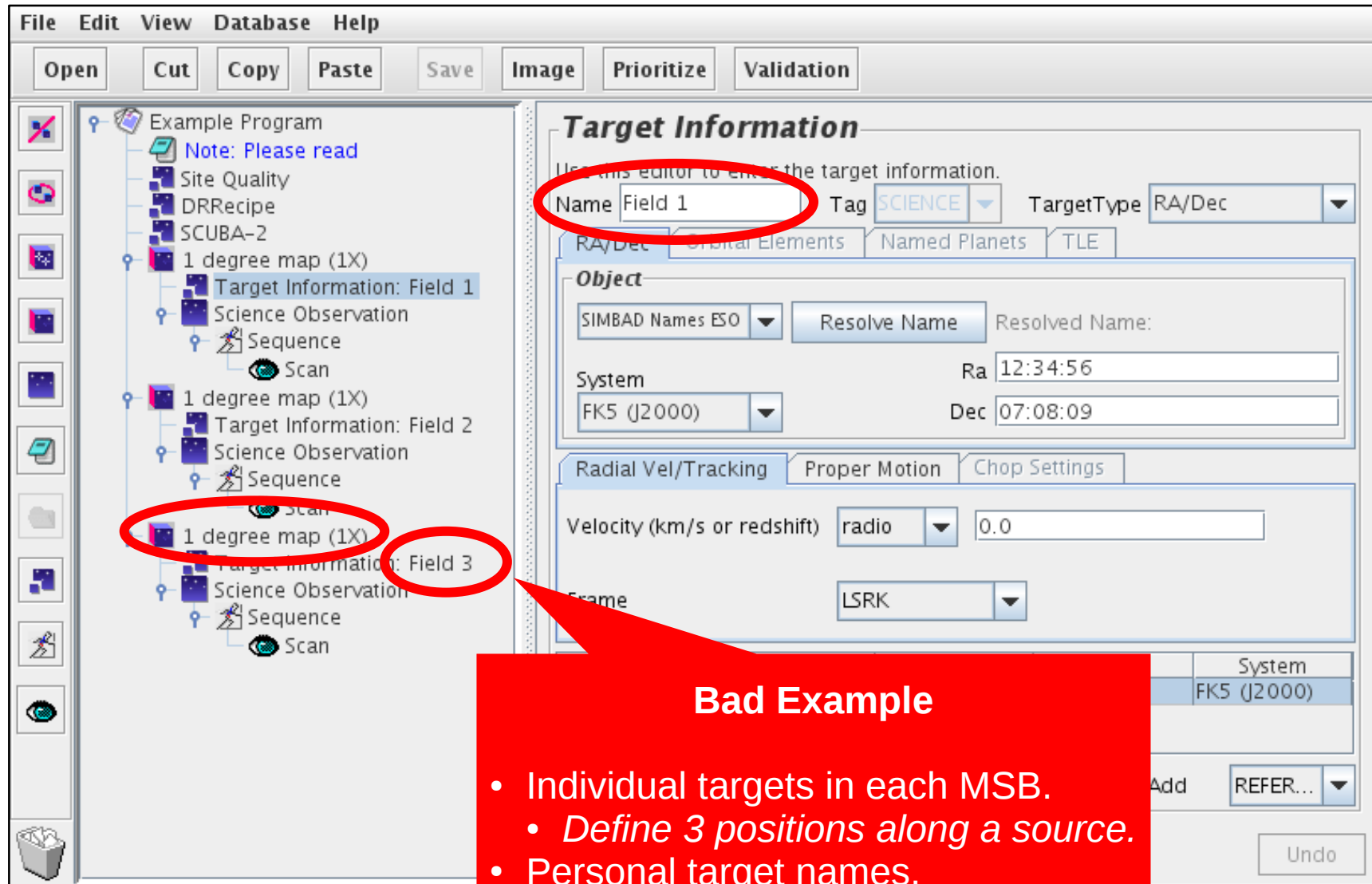
Inheritance — tips

- Science programs are hierarchical:
 - ◆ Top level
 - ➔ Folder
 - ➔ MSB
 - ➔ Observation
- Observations inherit options from parents.
 - Instrument, target, site quality, DR recipe, notes.

Inheritance — example



Target information without inheritance



Bad Example

- Individual targets in each MSB.
 - *Define 3 positions along a source.*
- Personal target names.
- Uninformative MSB titles.

Inheritance — target information

Target Information

File Edit View Database Help

Open Cut Copy Paste

Example Program

- Note: Please read
- Site Quality
- DRRecipe
- SCUBA-2
- 1 degree map (1X)
 - Target Information: Field 1
 - Science Observation
 - Sequence
 - Scan
- 1 degree map (1X)
 - Target Information: Field 2
 - Science Observation
 - Sequence
 - Scan
- 1 degree map (1X)
 - Target Information: Field 3
 - Science Observation
 - Sequence
 - Scan
 - Field 2 (1X)
 - Field 3 (1X)
 - Offset

Better Example

- Standard target name.
- Shared target component.
- Same base position for each MSB:
 - **ORAC-DR should automatically co-add maps.**

(arcsec)

p 0.0

q 3600.0

PA 0.0

#	p Offset	q Offset
0	0.0	3600.0

New

Rm. All

Remove

Display Derotated Offsets

Grid Pattern

☒ Overwrite ☐ Append

Initial Offset (arcsec)

Spacing (arcsec)

p 0 p 60

q 0 q 60

Rows

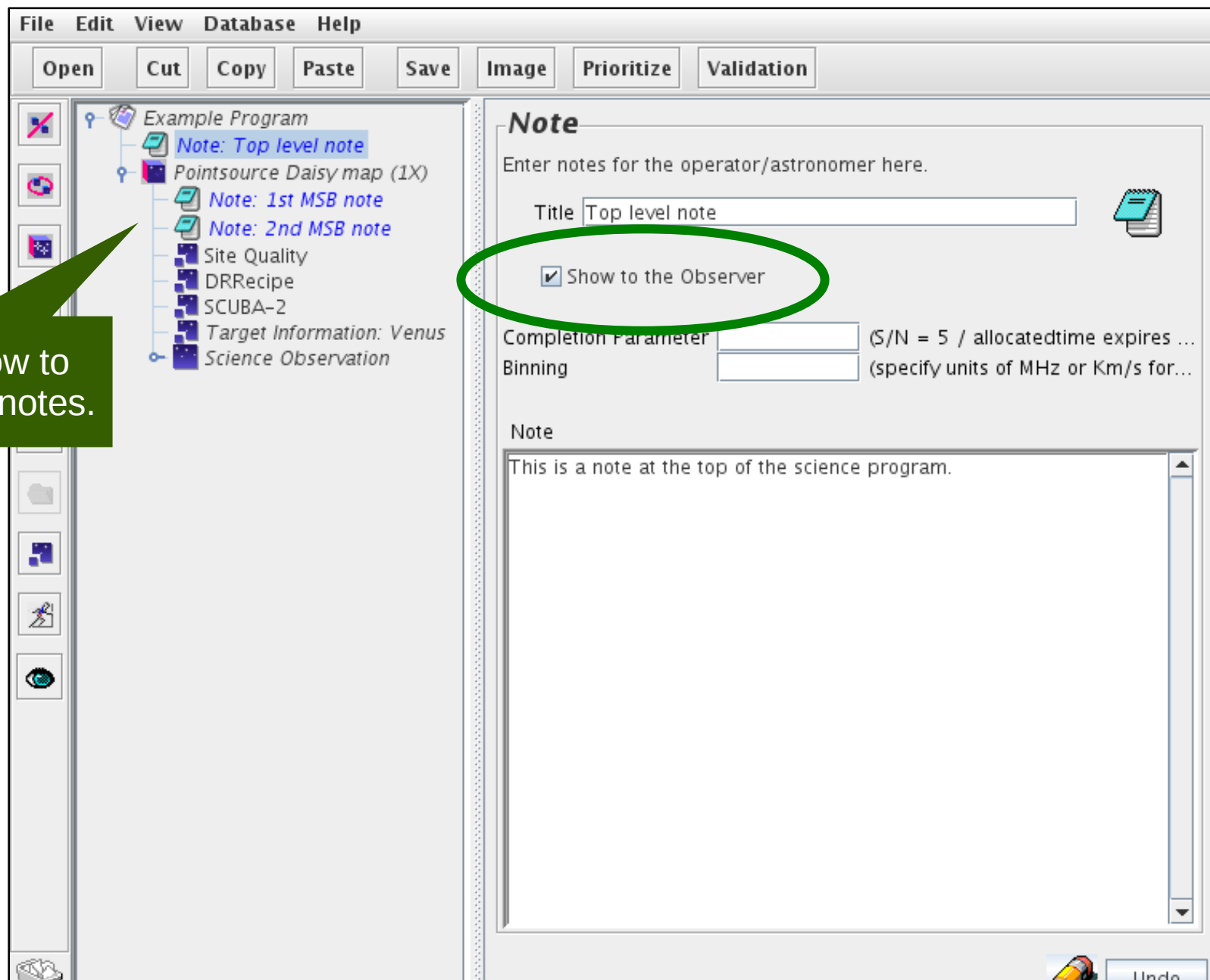
Cols

Create/Centre On Base

Set Spacing from Scan

- Personalized MSB titles.
- Offsets for position of each MSB.
- **Avoid having to manually compute offset positions.**

Inheritance — notes



Multiple “Show to the Observer” notes.

[illegible]

The OMP combines all of the notes when they are shown in the Query Tool.

[illegible]

Inheritance — warnings

- Warnings:
 - Parent options **after** the MSB are included too.
 - Target information & heterodyne setup must be at the same level when using target's radial velocity.
 - DR recipe must be at same or lower level than instrument.

Folders

- “AND” folders
 - Organize MSBs into groups.
- “OR” folders
 - Select alternative MSBs.

“AND” folders

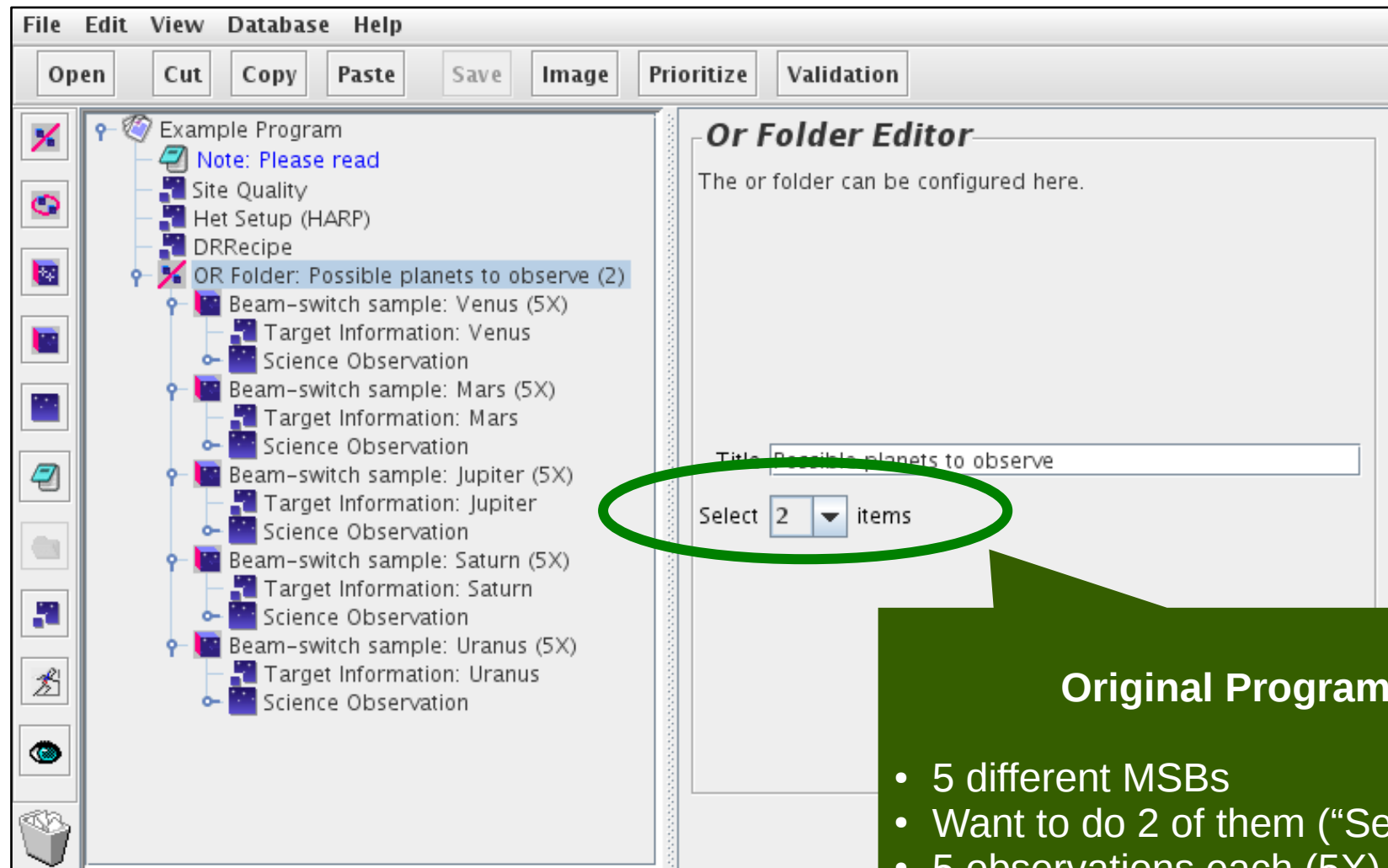
Configuration at the top level used by all MSBs.



Configuration in the “AND” folder used by the MSBs inside.

“AND” folder does not affect when MSBs are observed.

“OR” folders



“Or” folders — during selection

File Edit View Database Help

Open Cut Copy Paste Save Image Prioritize Validation

Example Program

Note: Please read

Site Quality

Het Setup (HARP)

DRRecipe

OR Folder: Possible planets to observe (1)

Beam-switch sample: Venus (5X)

Target Information: Venus

Science Observation

Beam-switch sample: Mars (5X)

Target Information: Mars

Science Observation

Beam-switch sample: Saturn (5X)

Target Information: Saturn

Science Observation

Beam-switch sample: Uranus (5X)

Target Information: Uranus

Science Observation

Beam-switch sample: Jupiter (4X)

Target Information: Jupiter

Science Observation

Or Folder Editor

The or folder can be configured here.

Title Possible planets to observe

Select 1 items

“Select” counter decreased to 1.

- This MSB has been observed.
- MSB moved outside OR folder.
- Observe counter decreased to 4.

“Or” folders — after selection

The screenshot shows the 'Or Folder Editor' window. The left pane displays a tree view of folders under 'Example Program'. The right pane shows the configuration for the selected folder, 'OR Folder: Possible planets to observe (0)'. The 'Select' dropdown is set to '0 items'. A green arrow points from the left window to the right window. A green circle highlights the 'Select 0 items' dropdown. Two green callout boxes provide context.

- “Select” counter now at 0.
- No more MSBs will be chosen.

- 2 MSBs have now been observed.
- Selected MSBs outside folder.
- They will be completed (4X more each).

Survey containers

- Repeat an observation for multiple sources.
- Source list can be loaded from a file.

Survey container — example

The screenshot shows a software window with a menu bar (File, Edit, View, Database, Help) and a toolbar (Open, Cut, Copy, Paste, Save, Image, Prioritize, Validation). On the left is a tree view showing a hierarchy: Example Program > SCUBA-2 > Site Quality > Survey Container: Some galaxies > Pointsource Daisy map (1X) > DRRecipe > Note: Please read > Science Observation > Sequence > Scan. A green arrow points from a green callout box to the 'Survey Container: Some galaxies' item. The main panel is titled 'Survey Information' and contains a text field 'Title: Some galaxies'. Below this are two tabs: 'Survey Targets' (selected) and 'Target Information'. The 'Survey Targets' tab displays a table of targets. The table has columns: Name, X Axis, Y Axis, Coord System, Rema..., and Priority. The data rows are M31 through M74. Below the table are controls for 'Remaining' (5), 'Priority' (1), and a 'Select' checkbox. At the bottom are buttons for 'Add', 'Duplicate', 'Remove', 'Remove all', and 'Load'. An 'Undo' button with a pencil icon is at the bottom right.

MSB inside Survey Container.
Means: make a copy of this MSB for each target.

Survey Information

Use this editor to enter the survey information.

Title:

Survey Targets | Target Information

Name	X Axis	Y Axis	Coord System	Rema...	Priority
M31	00:42:44.330	+41:16:07.50	FK5 (J2000)	5	1
M32	00:42:41.825	+40:51:54.61	FK5 (J2000)	5	2
M33	01:33:50.904	+30:39:35.79	FK5 (J2000)	5	3
M49	12:29:46.798	+08:00:01.48	FK5 (J2000)	5	4
M51	13:29:52.698	+47:11:42.93	FK5 (J2000)	5	5
M58	12:37:43.597	+11:49:05.12	FK5 (J2000)	5	6
M59	12:42:02.322	+11:38:48.95	FK5 (J2000)	5	7
M60	12:43:40.008	+11:33:09.40	FK5 (J2000)	5	8
M61	12:21:54.950	+04:28:24.92	FK5 (J2000)	5	9
M63	13:15:49.329	+42:01:45.44	FK5 (J2000)	5	10
M64	12:56:43.696	+21:40:57.57	FK5 (J2000)	5	11
M65	11:18:55.957	+13:05:31.96	FK5 (J2000)	5	12
M66	11:20:15.026	+12:59:28.64	FK5 (J2000)	5	13
M74	01:36:41.772	+15:47:00.46	FK5 (J2000)	5	14

Remaining Priority ☐ Select

Survey container — in the OMP

Help

Save Image Prioritize Validation

Survey Information

Use this editor to enter the survey information.

Title:

Survey Targets Target Information

Name	X Axis	Y Axis	Coord System
M31	00:42:44.330	+41:16:07.50	FK5 (J2000)
M32	00:42:41.825	+40:51:54.61	FK5 (J2000)
M33	01:33:50.904	+30:39:35.79	FK5 (J2000)
M49	12:29:46.798	+08:00:01.48	FK5 (J2000)
M51	13:29:52.698	+47:11:42.93	FK5 (J2000)
M58	12:37:43.597	+11:49:05.12	FK5 (J2000)
M59	12:42:02.322	+11:38:48.95	FK5 (J2000)
M60	12:43:40.008	+11:33:09.40	FK5 (J2000)
M61	12:21:54.950	+04:28:24.92	FK5 (J2000)
M63	13:15:49.329	+42:01:45.44	FK5 (J2000)
M64	12:56:43.696	+21:40:57.57	FK5 (J2000)
M65	11:18:55.957	+13:05:31.96	FK5 (J2000)
M66	11:20:15.026	+12:59:28.64	FK5 (J2000)
M74	01:36:41.772	+15:47:00.46	FK5 (J2000)

Remaining Priority

Add Duplicate Remove Remove

Becomes multiple
MSBs in the OMP.

MSBs remaining to be observed:

MSB	Target	Waveband	Instrument	Est. time	Remaining
1	M31	850	SCUBA-2	0.52 hours	5
2	M32	850	SCUBA-2	0.52 hours	5
3	M33	850	SCUBA-2	0.52 hours	5
4	M49	850	SCUBA-2	0.52 hours	5
5	M51	850	SCUBA-2	0.52 hours	5
6	M58	850	SCUBA-2	0.52 hours	5
7	M59	850	SCUBA-2	0.52 hours	5
8	M60	850	SCUBA-2	0.52 hours	5
9	M61	850	SCUBA-2	0.52 hours	5
10	M63	850	SCUBA-2	0.52 hours	5
11	M64	850	SCUBA-2	0.52 hours	5
12	M65	850	SCUBA-2	0.52 hours	5
13	M66	850	SCUBA-2	0.52 hours	5
14	M74	850	SCUBA-2	0.52 hours	5
15	M77	850	SCUBA-2	0.52 hours	5
16	M81	850	SCUBA-2	0.52 hours	5
17	M82	850	SCUBA-2	0.52 hours	5
18	M84	850	SCUBA-2	0.52 hours	5
19	M85	850	SCUBA-2	0.52 hours	5
20	M86	850	SCUBA-2	0.52 hours	5

Click [here](#) for more details on the science program.

Click [here](#) to download or plot the regions observed in this program.

Survey container — fetched MSB

The screenshot displays a software interface with two main windows. The background window shows a hierarchical tree of survey components: Example Program, SCUBA-2, Site Quality, Survey Container: Some ga..., Pointsource Daisy map, DRRecipe, Note: Please read, Science Observation, Sequence, and Scan. The foreground window, titled 'Survey Information', contains a 'Target Information' panel. A green oval highlights the 'Note: Please read' item in the tree, with a green arrow pointing to a green text box. The 'Target Information' panel includes fields for Name (M31), Tag (SCIENCE), and TargetType (RA/Dec). It also has tabs for RA/Dec, Orbital Elements, Named Planets, and TLE. The 'Object' section shows SIMBAD Names ESO, a Resolve Name button, and Resolved Name. The System section shows FK5 (J2000) and coordinates Ra 00:42:44.330 and Dec +41:16:07.50. The 'Radial Vel/Tracking' section shows Velocity (km/s or redshift) set to radio and 0.0, and Frame set to LSRK. A table at the bottom lists the target information.

MSB fetched from the OMP

System inserts a target from the survey container when MSB is observed.

Target Information

Use this editor to enter the target information.

Name: M31 Tag: SCIENCE TargetType: RA/Dec

RA/Dec Orbital Elements Named Planets TLE

Object

SIMBAD Names ESO Resolve Name Resolved Name:

System FK5 (J2000) Ra: 00:42:44.330 Dec: +41:16:07.50

Radial Vel/Tracking Proper Motion Chop Settings

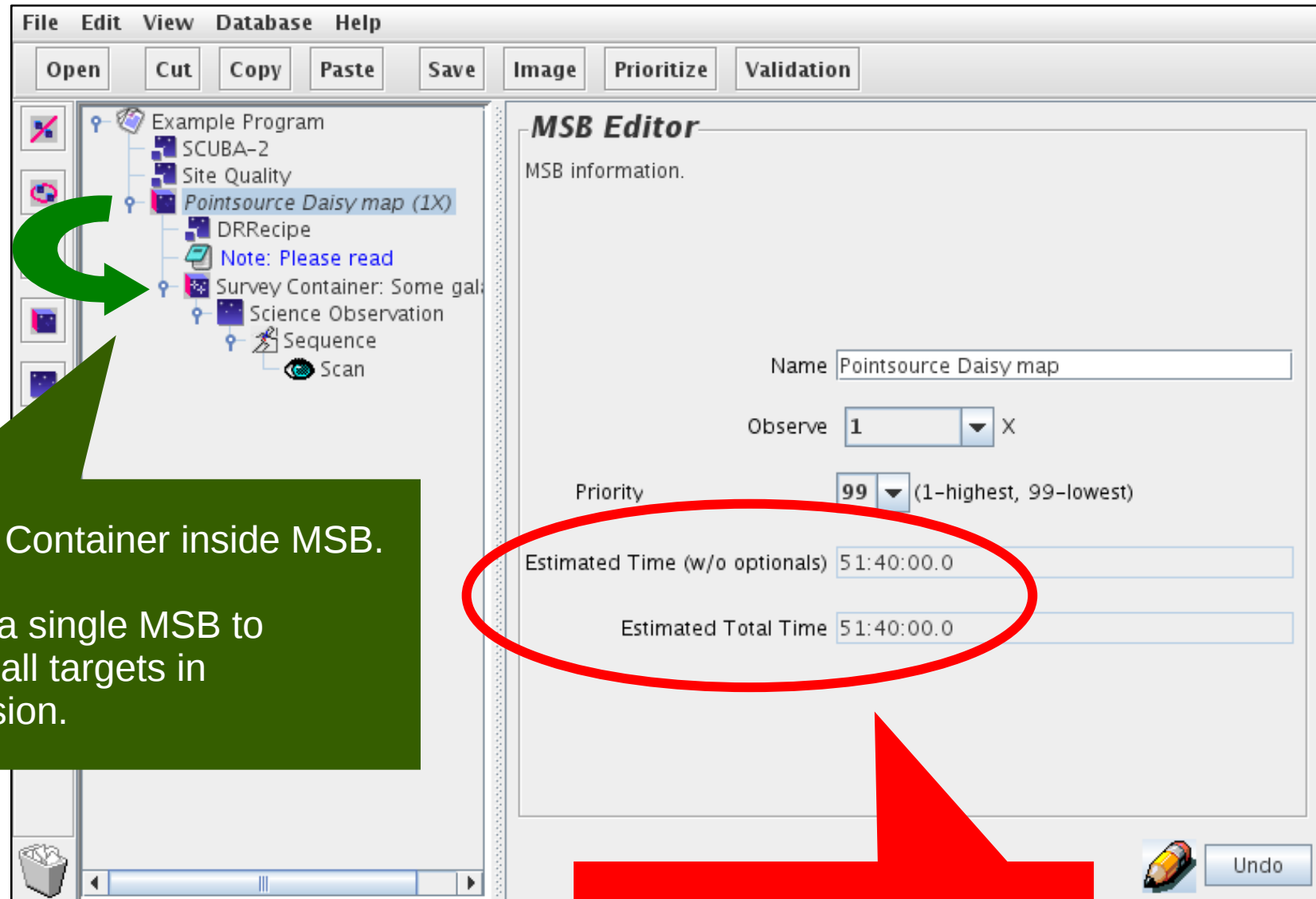
Velocity (km/s or redshift) radio 0.0

Frame LSRK

Tag	Name	X Axis	Y Axis	System
SCIENCE	M31	00:42:44.330	+41:16:07.50	FK5 (J2000)

Plot... Set SCIENC... Remove Add REFER... Undo

Survey container in MSB



Survey Container inside MSB.

Means: a single MSB to observe all targets in one session.

Very long time estimate!

Survey container in MSB — OMP

The screenshot shows the MSB Editor interface. The left pane displays a tree view of the survey structure, including 'Example Program', 'SCUBA-2', 'Site Quality', 'Pointsource Daisy map (1X)', 'DRRecipe', 'Note: Please read', 'Survey Container: Some gal...', 'Science Observation', 'Sequence', and 'Scan'. The right pane, titled 'MSB Editor', shows 'MSB information.' and a table of 'MSBs remaining to be observed:'. The table has columns for MSB, Target, Waveband, Instrument, Est. time, and Remaining. A red circle highlights the 'Est. time' and 'Remaining' columns for the first row. A red arrow points from a text box at the bottom left to the table.

MSB	Target	Waveband	Instrument	Est. time	Remaining
1	M31/M32/M33/M49 /M51/M58/M59/M60 /M61/M63/M64/M65 /M66/M74/M77/M81 /M82/M84/M85/M86	850	SCUBA2	51.67 hours	1

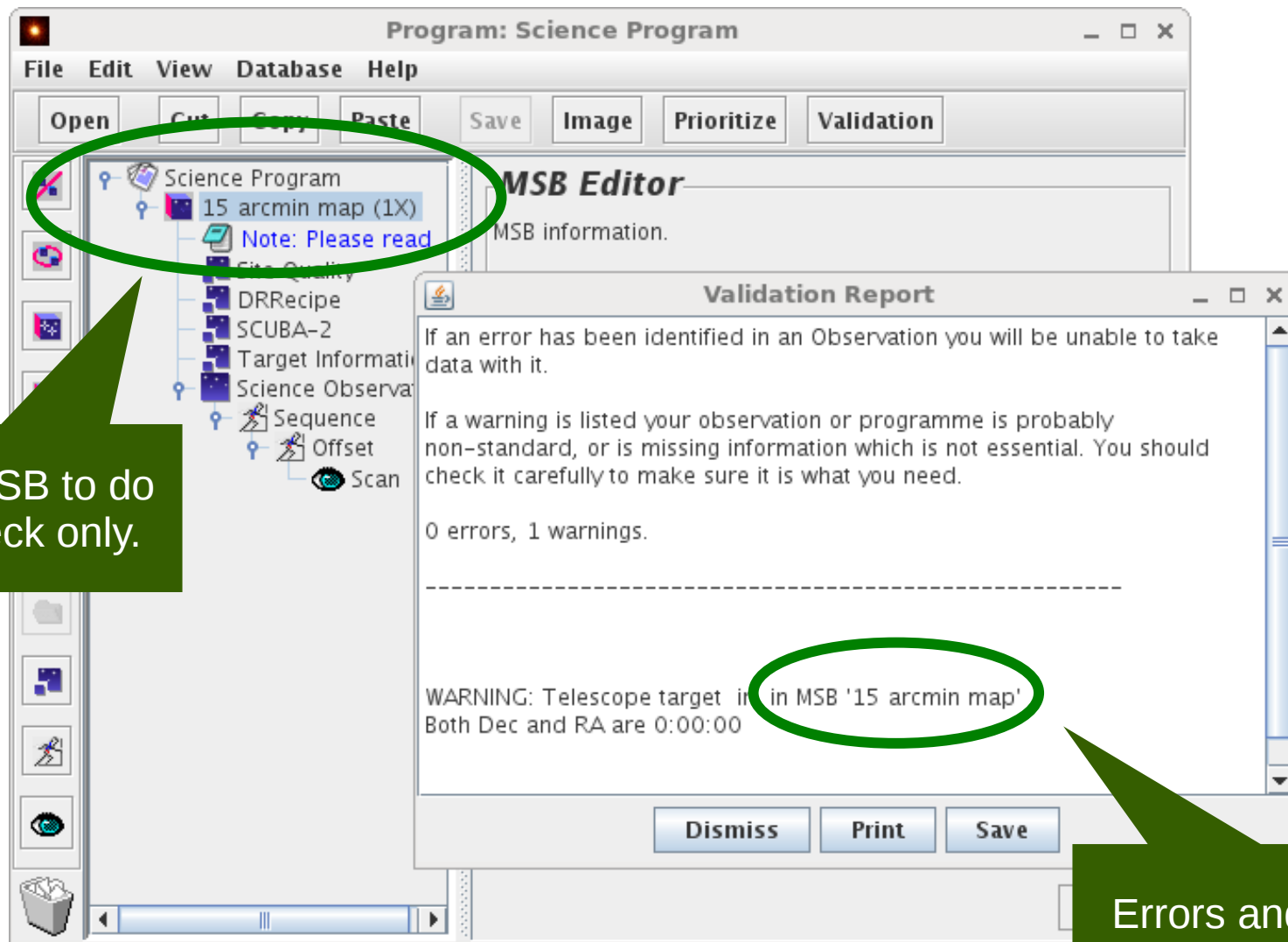
Click [here](#) for more details on the science program.
Click [here](#) to download or plot the regions observed in this program.

Single large MSB in the OMP.
Normally not what you want!

Validation — overview

- Validation of a single MSB:
 - Internal check only.
- Validation of whole program:
 - Internal check of each MSB.
 - XML schema validation of program.

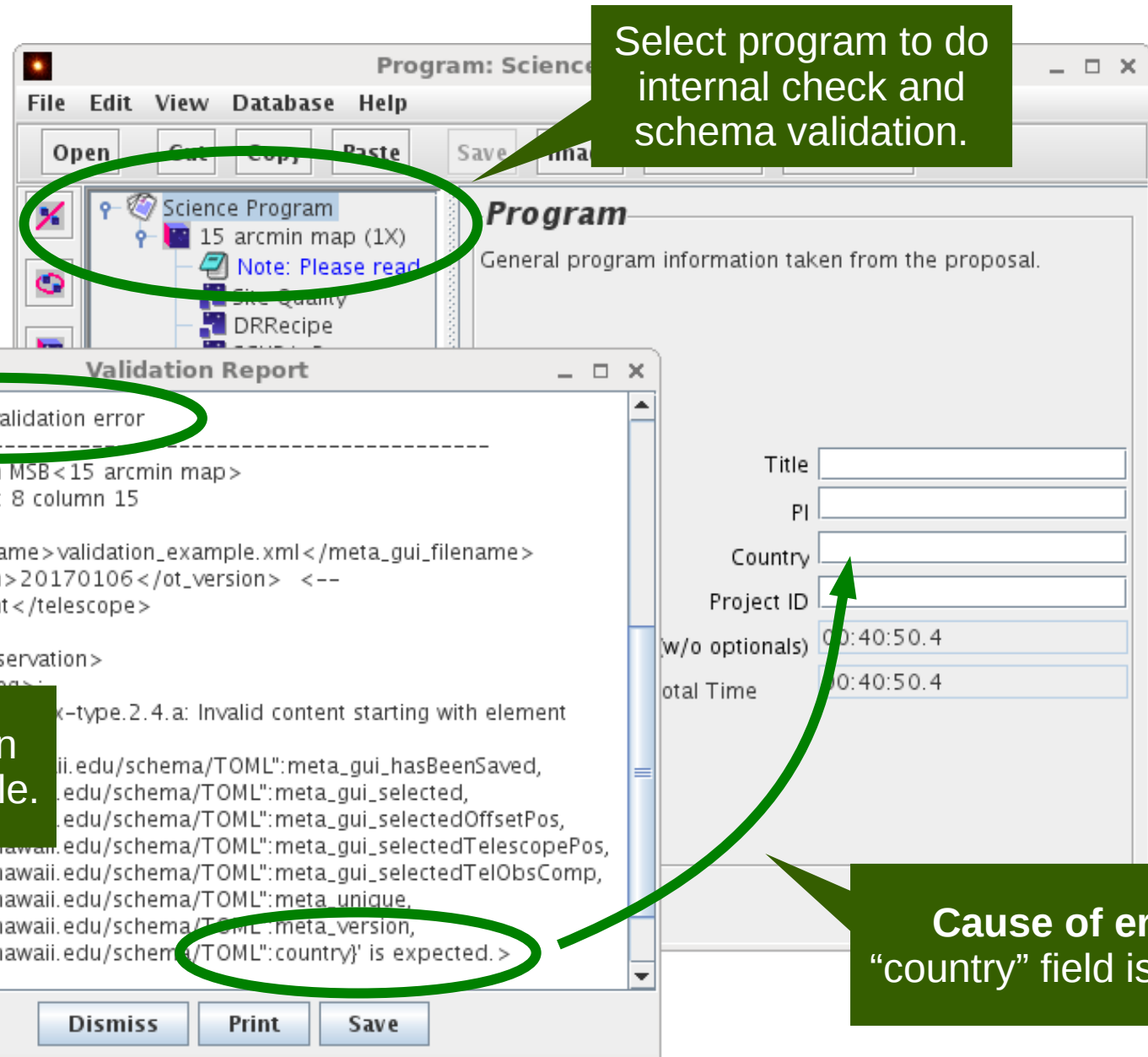
Validation — internal check



Select an MSB to do internal check only.

Errors and warnings generated by the OT.

Validation — XML schema validation



Technical description
of problems in XML file.

Common pitfalls (1/2)

- Some MSBs can be hard to observe:
 - Long time.
 - Strict constraints (e.g. opacity, scheduling).
 - Widely-spaced targets.
- “Observe” counter vs. “Repeat” iterator.
 - MSB “observe” counter: do MSB multiple times.
 - “Repeat” iterator: extends duration of the MSB.

Common pitfalls (2/2)

- Program may have been updated by the OMP.
 - Message: “Science Program has changed on disk”.
 - Fetch program from OMP database before editing.
- Must use Oracle’s version of Java.
 - OpenJDK can appear to work at first but problems often occur.
- Sometimes updates only saved on key-press.

Tutorials

- Basics tutorial
 - Installation and basic usage of the OT.
- Tricks tutorial
 - Practice of techniques from this presentation.
- Tutorials & example files can be found here:
<http://www.eaobservatory.org/jcmt/science/reductionanalysis-tutorials/>