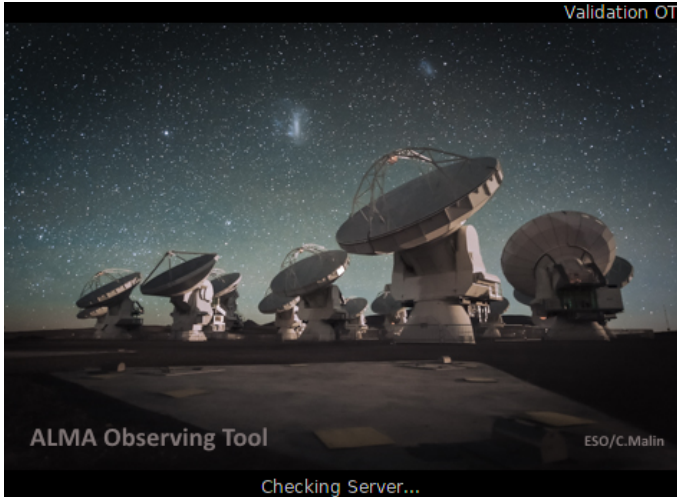
The ALMA Observing Tool (OT)

(or the essential tool to prepare and submit a proposal for ALMA)



Ana Karla Díaz-Rodríguez

EUROPEAN ARC
ALMA Regional Centre || UK

(remainder for me: pdf for scientific justification)

MANCHESTER 1824

ALMA timeline

- March: Call for proposals (CfP)
- April: Proposals due
- August: Grades for proposals are announced
- September: Phase 2 of proposal submission (review of the Scheduling Blocks); end of observations from the previous cycle; ACA supplemental CfP
- October: Observations start for new cycle; ACA proposals due

ALMA timeline

- March: Call for proposals (CfP)
- April: Proposals due

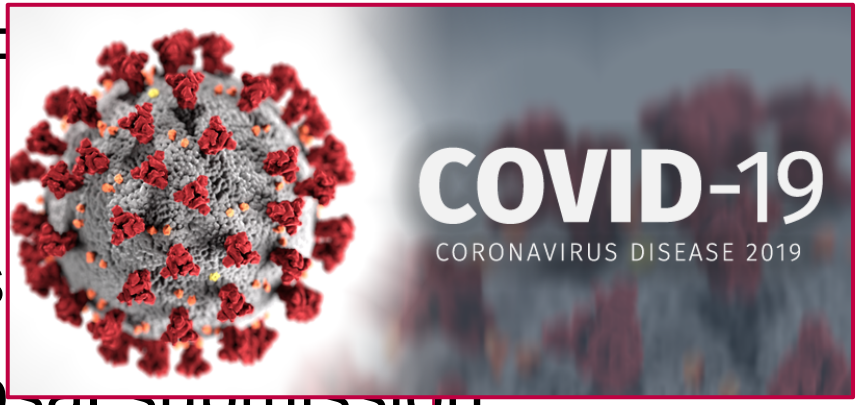
OT (Phase 1)

- August: Grades for proposals are announced
- September: Phase 2 of proposal submission (review of the Scheduling Blocks); end of observations from the previous cycle; ACA supplemental CfP
- October: Observations start for new cycle; ACA proposals due

OT (if proposal accepted)

ALMA timeline

- March: Call for proposals (CfP
- April: Proposals due
- August: Grades for proposals
- September: Phase 2 of proposal submission (review of the Scheduling Blocks); end of observations from the previous cycle; ACA supplemental CfP
- October: Observations start for new cycle; ACA proposals due



Shifted 1 year

Cycle 8 2021 ALMA timeline

- March 17: Call for proposals (CfP)
- April 21: Proposals due
- August: Grades for proposals are announced
- September 8: ACA supplemental CfP
- October 1: Observations start for Cycle 8 and continue with remainder of Cycle 7
- October 6: ACA proposals due

Observing Tool (OT)

- Java desktop application (c8: own version of Java 11)
- Updated each cycle to match ALMA capabilities
- Works on Linux, Mac, Windows

Download and installing: ALMA OT **Installer** (recommended) or **tarball** (if anything goes wrong with the installer :( )

Documentation: OT Quickstart Guide, OT video tutorials, User Manual

Lets propose!

ALMA proposal

Science justification + Technical Justification

Why?
4 or 6 pages
PDF file
(templates)

How?
OT

Lets propose!

ALMA proposal

Science justification + Technical Justification

Why? How?

Science Goals contain the technical specification of your project. Are limited to one correlator setup, one calibration strategy, and one set of Control and Performance parameters.

- Band 3 observations of one or more targets **(1 SG)**
- Band 3 observations at 0.02” and 4” **(2 SG)**
- Band 3, Band 4 and Band 5 observations **(3 SG)**

Now, lets propose!

Example 1: Continuum observations of several targets (e.g. survey of protostars)

Example 2: Line observations of single target (e.g. study kinematics of a protostellar disk)

Example 3: Mosaic observations (e.g. mapping a star-forming filament)

Now, lets propose!

Example 1: Continuum observations of several targets (e.g. survey of protostars)

Example 2: Line observations of single target (e.g. study kinematics of a protostellar disk)

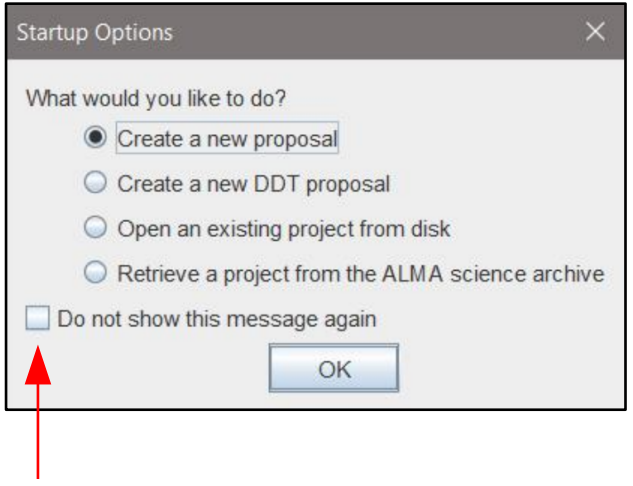
Example 3: Mosaic observations (e.g. mapping a star-forming filament)

0. Register with the ALMA Science Portal (PI and co-Is)

Open the OT

Linux (terminal): ./ALMA-OT.sh

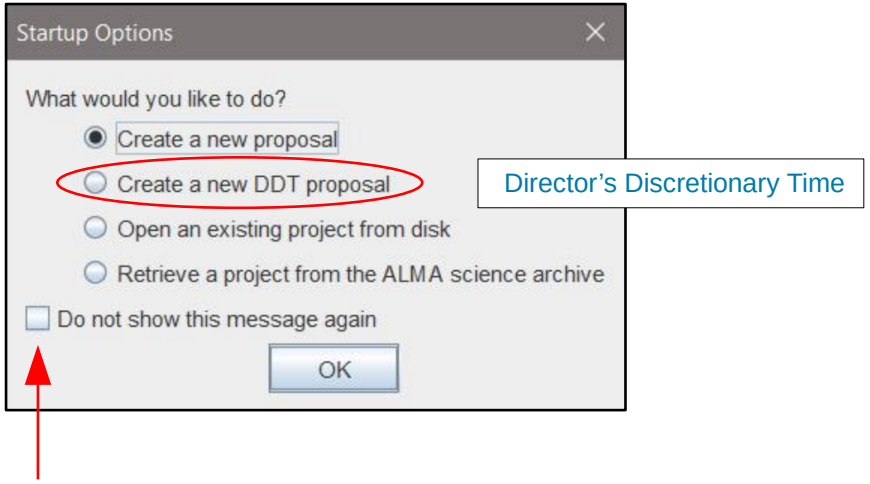
Mac (double-click): ALMA-OT.app



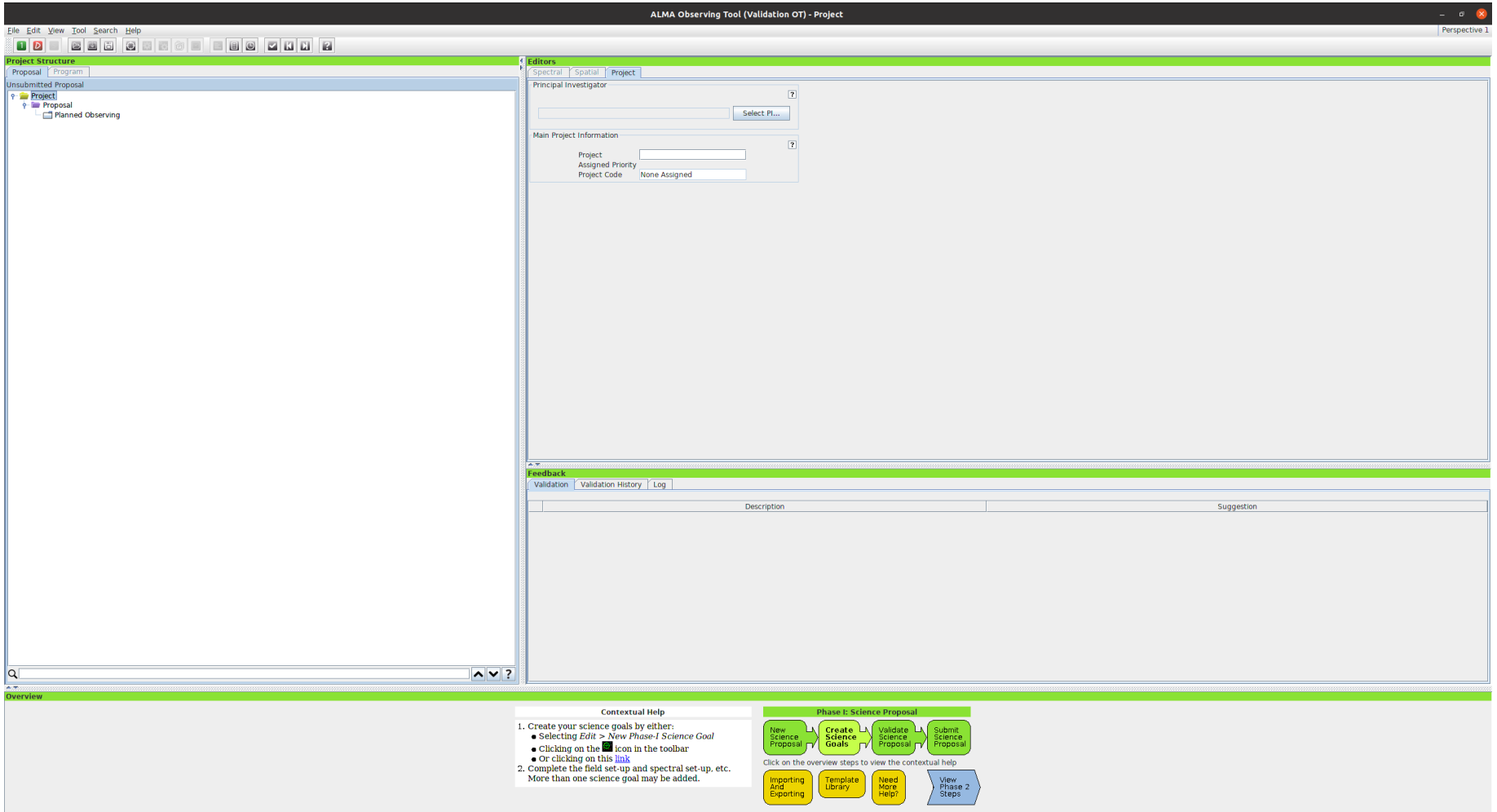
Open the OT

Linux (terminal): ./ALMA-OT.sh

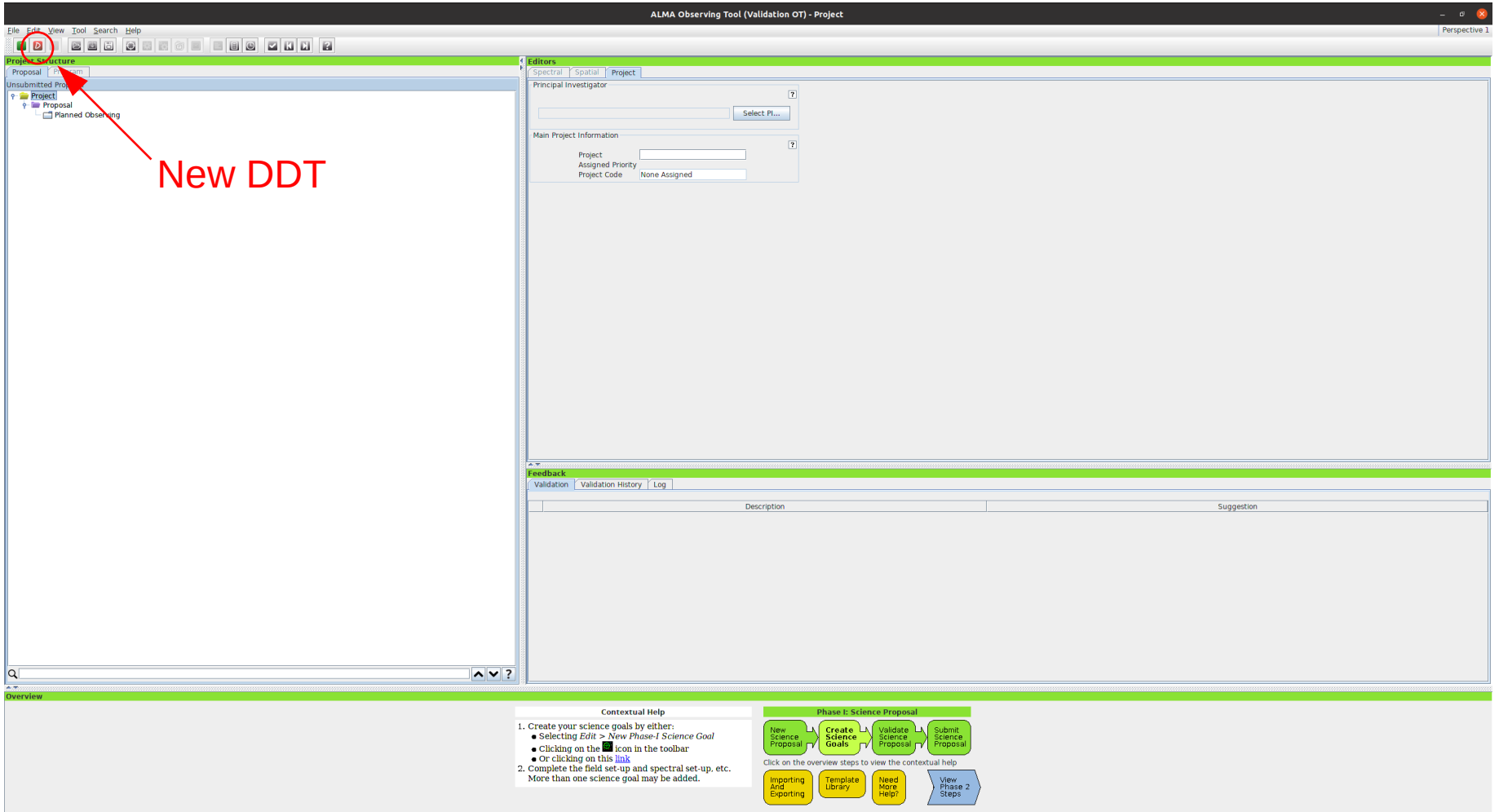
Mac (double-click): ALMA-OT.app



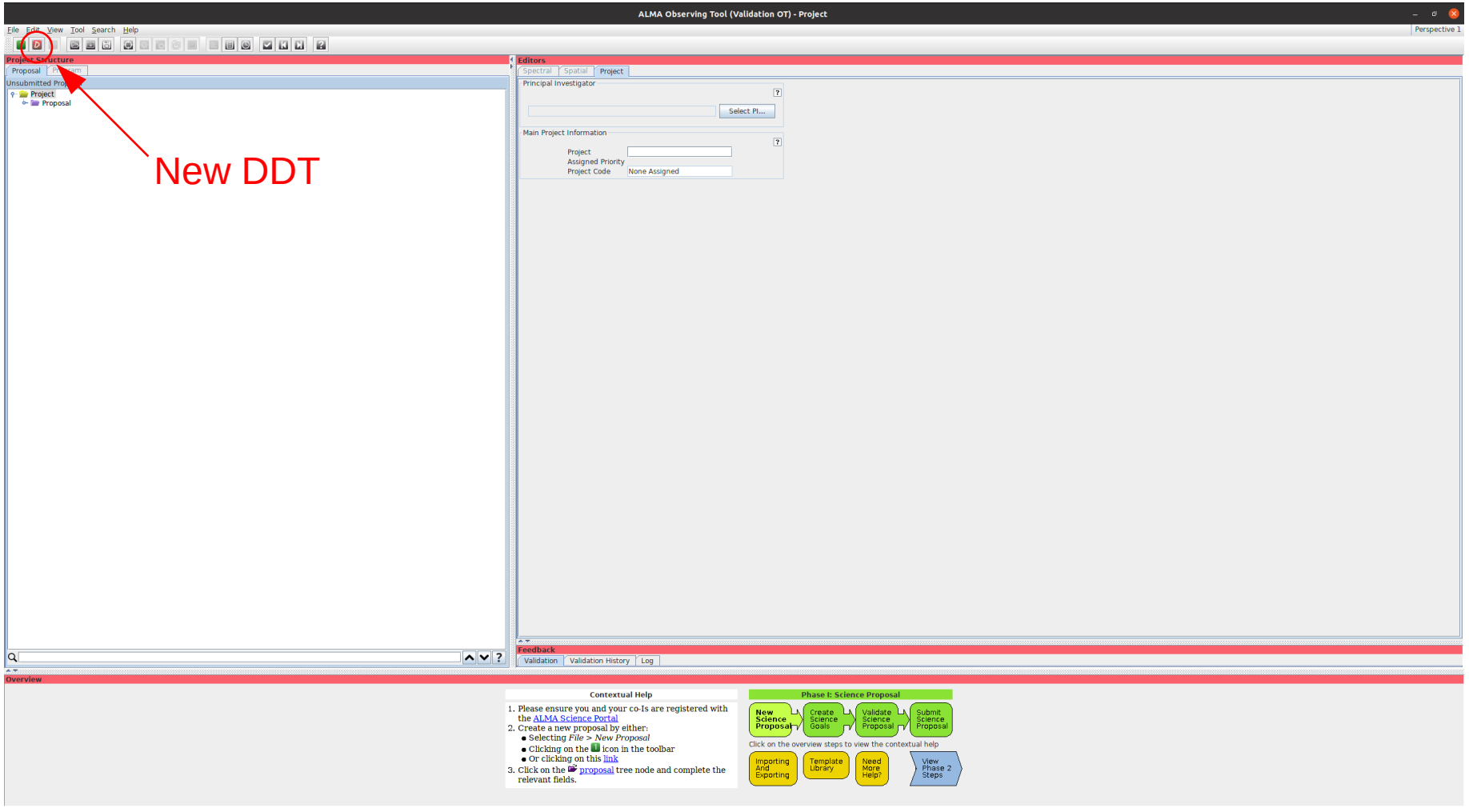
Open the OT


ALMA Observing Tool (Validation OT) - Project
File Edit View Tool Search Help
Perspective 1
Project Structure
Proposal Program
Unsubmitted Proposal
Project
Proposal
Planned Observing
Editors
Spectral Spatial Project
Principal Investigator
Select PI...
Main Project Information
Project
Assigned Priority
Project Code
None Assigned
Feedback
Validation Validation History Log
Description
Suggestion
Overview
Contextual Help
1. Create your science goals by either:
Selecting Edit > New Phase-I Science Goal
Clicking on the icon in the toolbar
Or clicking on this link
2. Complete the field set-up and spectral set-up, etc.
More than one science goal may be added.
Phase I: Science Proposal
New Science Proposal
Create Science Goals
Validate Science Proposal
Submit Science Proposal
Click on the overview steps to view the contextual help
Importing And Exporting
Template Library
Need More Help?
View Phase 2 Steps

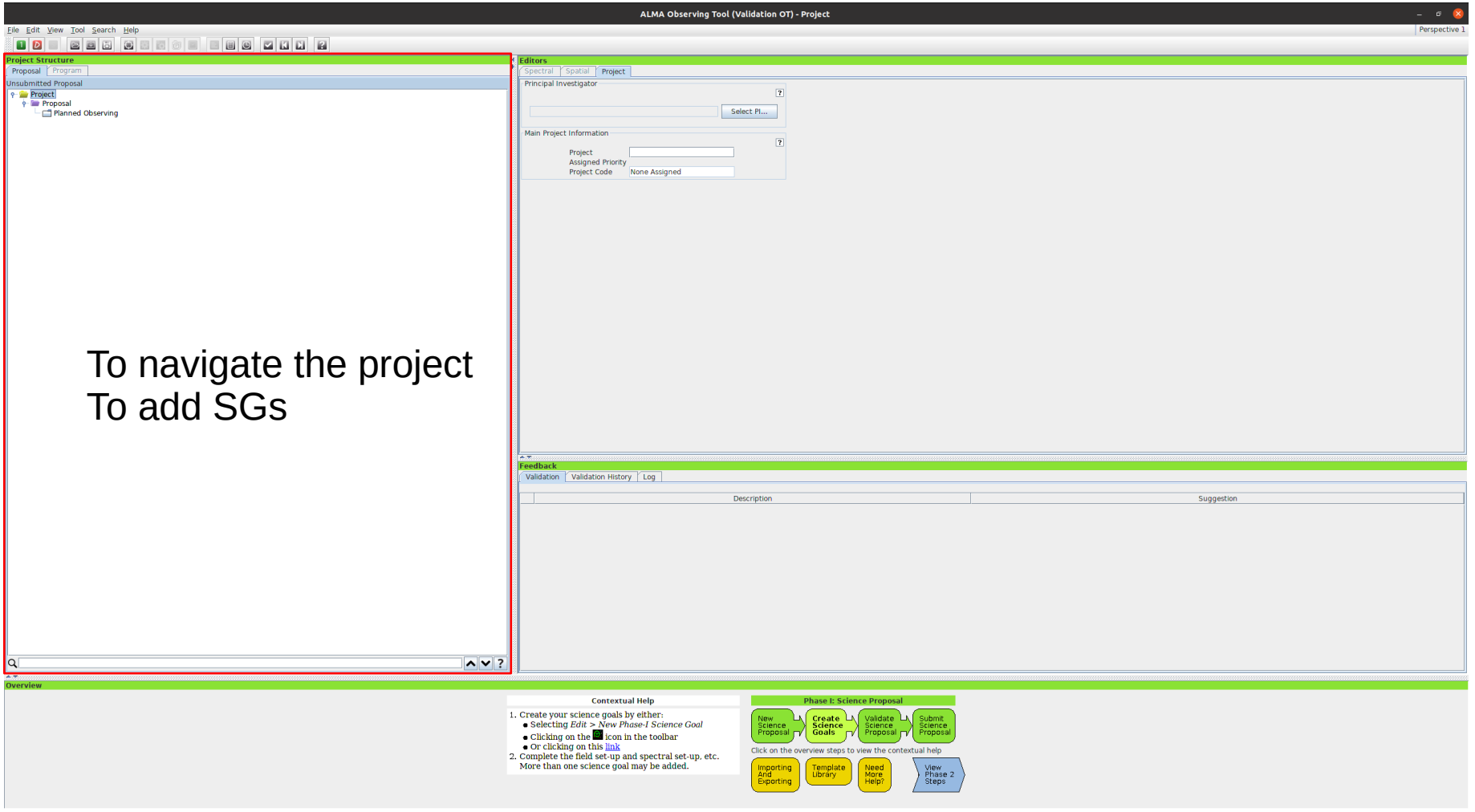
Open the OT


ALMA Observing Tool (Validation OT) - Project
File Edit View Tool Search Help
Perspective 1
Project Structure
Proposal
Unsubmitted Pro
Project
Proposal
Planned Observing
New DDT
Editors
Spectral
Spatial
Project
Principal Investigator
Select PI...
Main Project Information
Project
Assigned Priority
Project Code
None Assigned
Feedback
Validation
Validation History
Log
Description
Suggestion
Overview
Contextual Help
1. Create your science goals by either:
Selecting Edit > New Phase-I Science Goal
Clicking on the icon in the toolbar
Or clicking on this link
2. Complete the field set-up and spectral set-up, etc.
More than one science goal may be added.
Phase I: Science Proposal
New Science Proposal
Create Science Goals
Validate Science Proposal
Submit Science Proposal
Click on the overview steps to view the contextual help
Importing And Exporting
Template Library
Need More Help?
View Phase 2 Steps

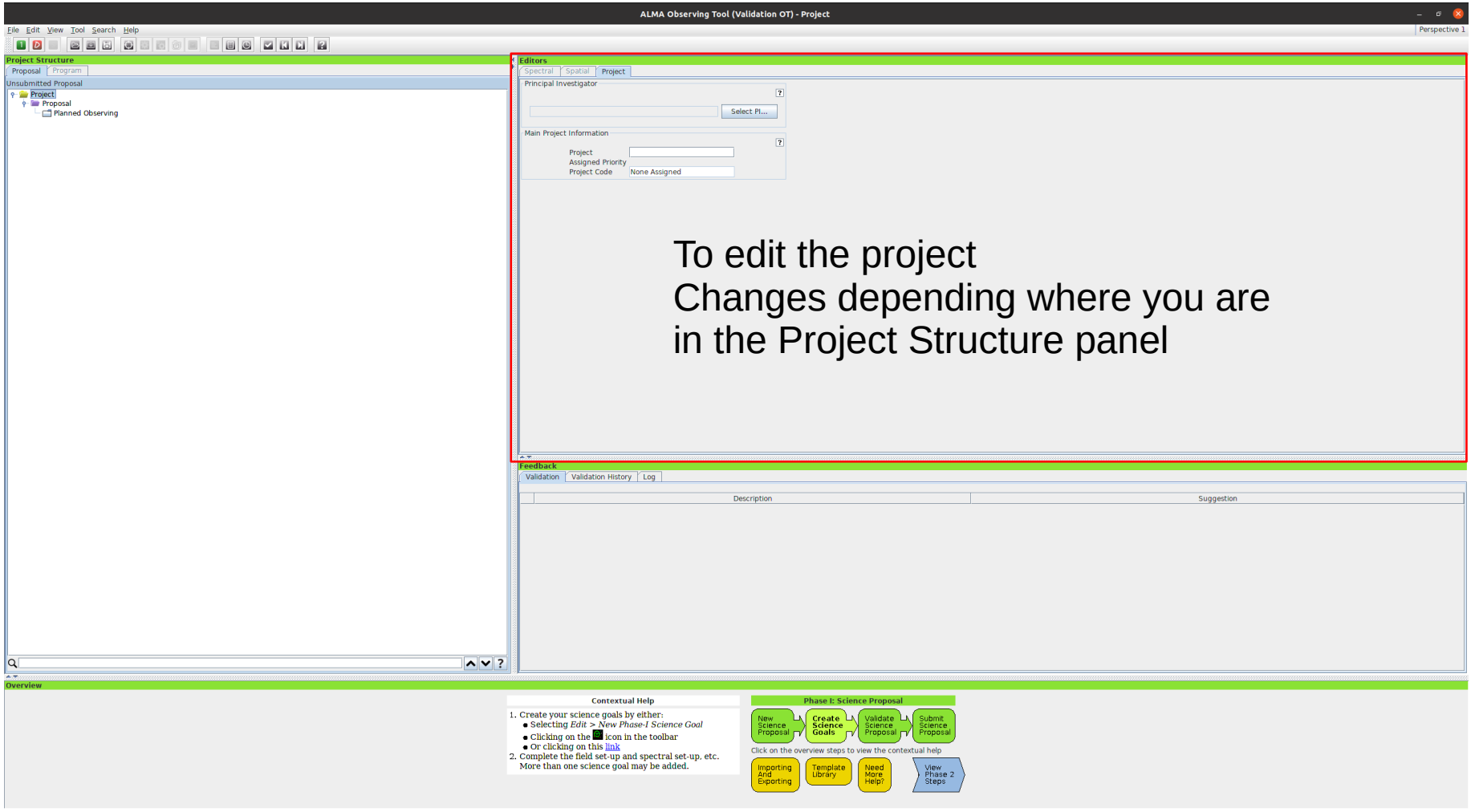
Open the OT


ALMA Observing Tool (Validation OT) - Project
File Edit View Tool Search Help
Perspective 1
Project Structure
Proposal
Unsubmitted Pro
Project
Proposal
New DDT
Editors
Spectral
Spatial
Project
Principal Investigator
Select PI...
Main Project Information
Project
Assigned Priority
Project Code
None Assigned
Feedback
Validation
Validation History
Log
Overview
Contextual Help
1. Please ensure you and your co-Is are registered with the ALMA Science Portal
2. Create a new proposal by either:
Selecting File > New Proposal
Clicking on the icon in the toolbar
Or clicking on this link
3. Click on the proposal tree node and complete the relevant fields.
Phase I: Science Proposal
New Science Proposal
Create Science Goals
Validate Science Proposal
Submit Science Proposal
Click on the overview steps to view the contextual help
Importing and Exporting
Template Library
Need More Help?
View Phase 2 Steps

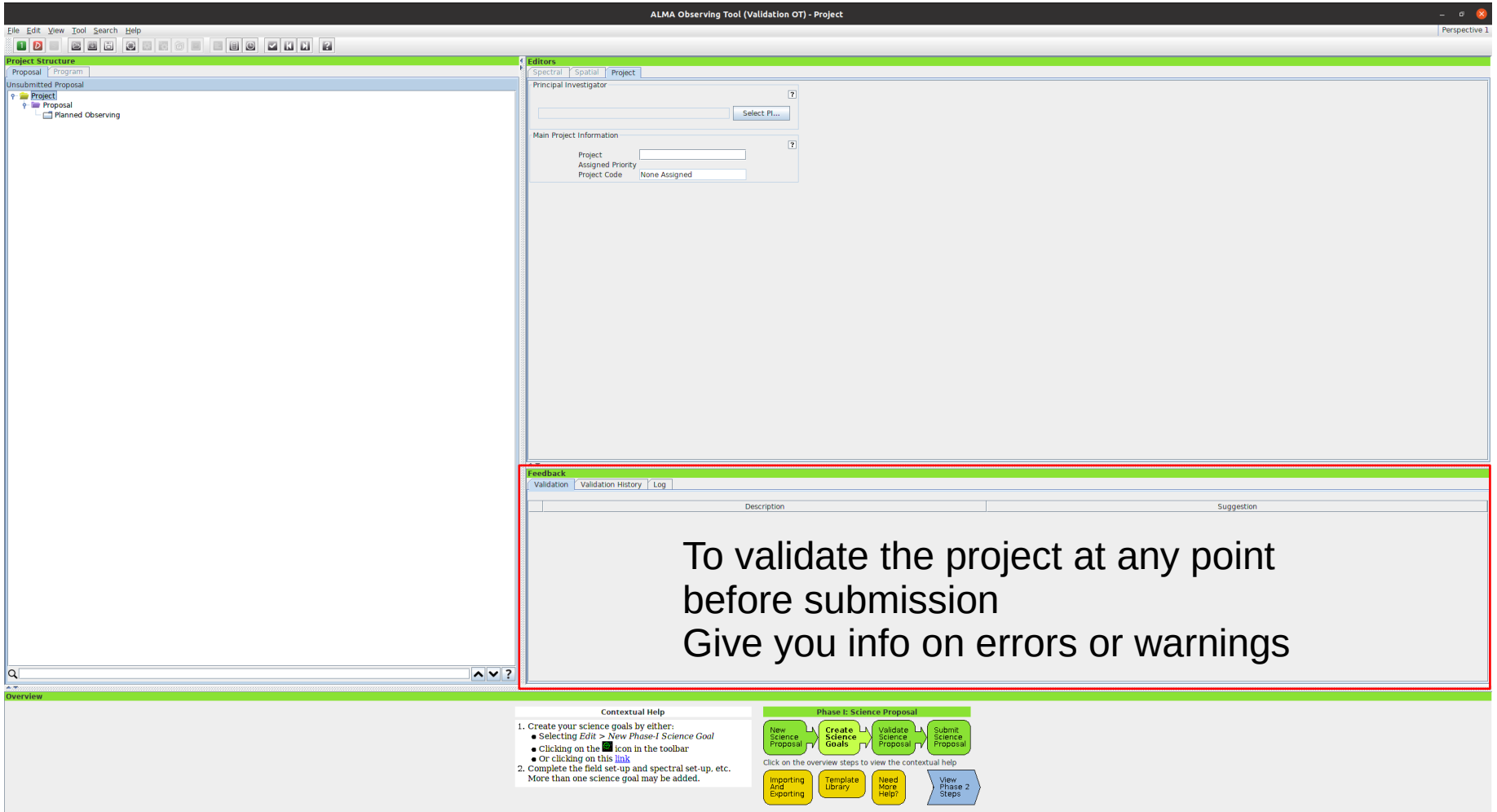
Open the OT


ALMA Observing Tool (Validation OT) - Project
File Edit View Tool Search Help
Perspective 1
Project Structure
Proposal Program
Unsubmitted Proposal
Project
Proposal
Planned Observing
To navigate the project
To add SGs
Editors
Spectral Spatial Project
Principal Investigator
Select PI...
Main Project Information
Project
Assigned Priority
Project Code
None Assigned
Feedback
Validation Validation History Log
Description
Suggestion
Overview
Contextual Help
1. Create your science goals by either:
Selecting Edit > New Phase-I Science Goal
Clicking on the icon in the toolbar
Or clicking on this link
2. Complete the field set-up and spectral set-up, etc.
More than one science goal may be added.
Phase I: Science Proposal
New Science Proposal
Create Science Goals
Validate Science Proposal
Submit Science Proposal
Click on the overview steps to view the contextual help
Importing And Exporting
Template Library
Need More Help?
View Phase 2 Steps

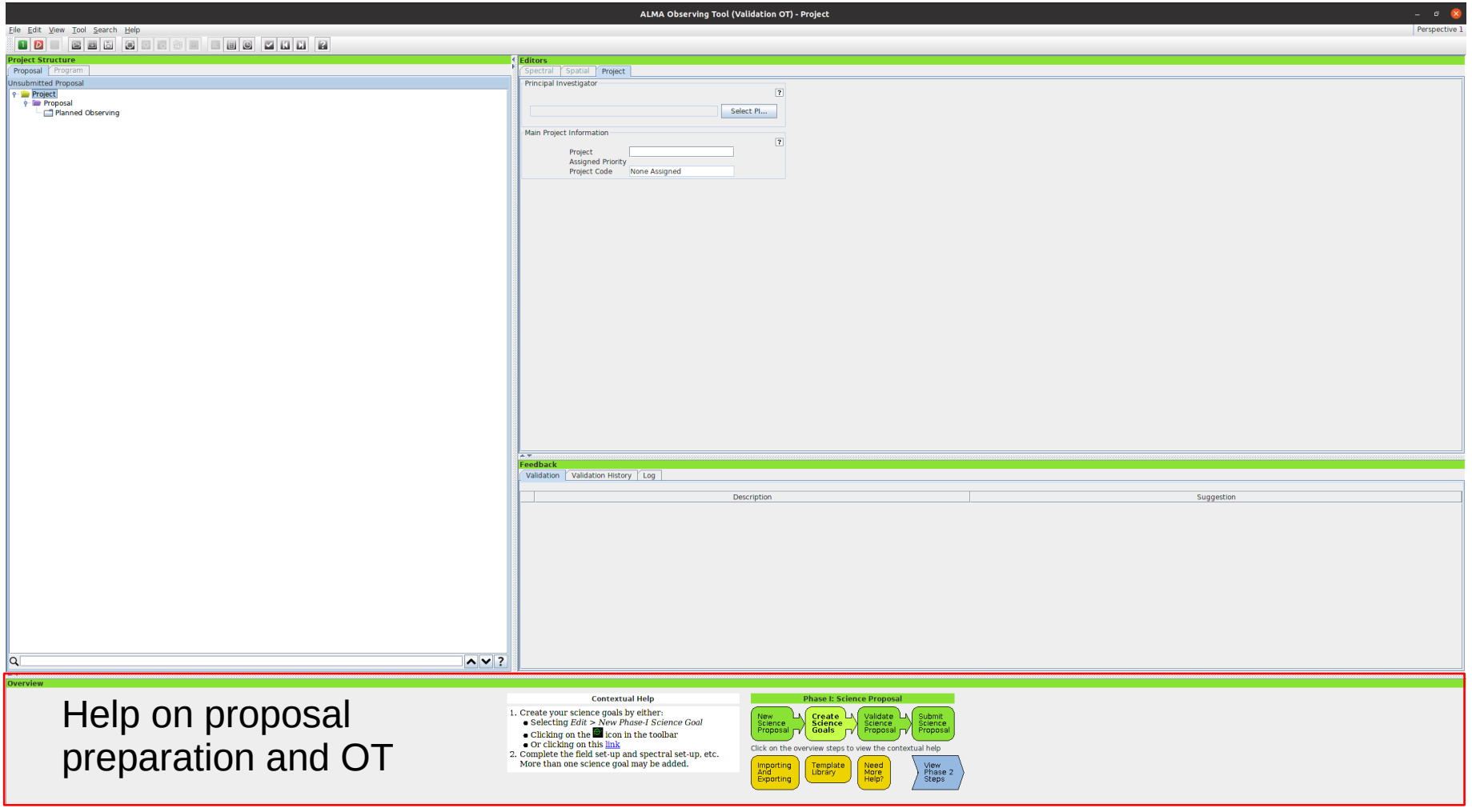
Open the OT


ALMA Observing Tool (Validation OT) - Project
File Edit View Tool Search Help
Perspective 1
Project Structure
Proposal Program
Unsubmitted Proposal
Project
Proposal
Planned Observing
Editors
Spectral Spatial Project
Principal Investigator
Select PI...
Main Project Information
Project
Assigned Priority
Project Code
None Assigned
To edit the project
Changes depending where you are
in the Project Structure panel
Feedback
Validation Validation History Log
Description
Suggestion
Overview
Contextual Help
1. Create your science goals by either:
Selecting Edit > New Phase-I Science Goal
Clicking on the icon in the toolbar
Or clicking on this link
2. Complete the field set-up and spectral set-up, etc.
More than one science goal may be added.
Phase I: Science Proposal
New Science Proposal
Create Science Goals
Validate Science Proposal
Submit Science Proposal
Click on the overview steps to view the contextual help
Importing And Exporting
Template Library
Need More Help?
View Phase 2 Steps

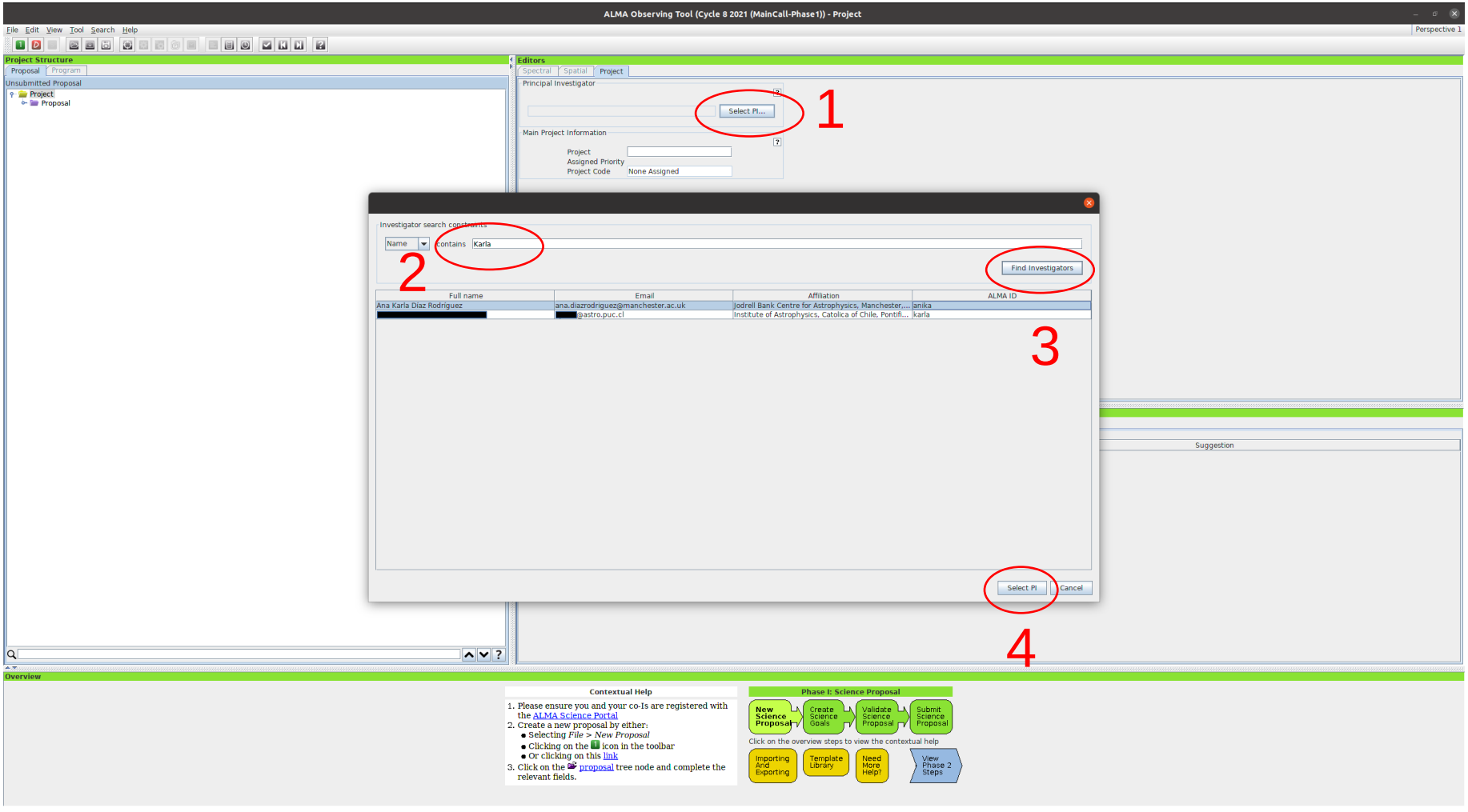
Open the OT


ALMA Observing Tool (Validation OT) - Project
File Edit View Tool Search Help
Perspective 1
Project Structure
Proposal Program
Unsubmitted Proposal
Project
Proposal
Planned Observing
Editors
Spectral Spatial Project
Principal Investigator
Select PI...
Main Project Information
Project
Assigned Priority
Project Code
None Assigned
Feedback
Validation Validation History Log
Description
Suggestion
To validate the project at any point before submission
Give you info on errors or warnings
Overview
Contextual Help
1. Create your science goals by either:
Selecting Edit > New Phase-I Science Goal
Clicking on the icon in the toolbar
Or clicking on this link
2. Complete the field set-up and spectral set-up, etc. More than one science goal may be added.
Phase I: Science Proposal
New Science Proposal
Create Science Goals
Validate Science Proposal
Submit Science Proposal
Click on the overview steps to view the contextual help
Importing And Exporting
Template Library
Need More Help?
View Phase 2 Steps

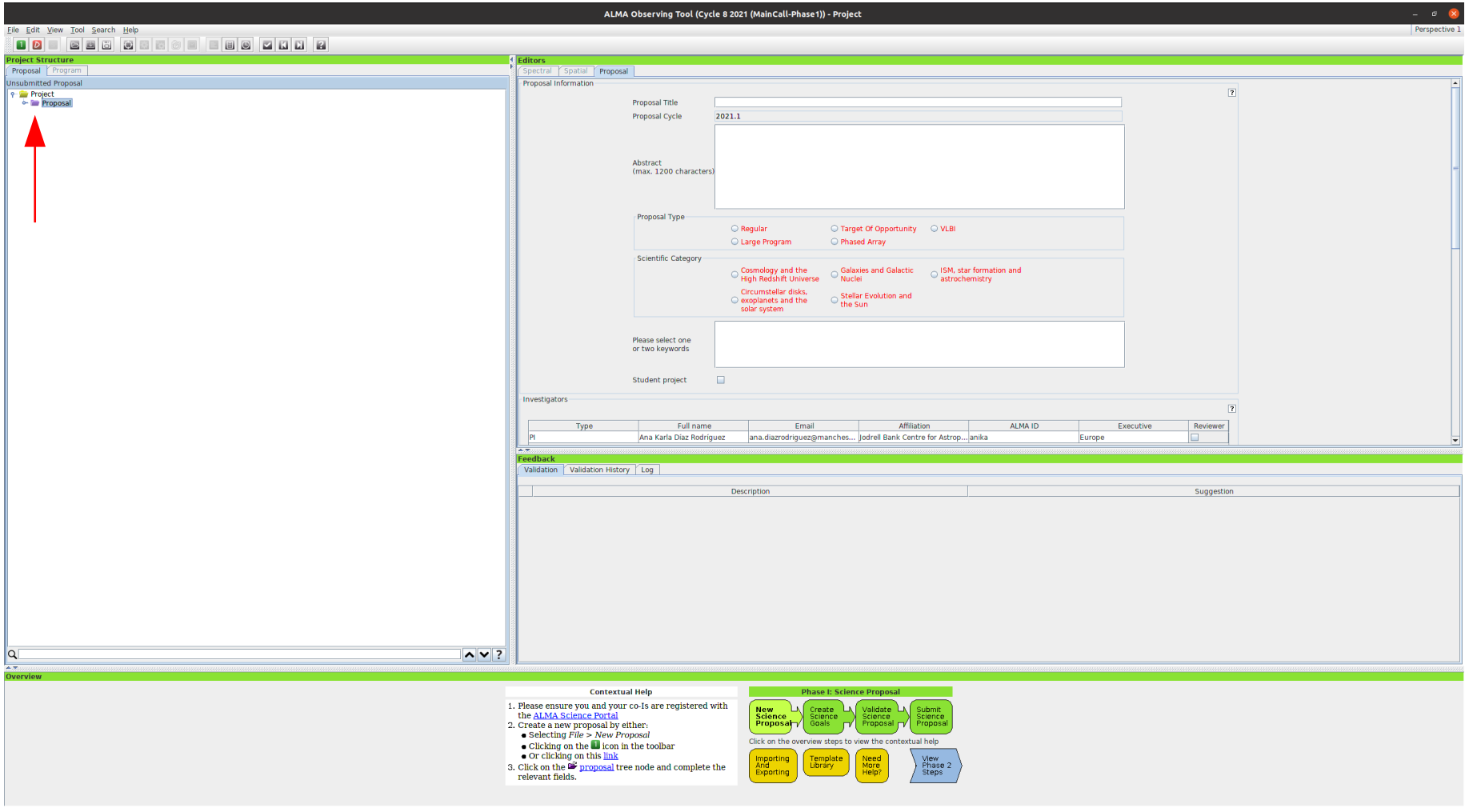
Open the OT


ALMA Observing Tool (Validation OT) - Project
File Edit View Tool Search Help
Perspective 1
Project Structure
Proposal Program
Unsubmitted Proposal
Project
Proposal
Planned Observing
Editors
Spectral Spatial Project
Principal Investigator
Select PI...
Main Project Information
Project
Assigned Priority
Project Code
None Assigned
Feedback
Validation Validation History Log
Description
Suggestion
Overview
Help on proposal preparation and OT
Contextual Help
1. Create your science goals by either:
Selecting Edit > New Phase-I Science Goal
Clicking on the icon in the toolbar
Or clicking on this link
2. Complete the field set-up and spectral set-up, etc.
More than one science goal may be added.
Phase I: Science Proposal
New Science Proposal
Create Science Goals
Validate Science Proposal
Submit Science Proposal
Click on the overview steps to view the contextual help
Importing And Exporting
Template Library
Need More Help?
View Phase 2 Steps

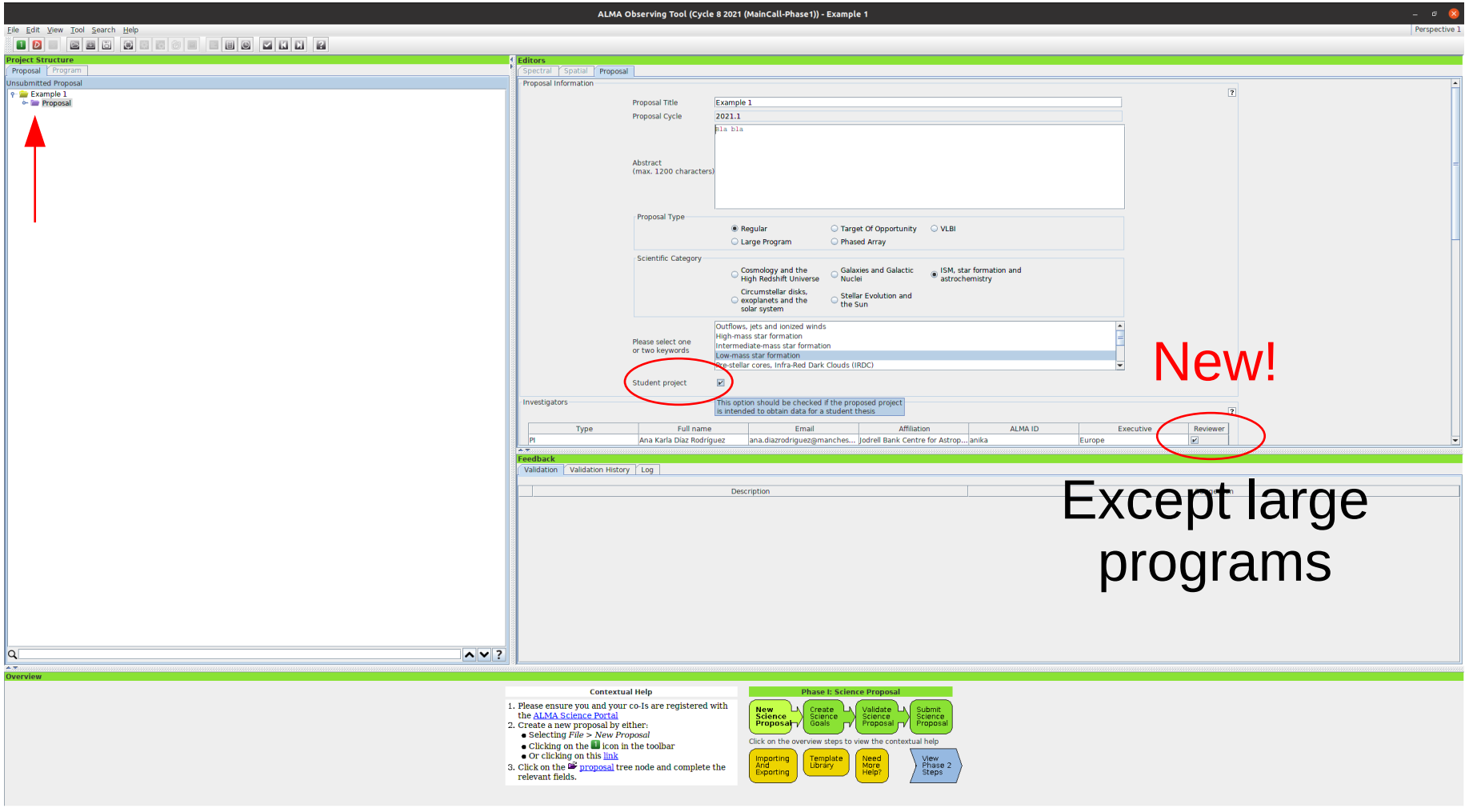
For each proposal you must...



For each proposal you must...



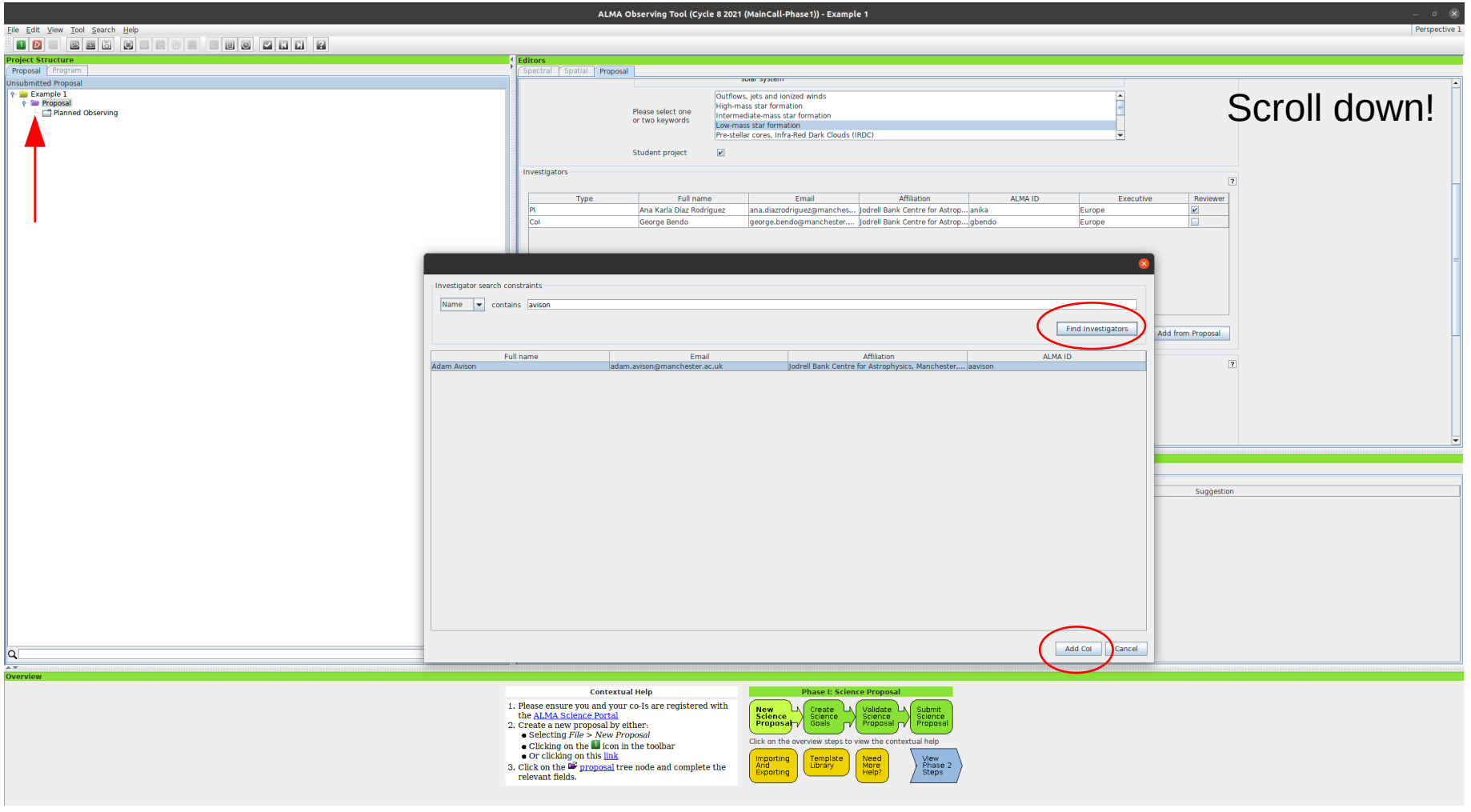
For each proposal you must...



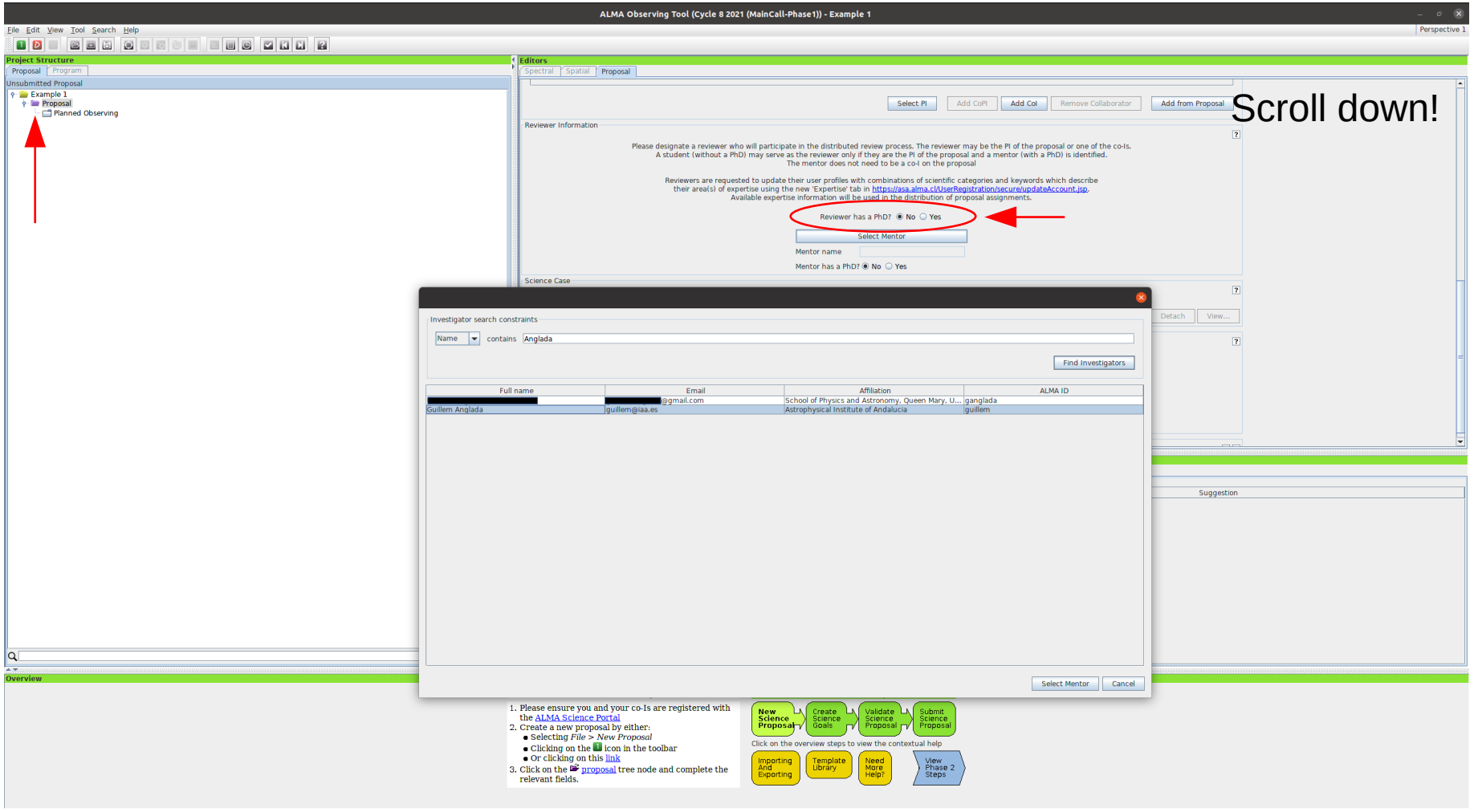
New!

Except large programs

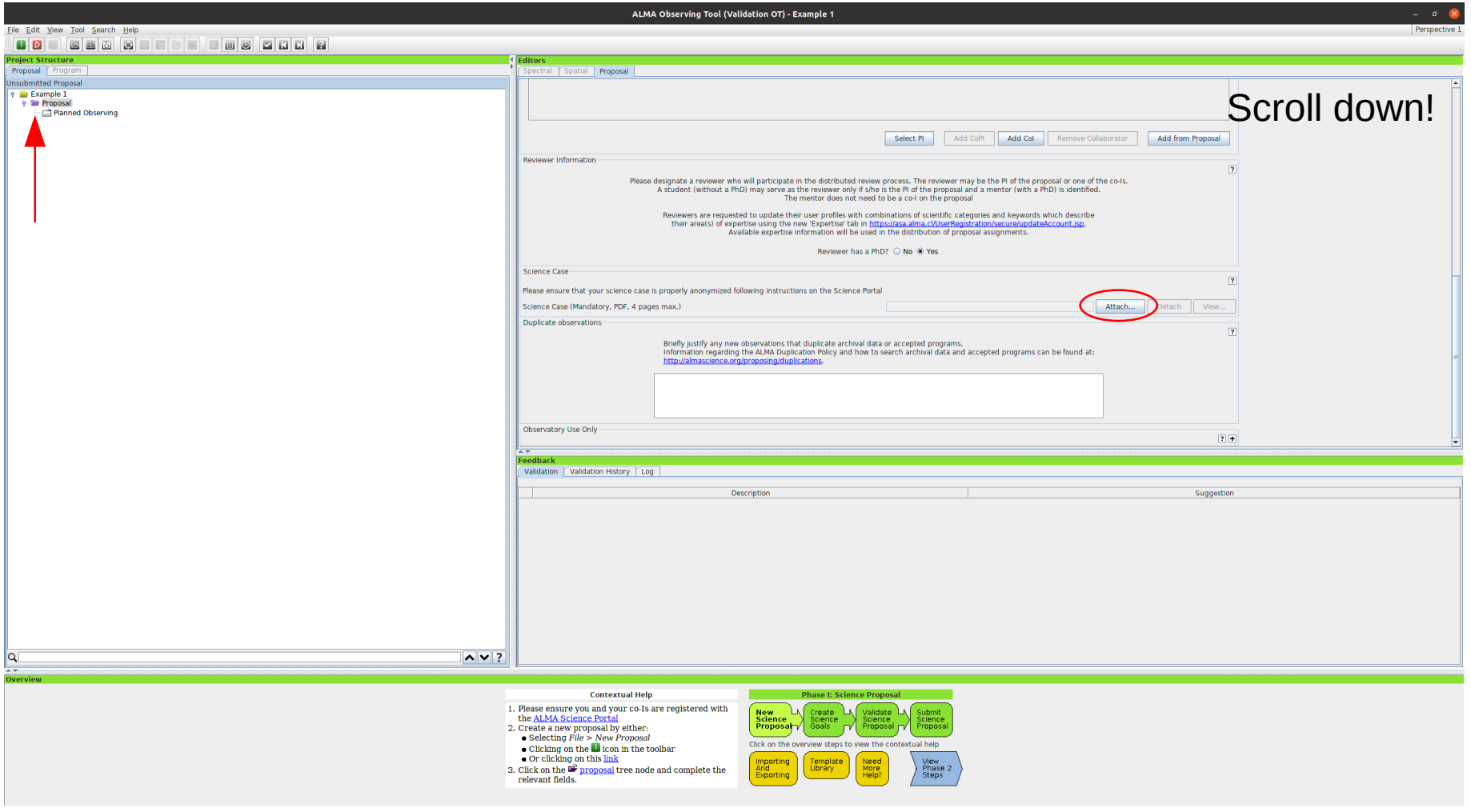
For each proposal you must...



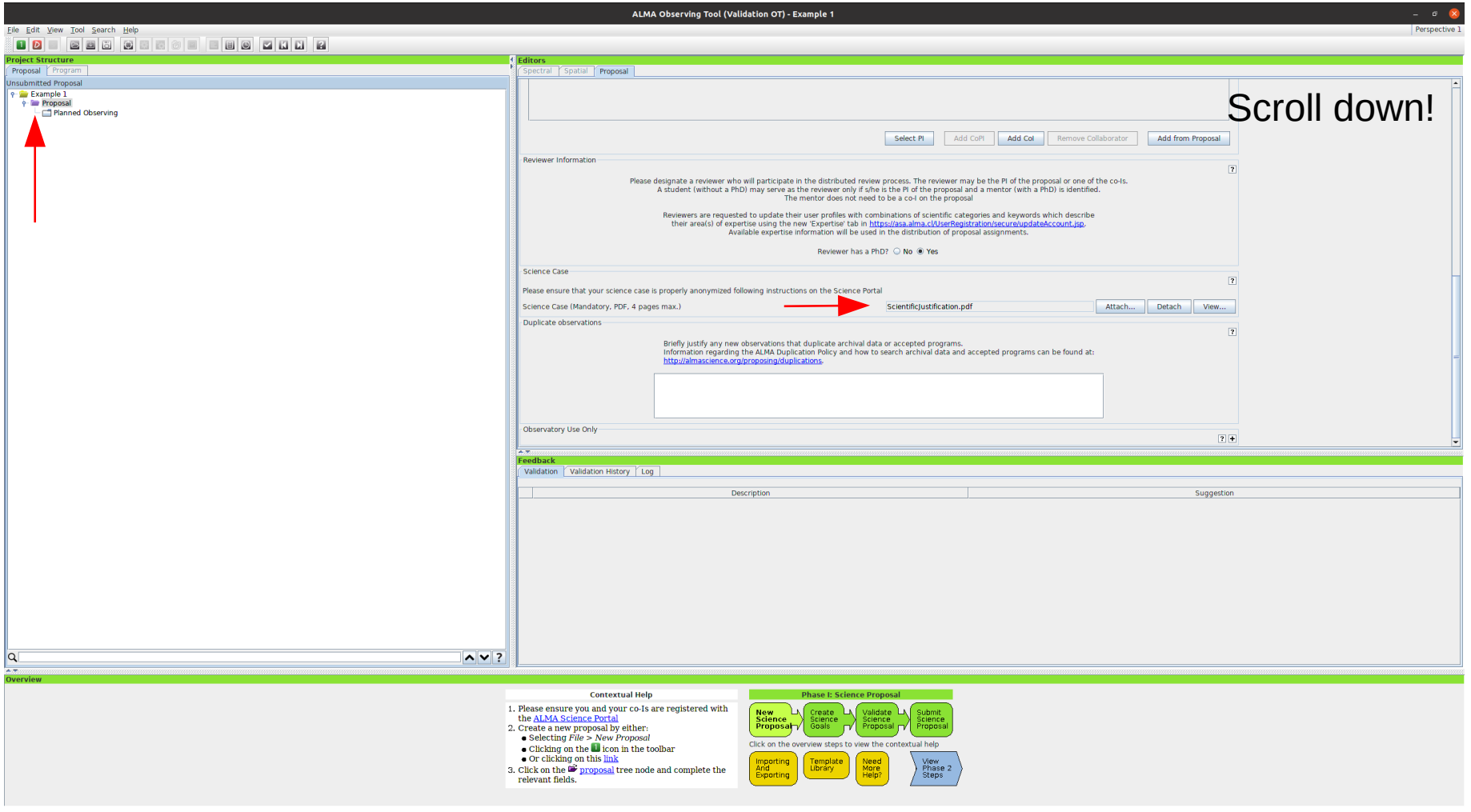
For each proposal you must...



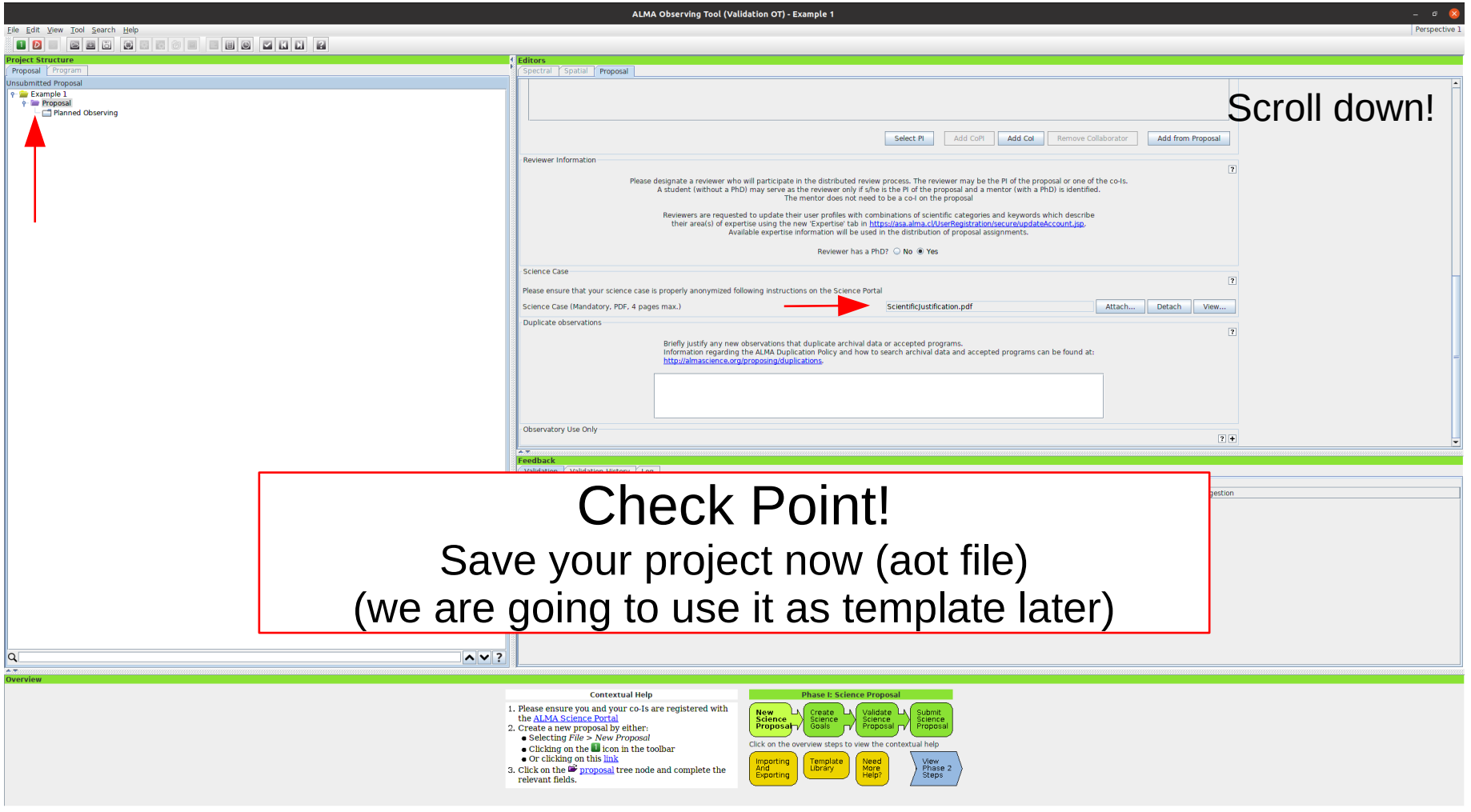
For each proposal you must...



For each proposal you must...



For each proposal you must...

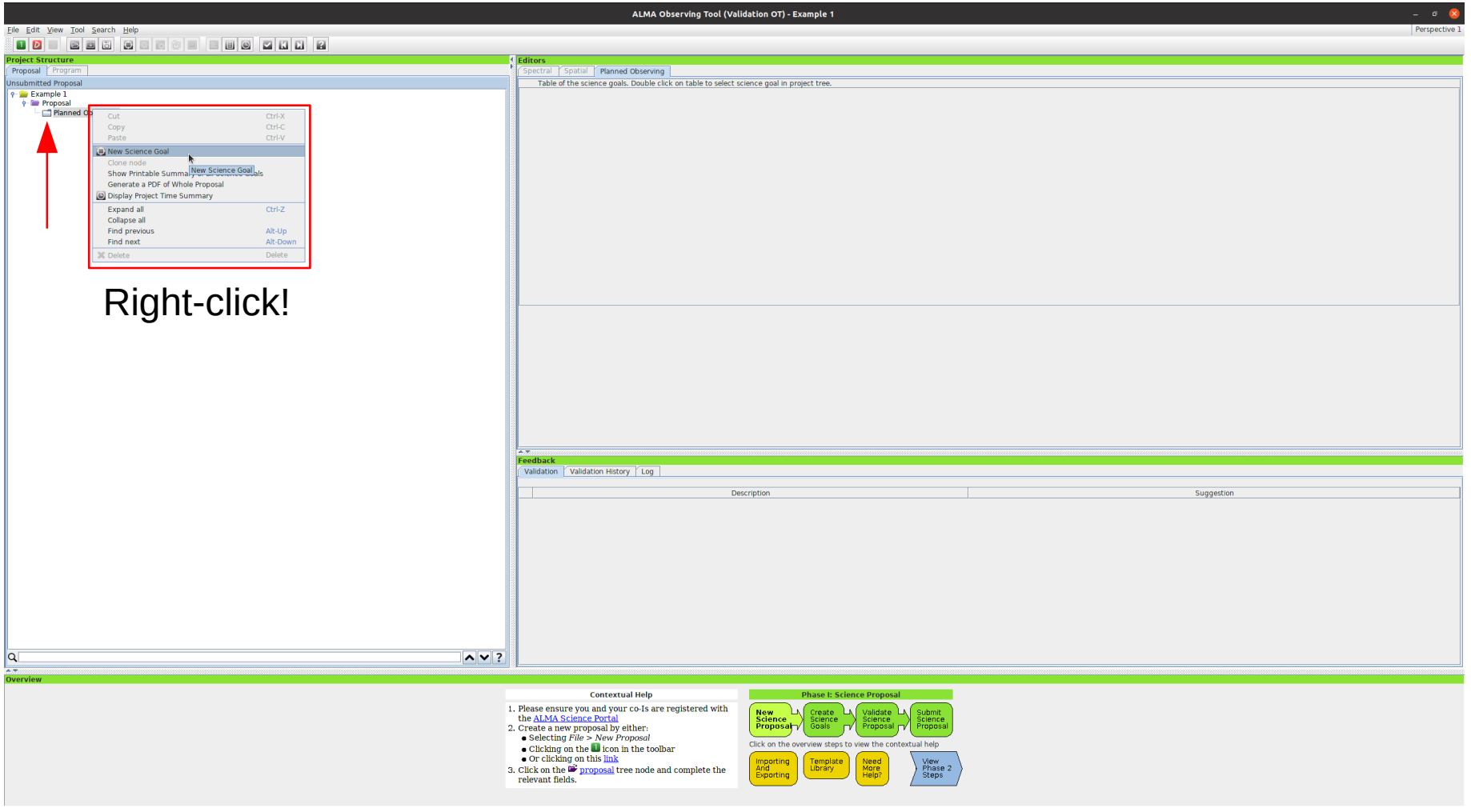


Now, lets propose!

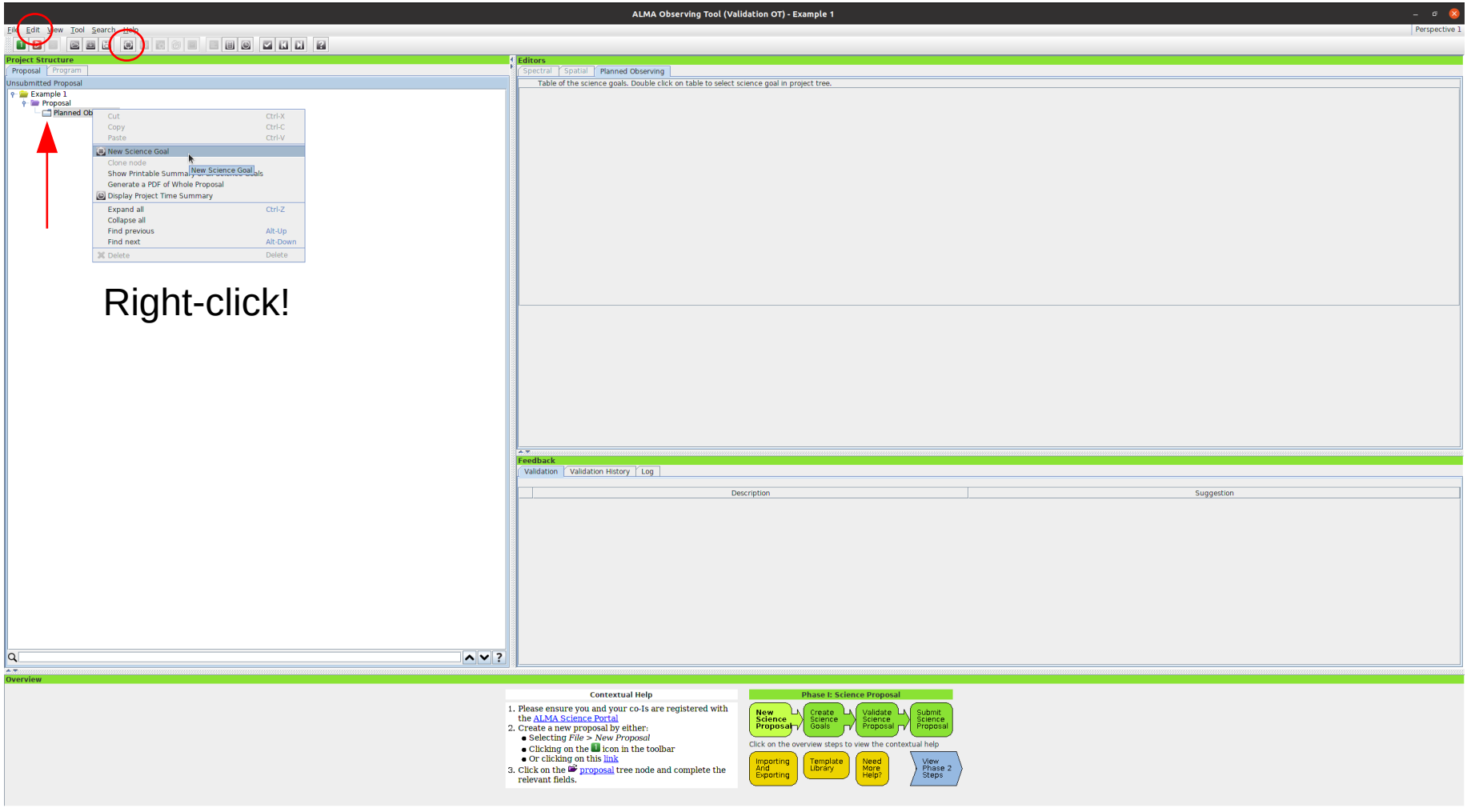
Example 1: Continuum observations of several targets (e.g. survey of protostars)

- 1 Science Goal with multiple targets

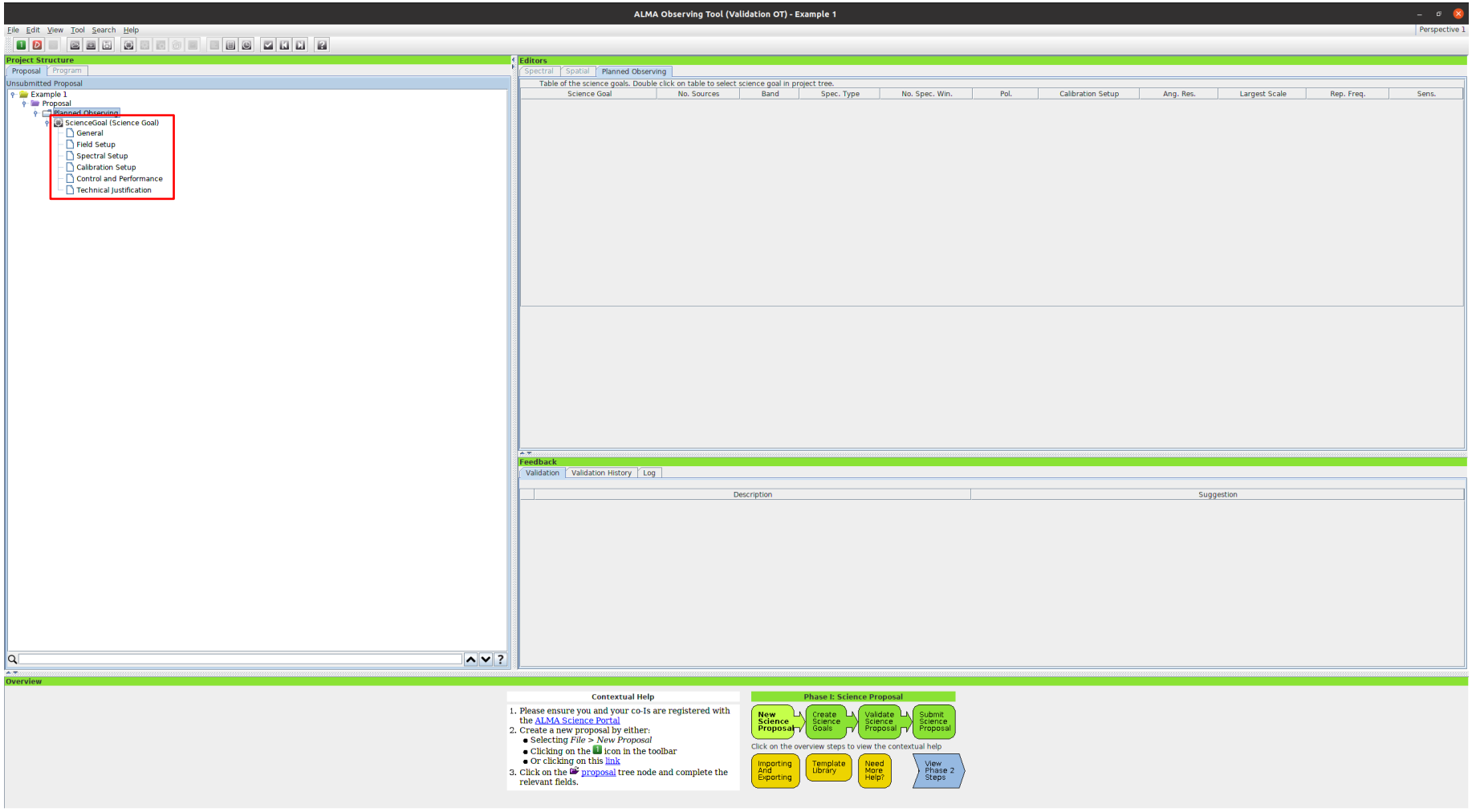
Example 1: Continuum observations of several targets



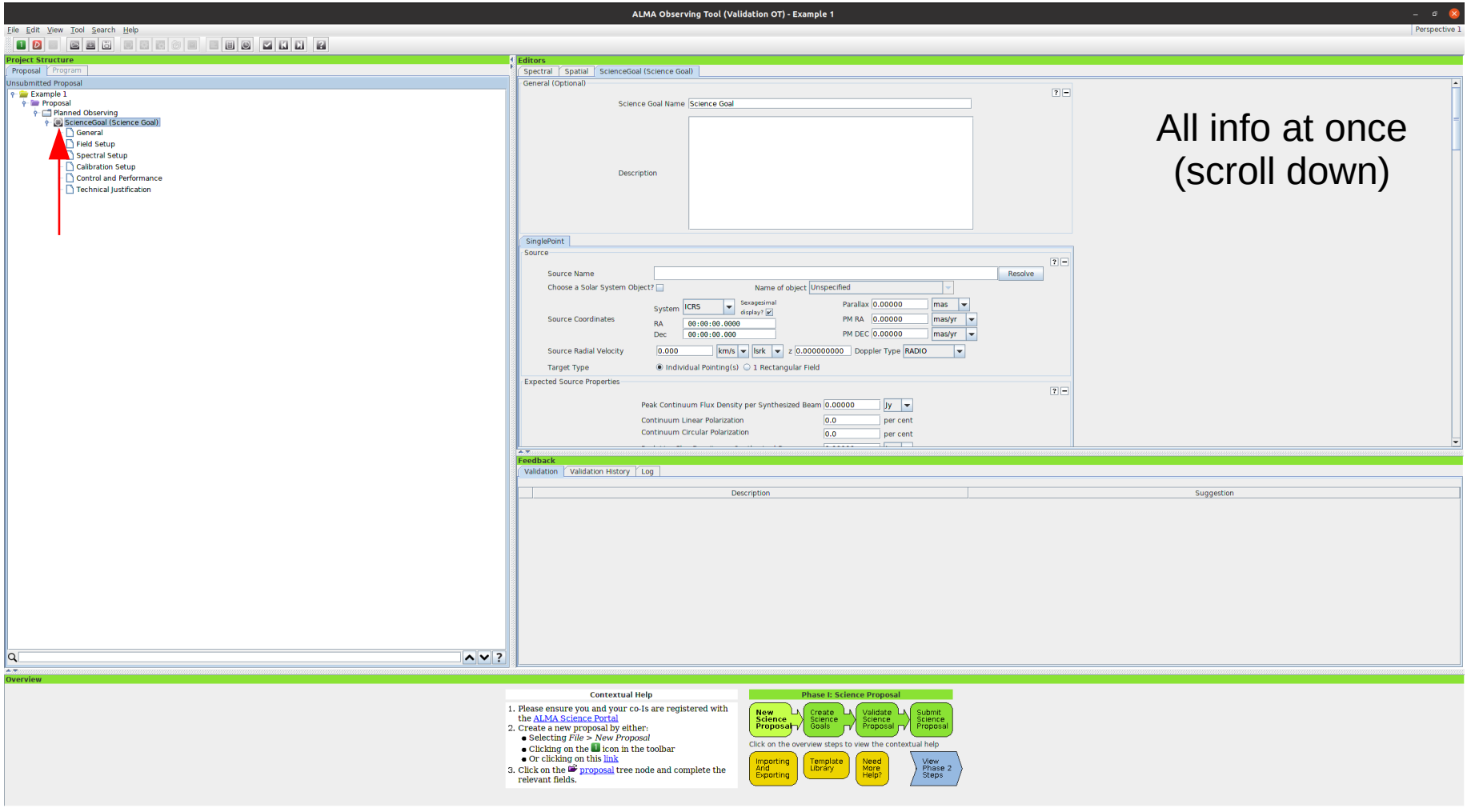
Example 1: Continuum observations of several targets



Example 1: Continuum observations of several targets

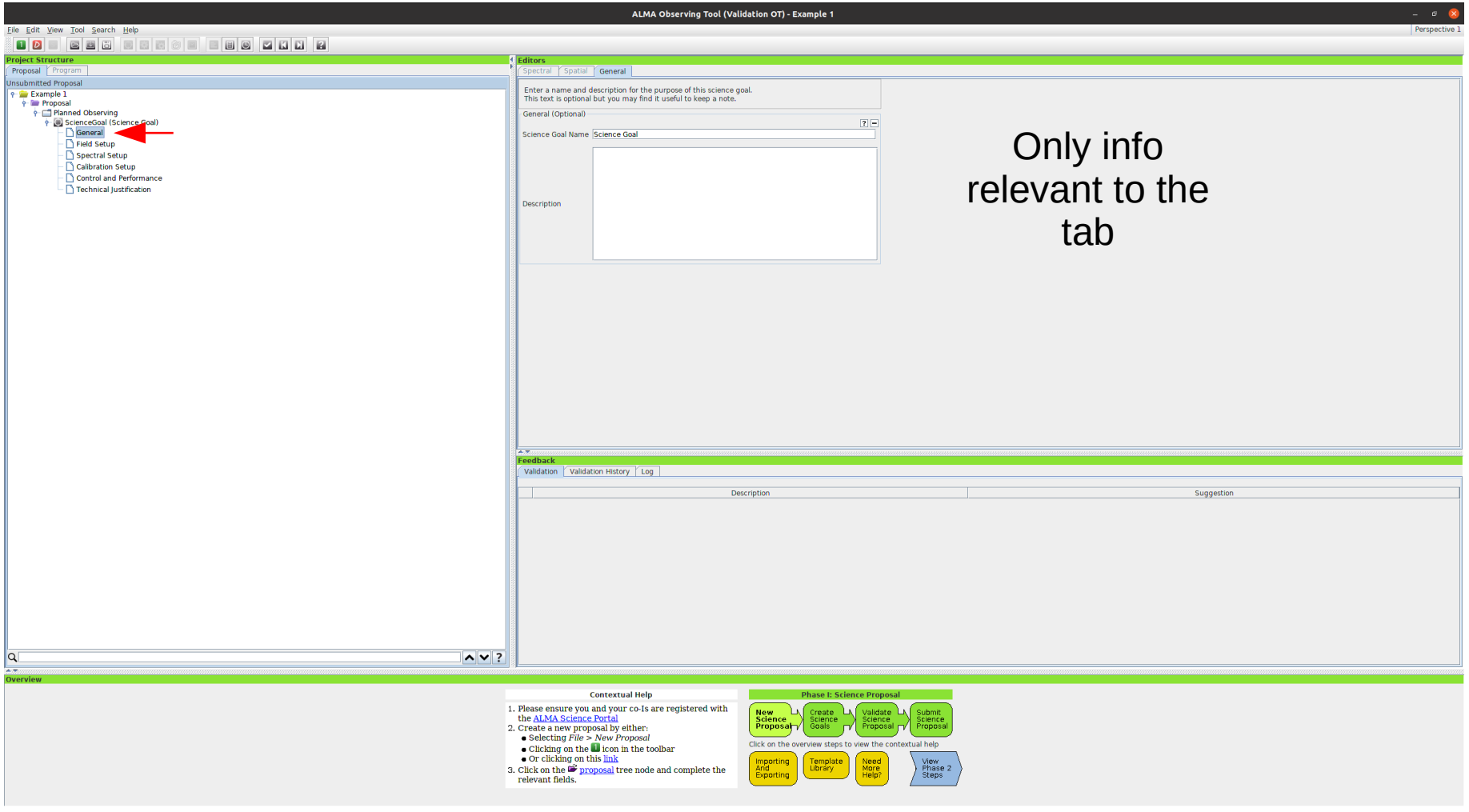


Example 1: Continuum observations of several targets

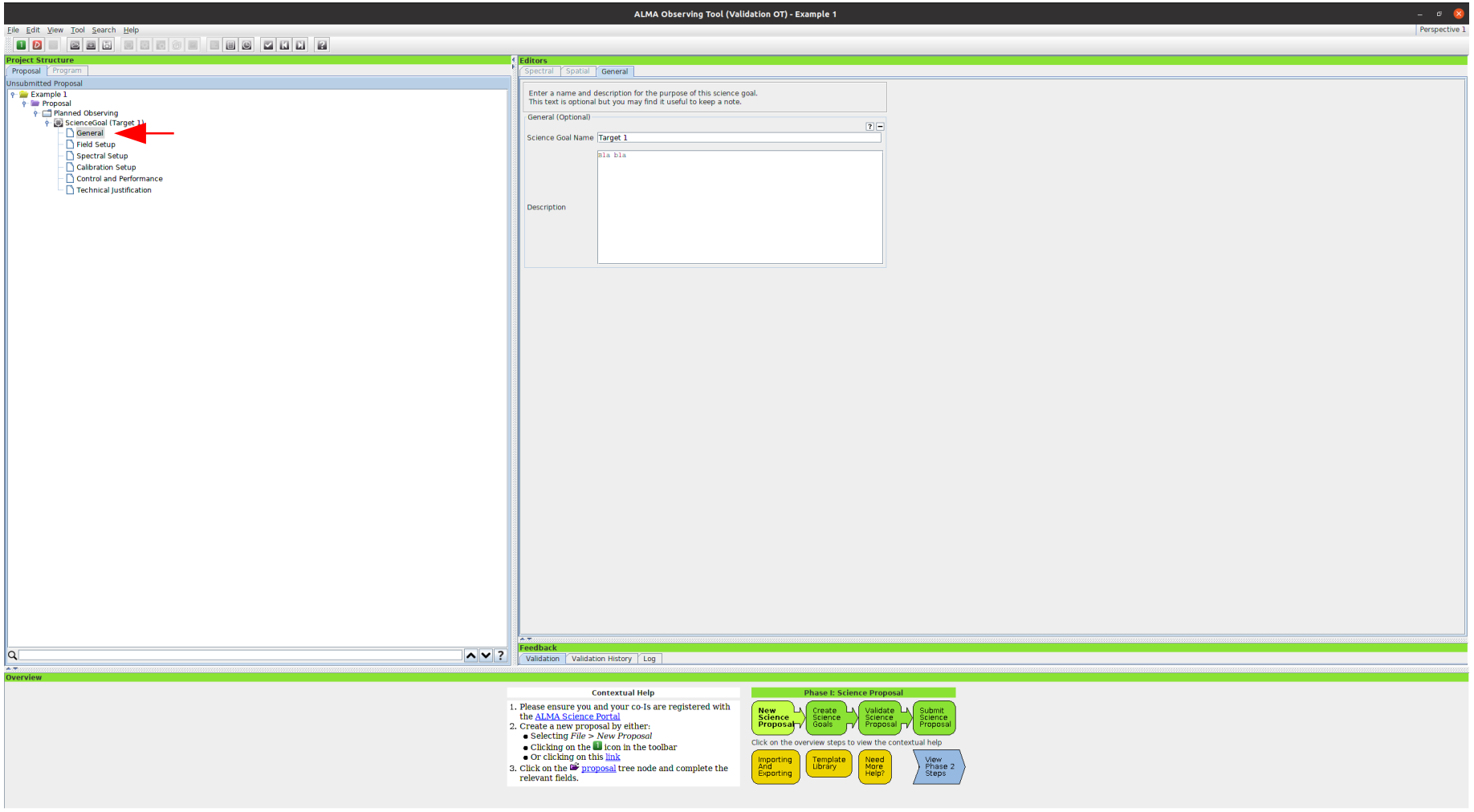


All info at once
(scroll down)

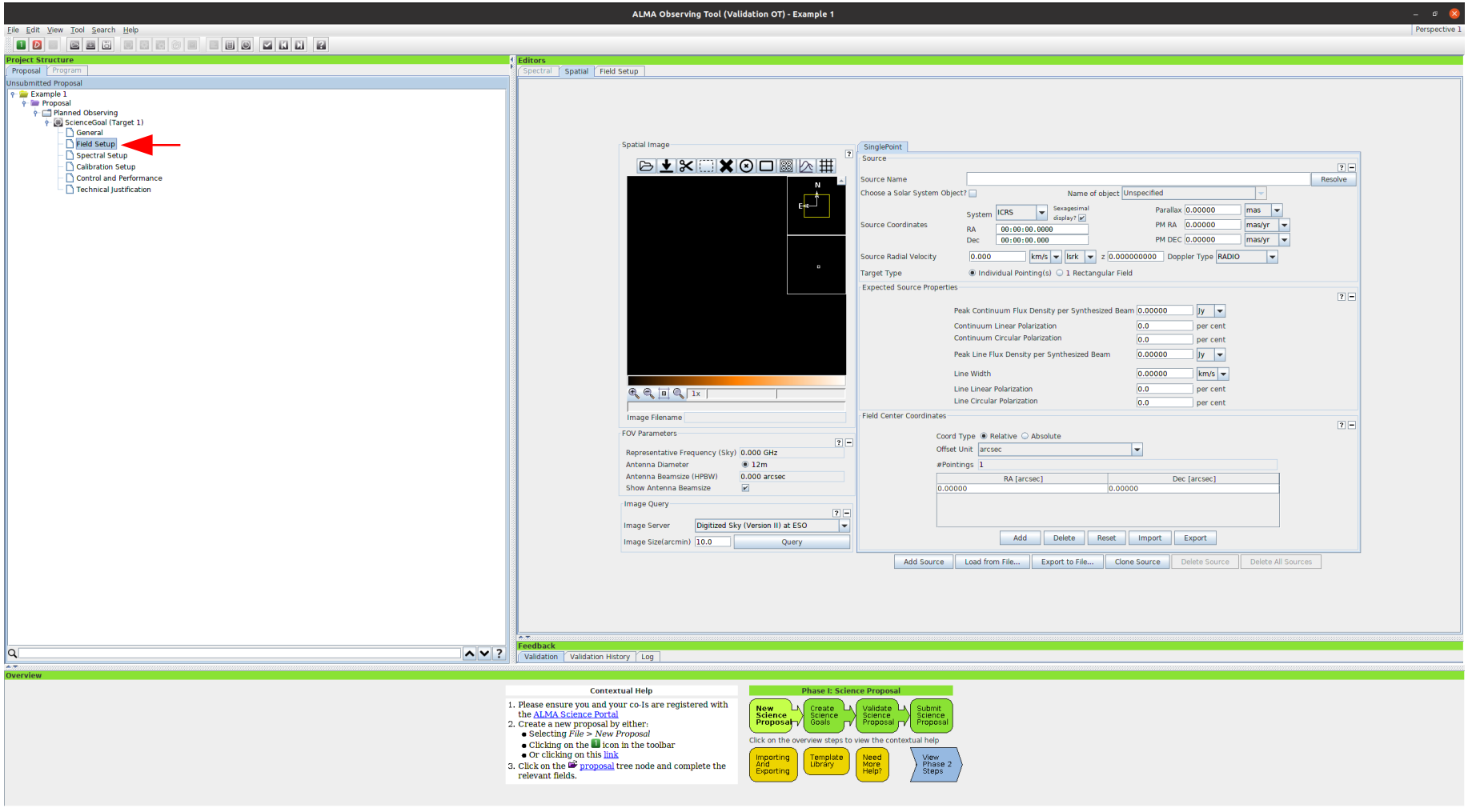
Example 1: Continuum observations of several targets



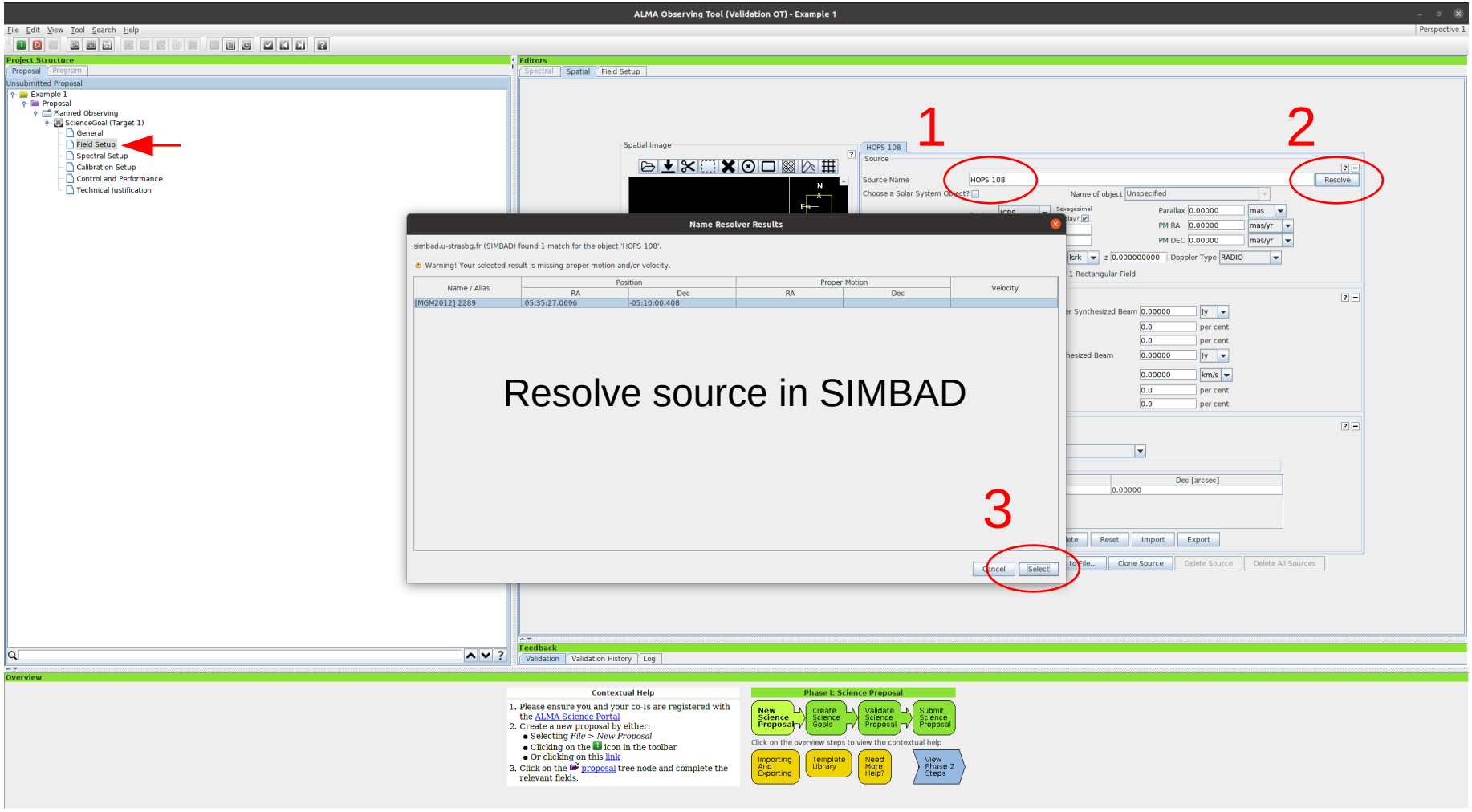
Example 1: Continuum observations of several targets



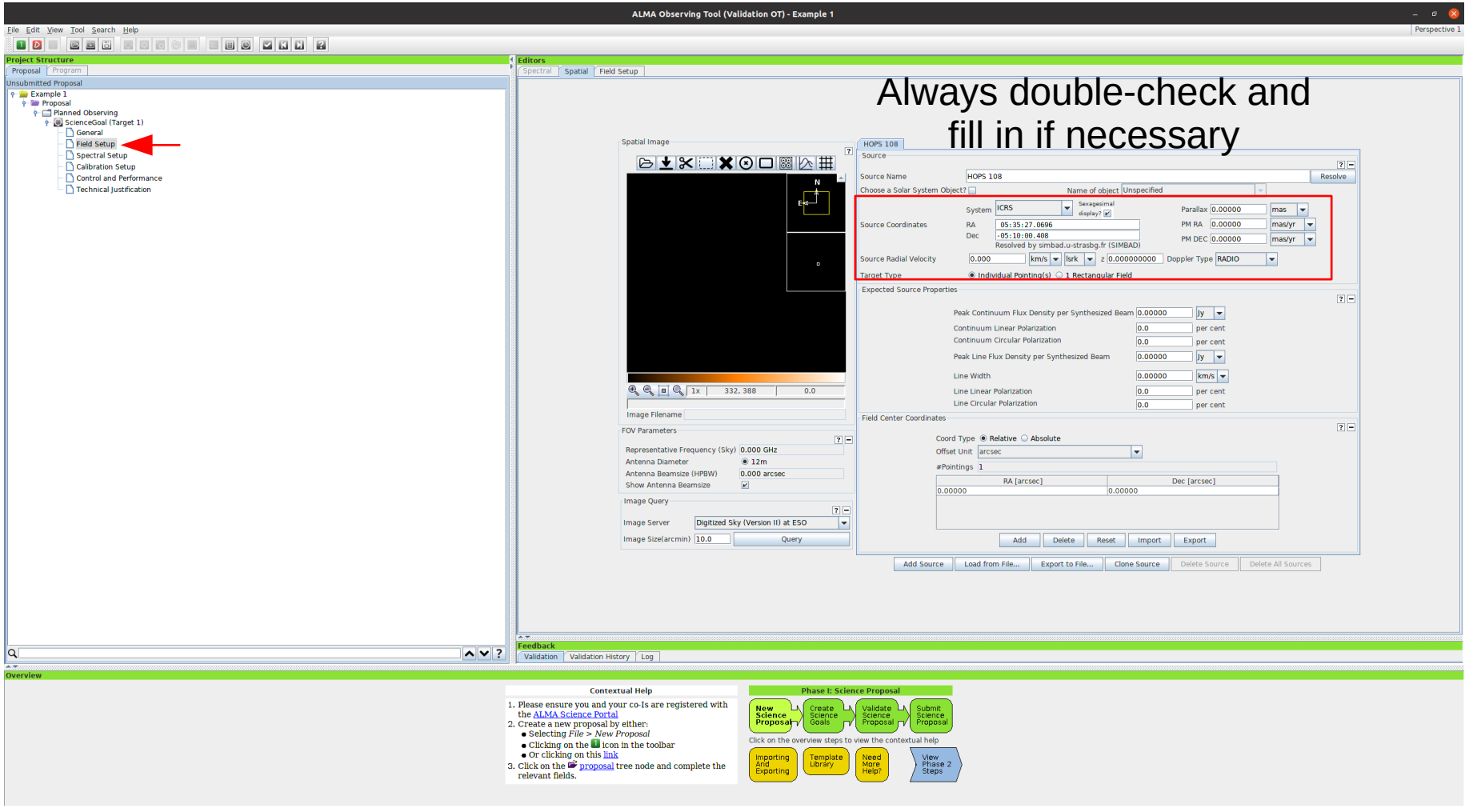
Example 1: Continuum observations of several targets



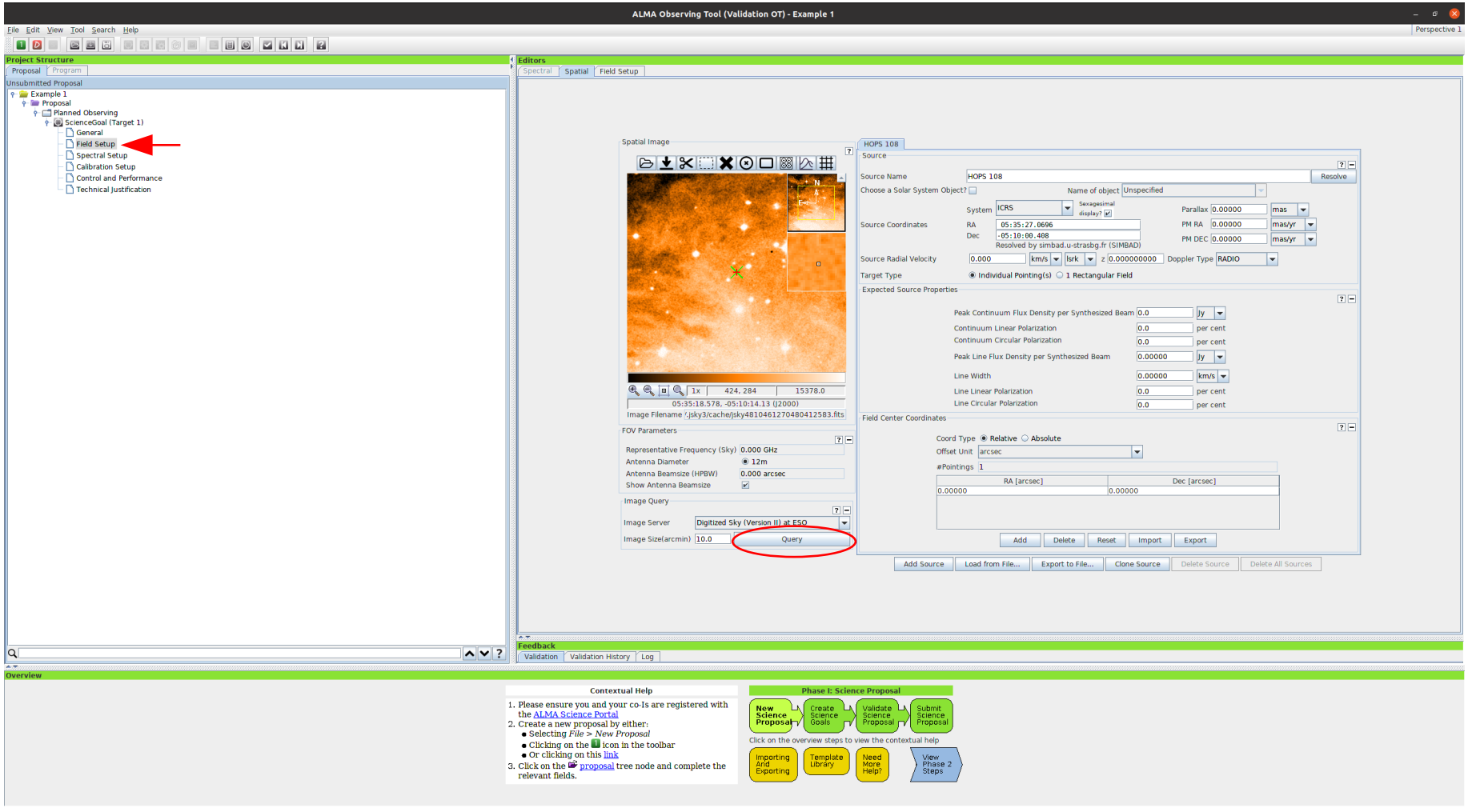
Example 1: Continuum observations of several targets



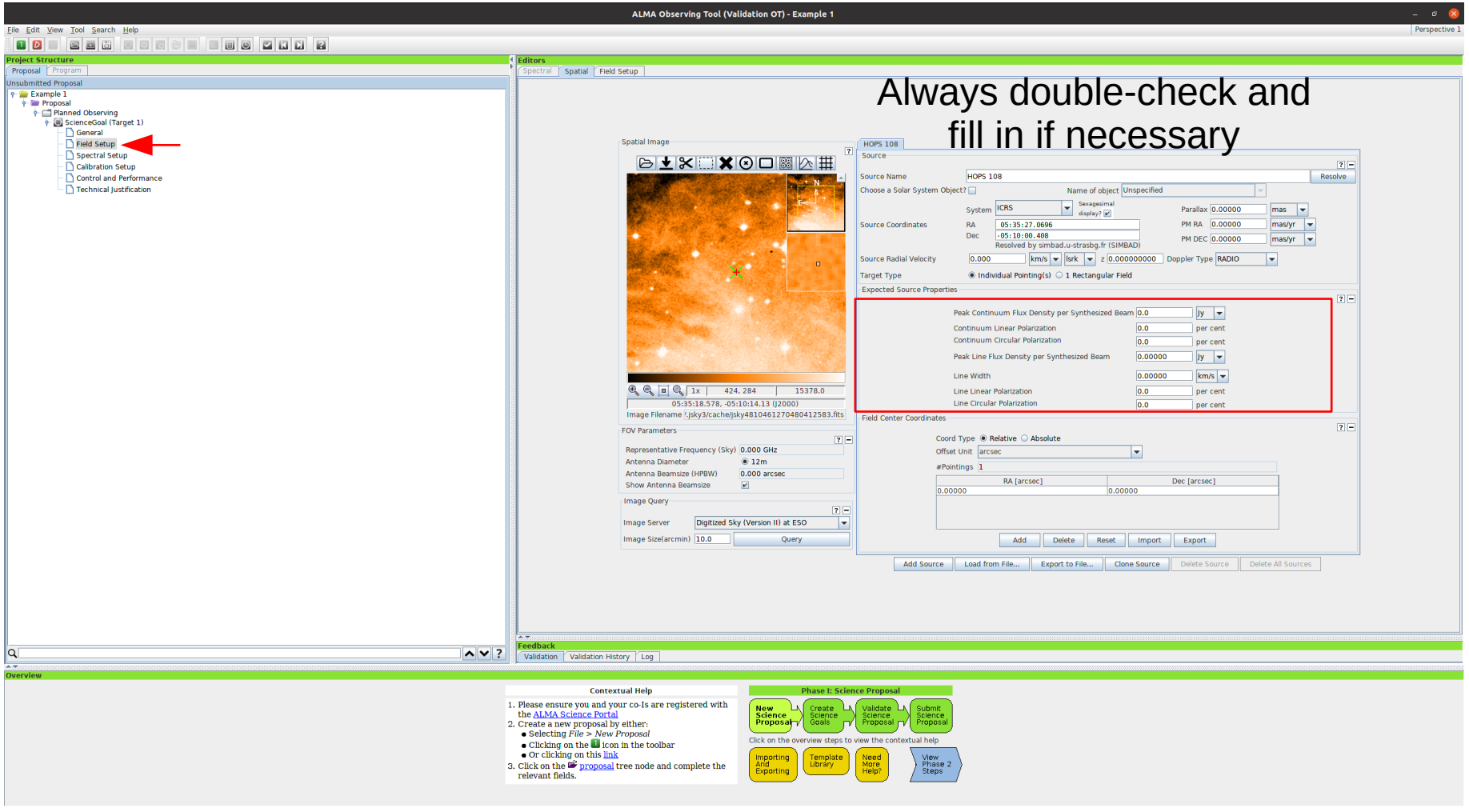
Example 1: Continuum observations of several targets



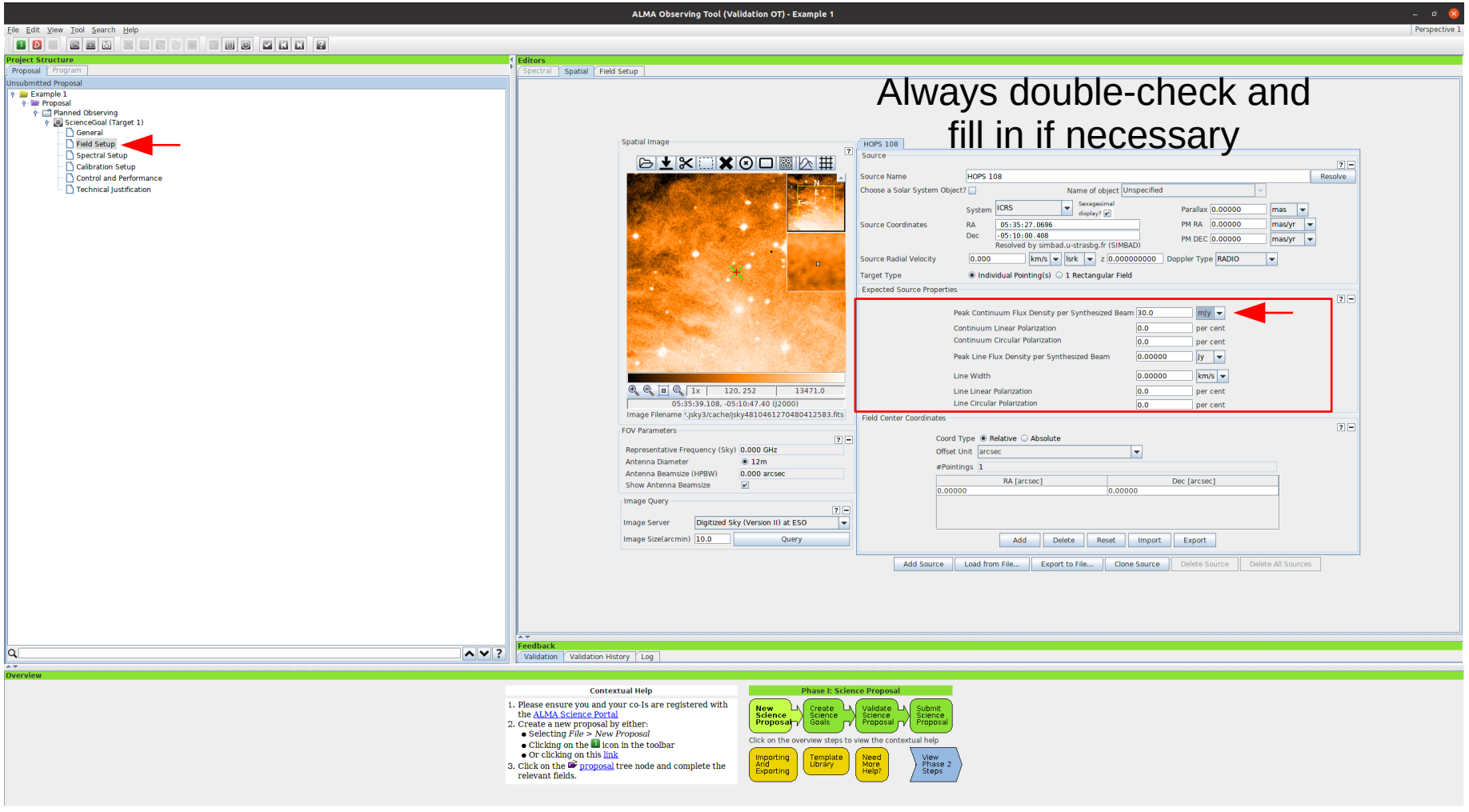
Example 1: Continuum observations of several targets



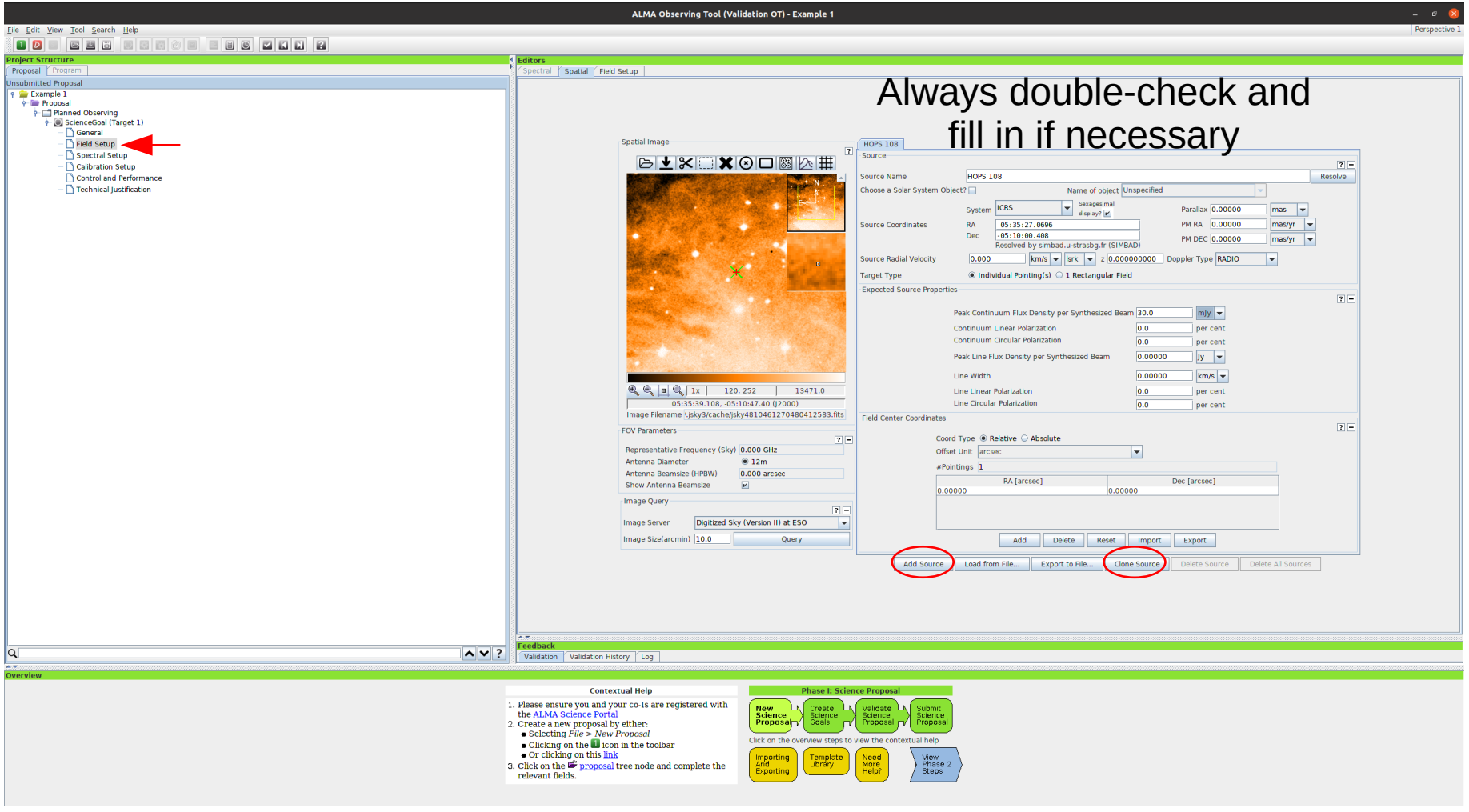
Example 1: Continuum observations of several targets



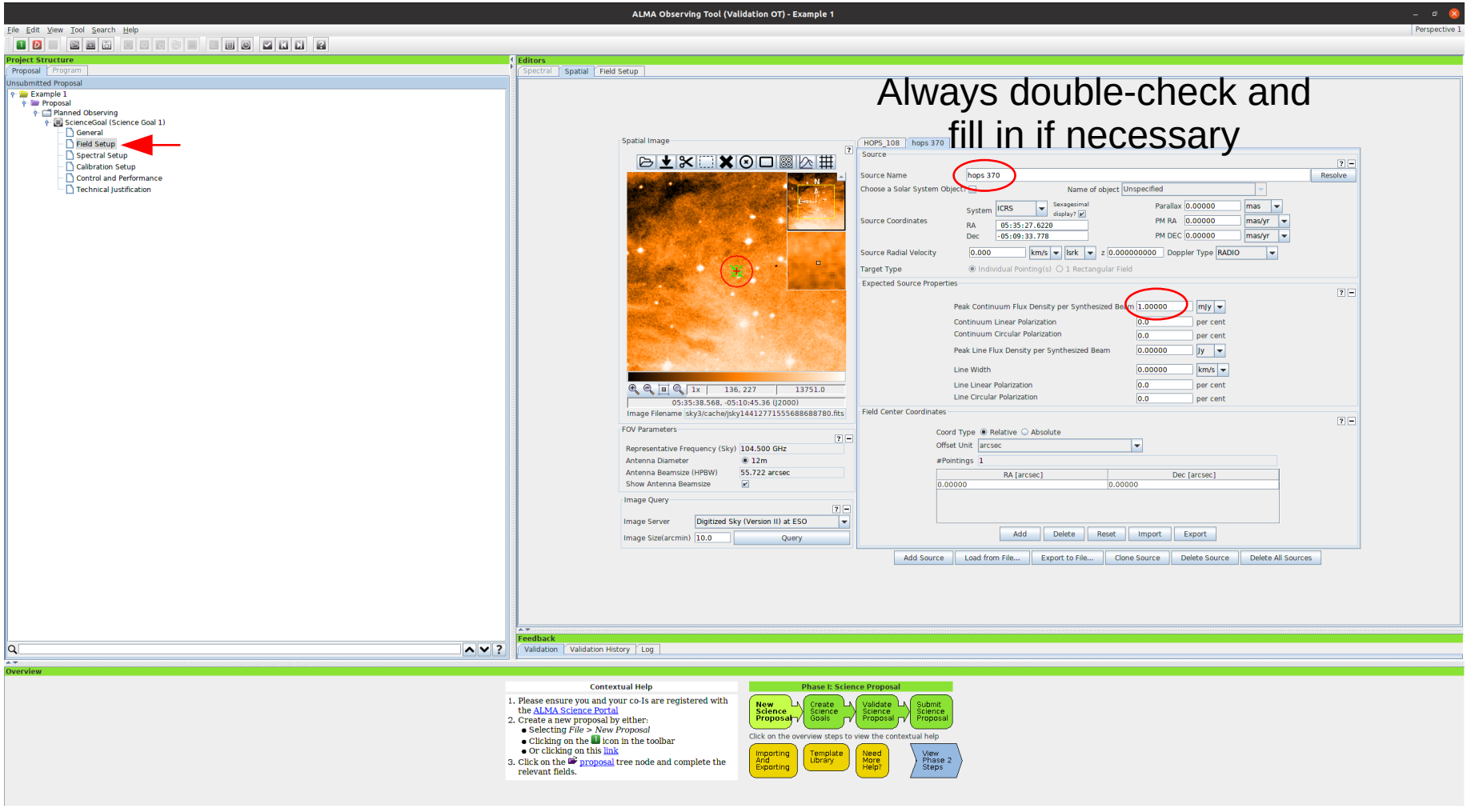
Example 1: Continuum observations of several targets



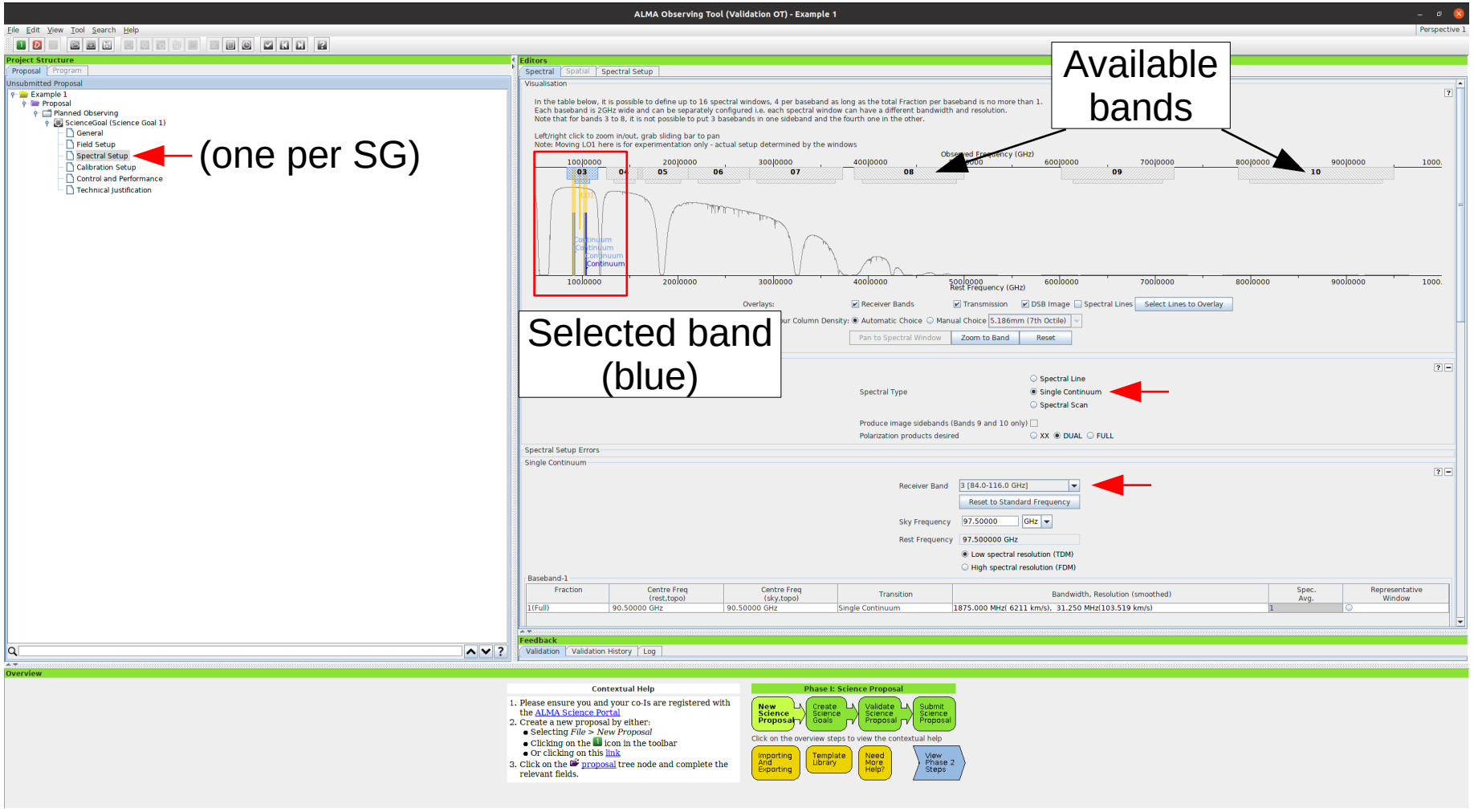
Example 1: Continuum observations of several targets



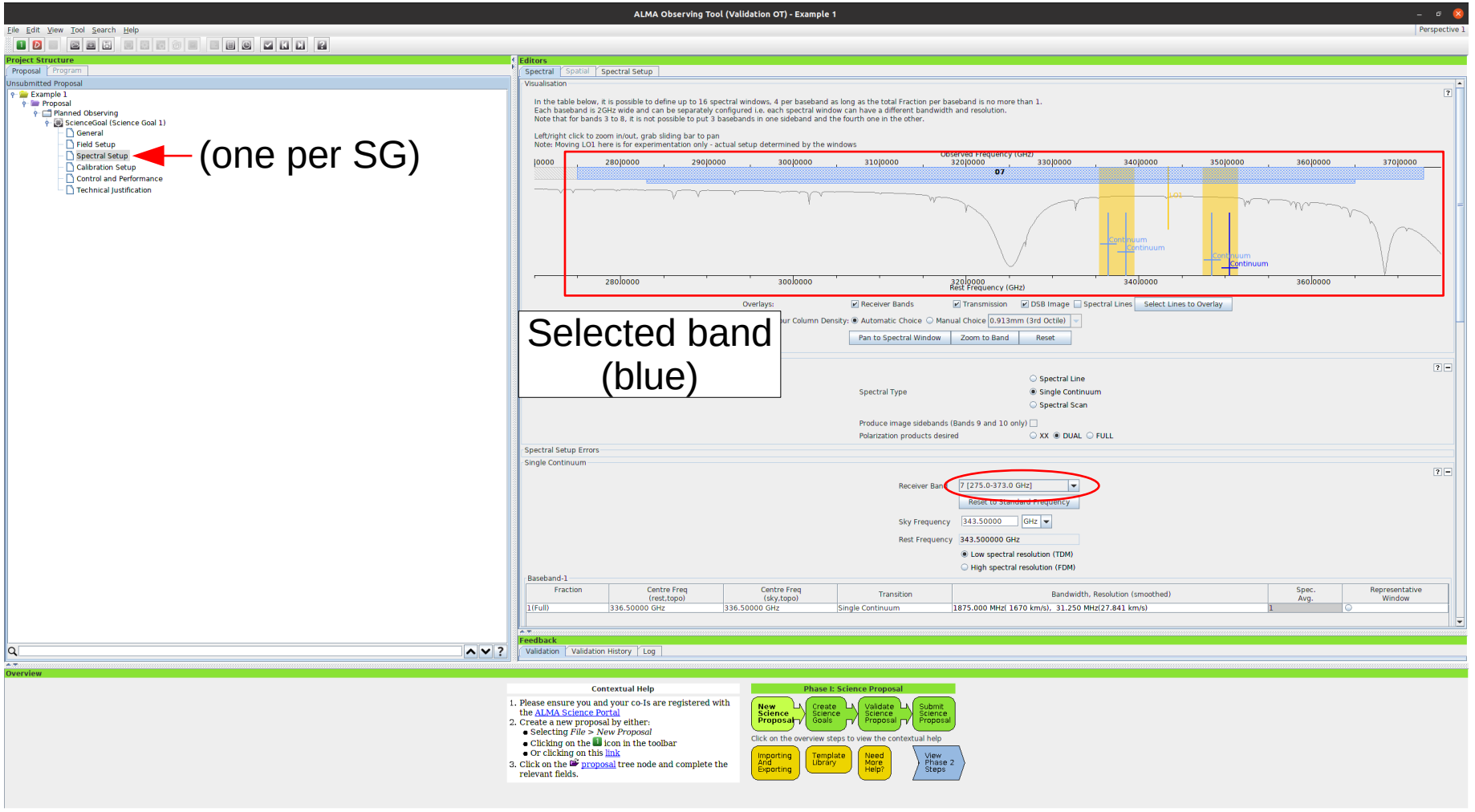
Example 1: Continuum observations of several targets



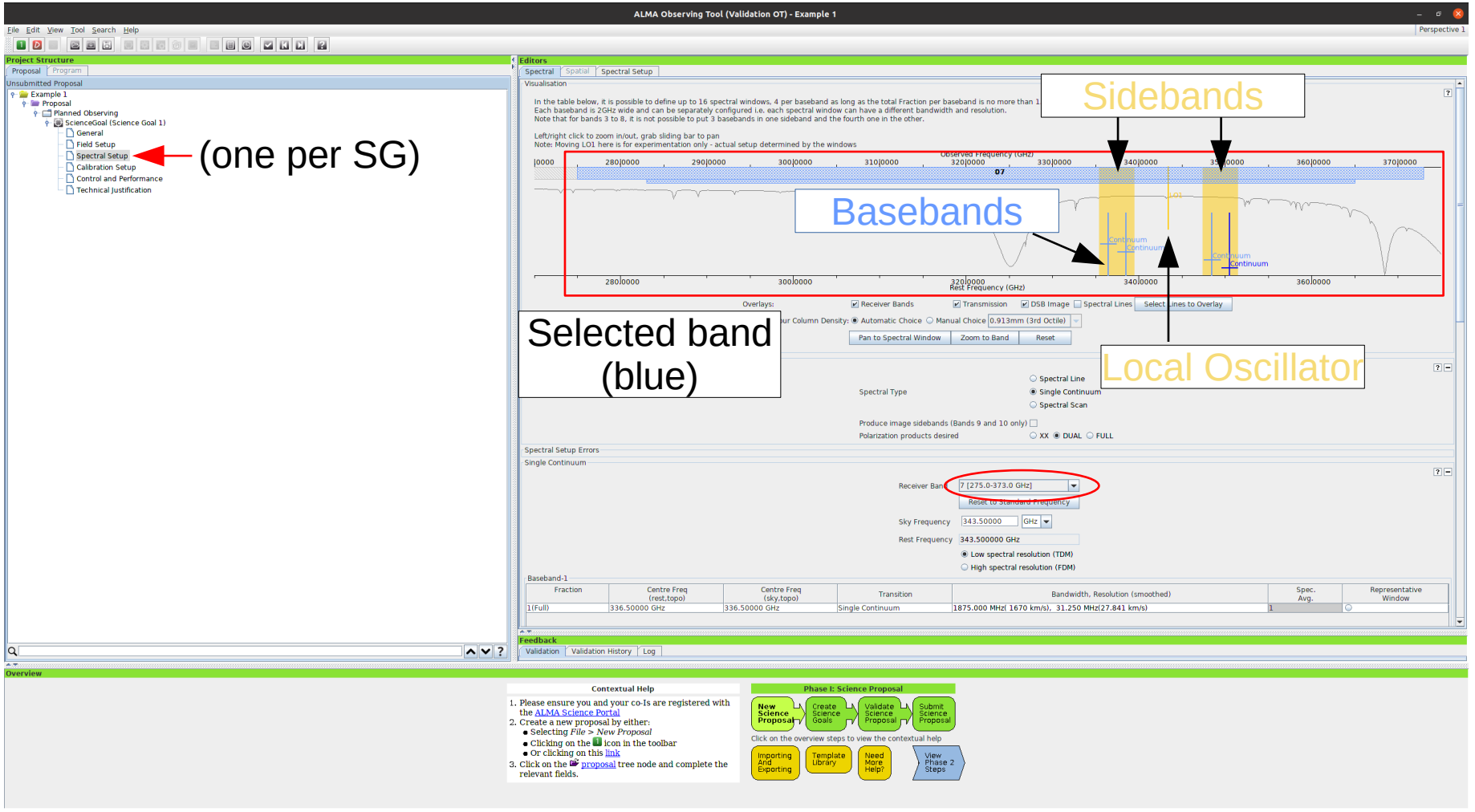
Example 1: Continuum observations of several targets



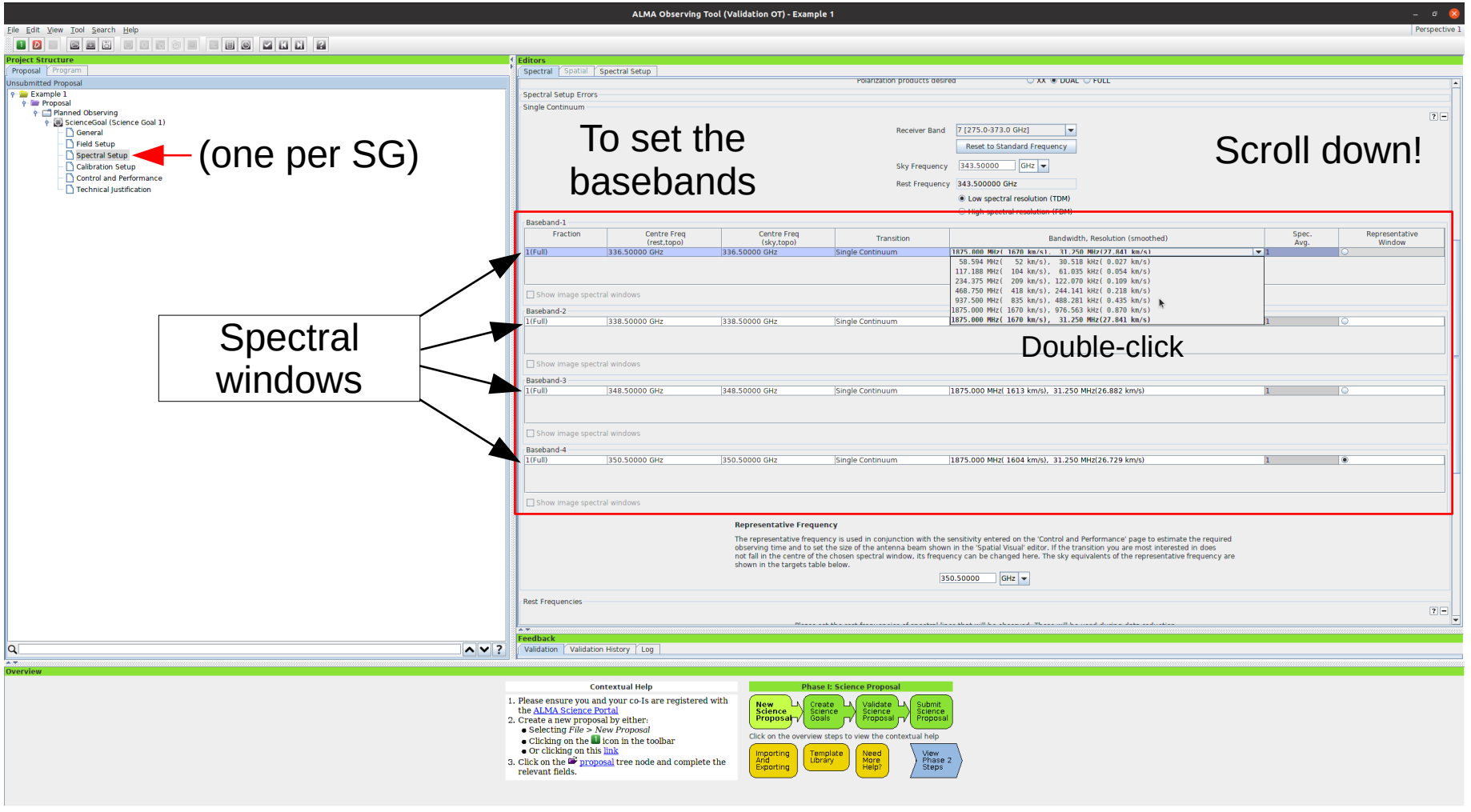
Example 1: Continuum observations of several targets



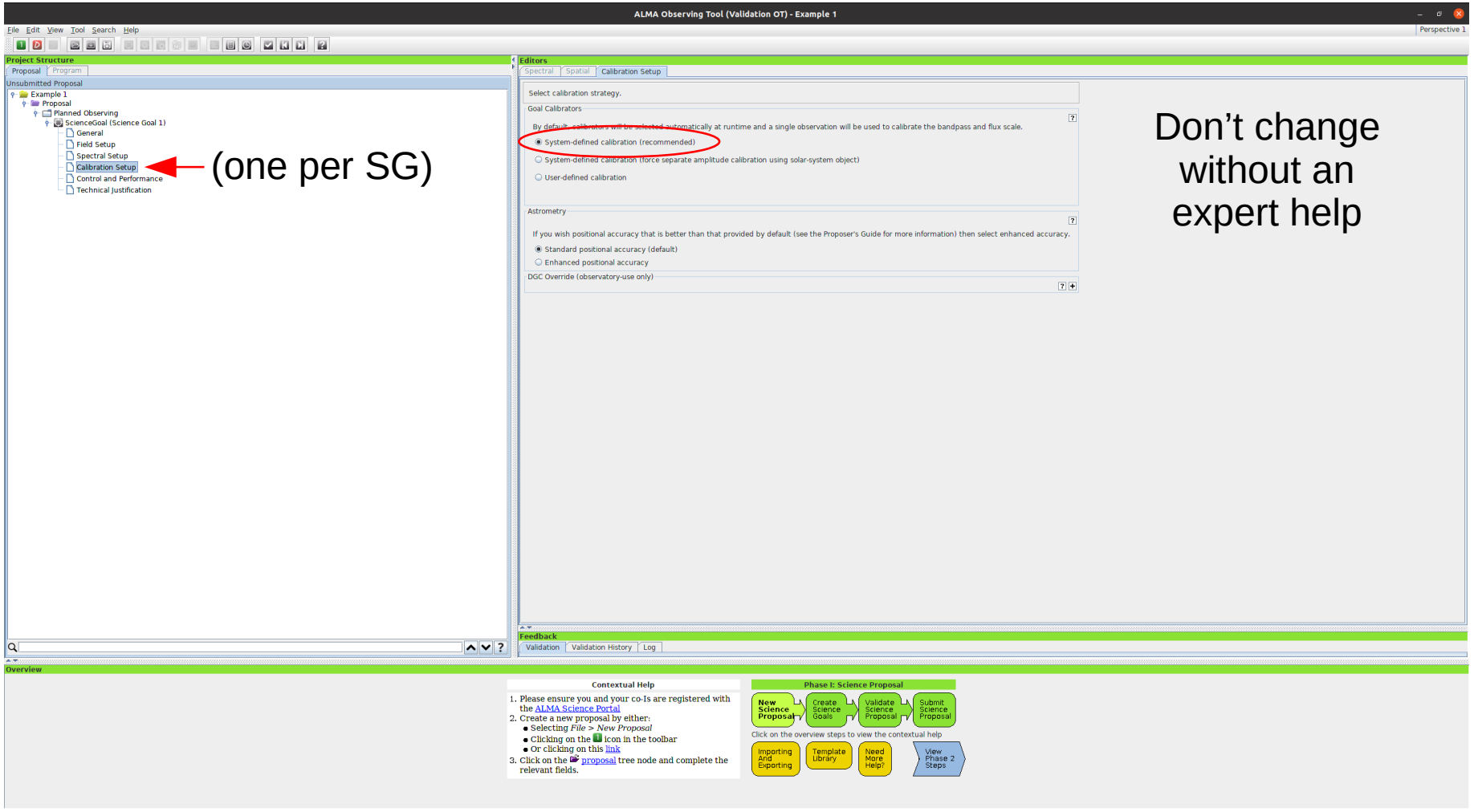
Example 1: Continuum observations of several targets



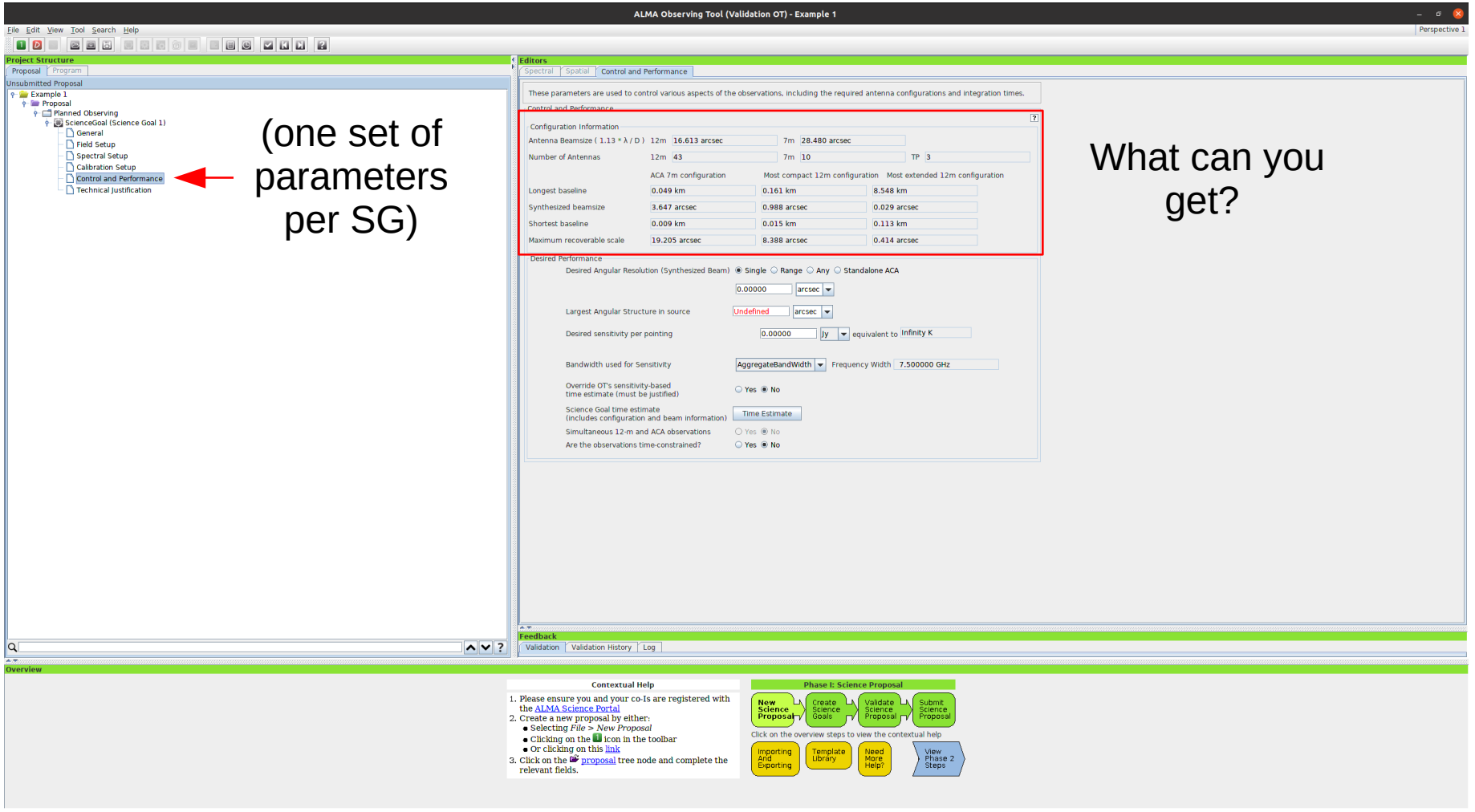
Example 1: Continuum observations of several targets



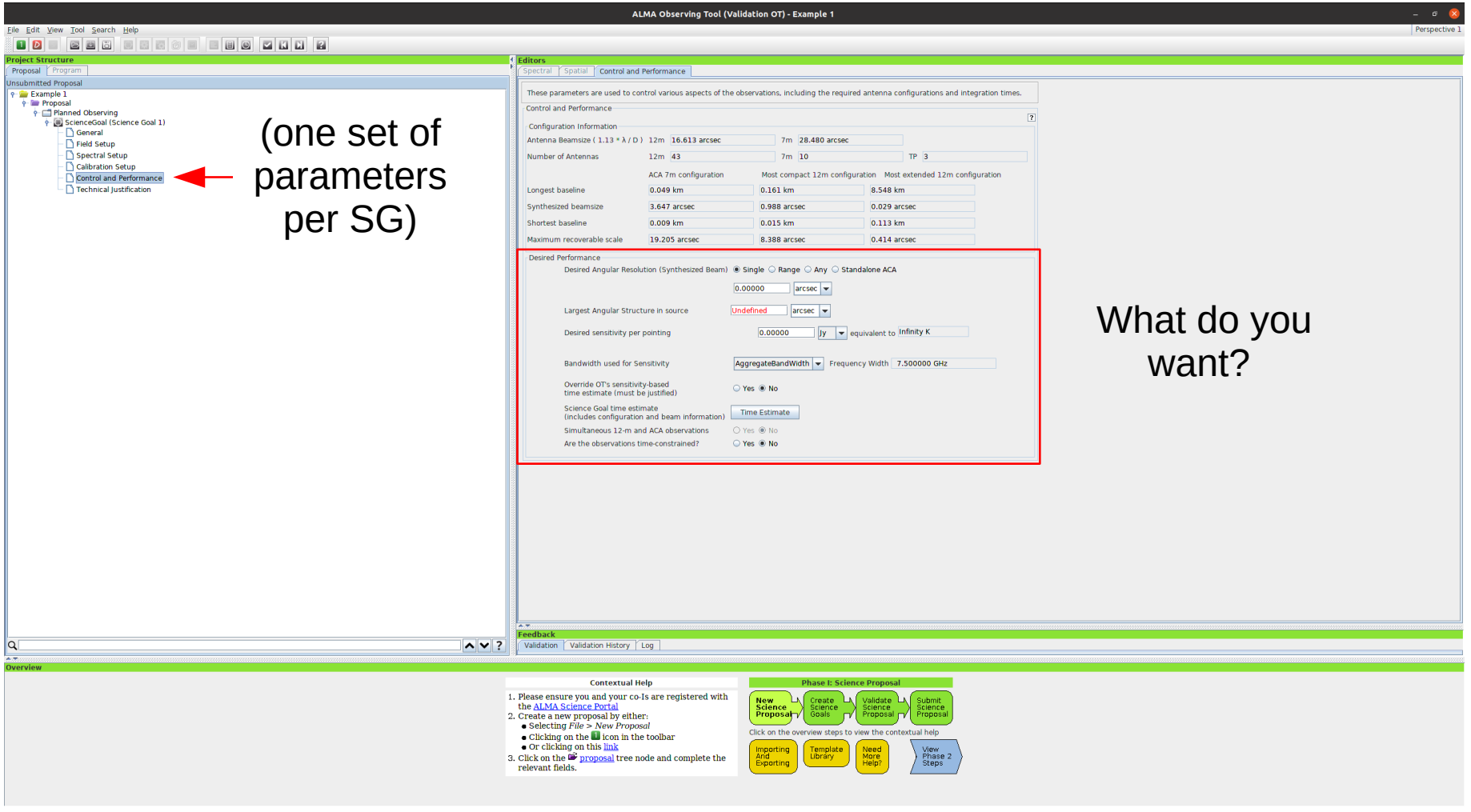
Example 1: Continuum observations of several targets



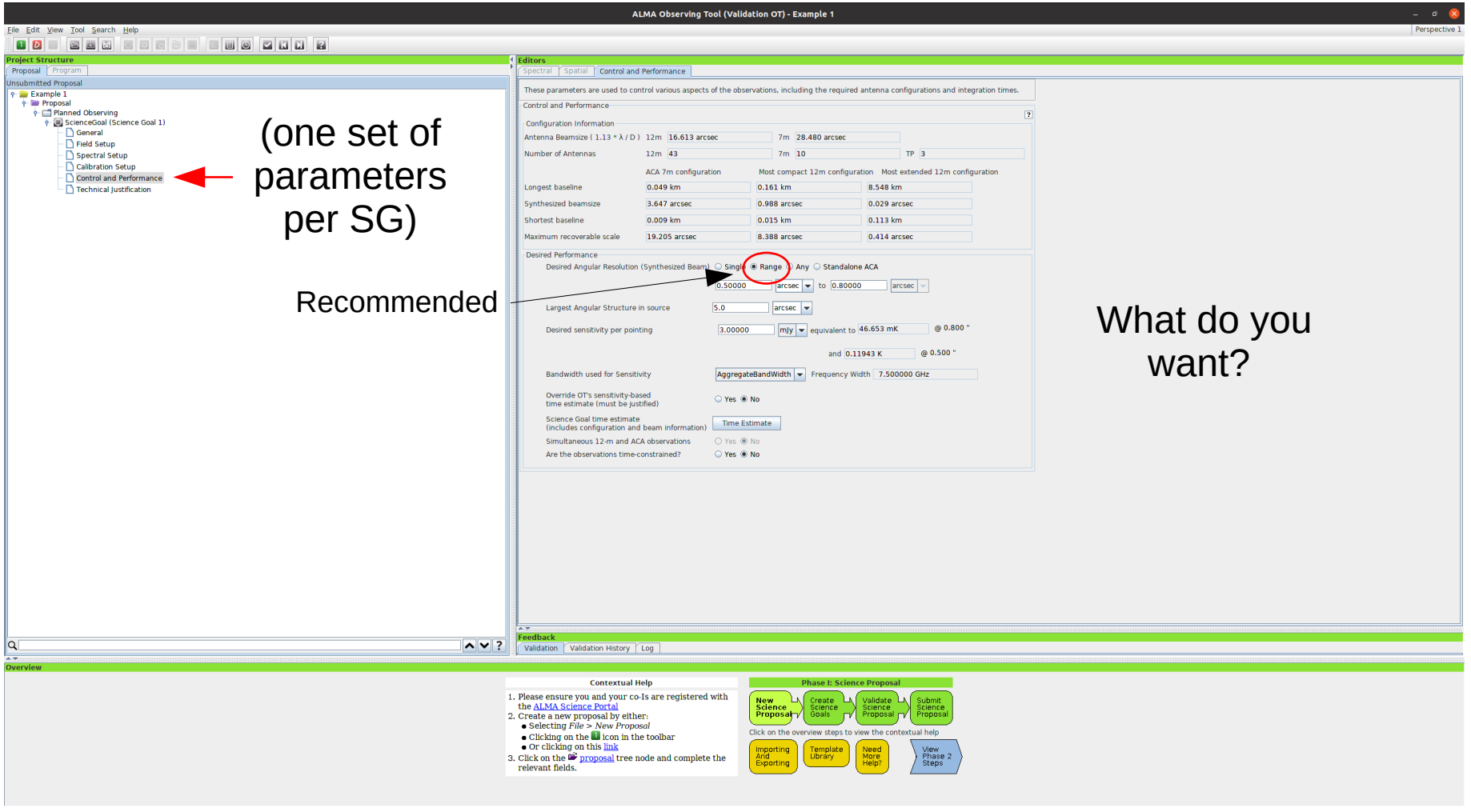
Example 1: Continuum observations of several targets



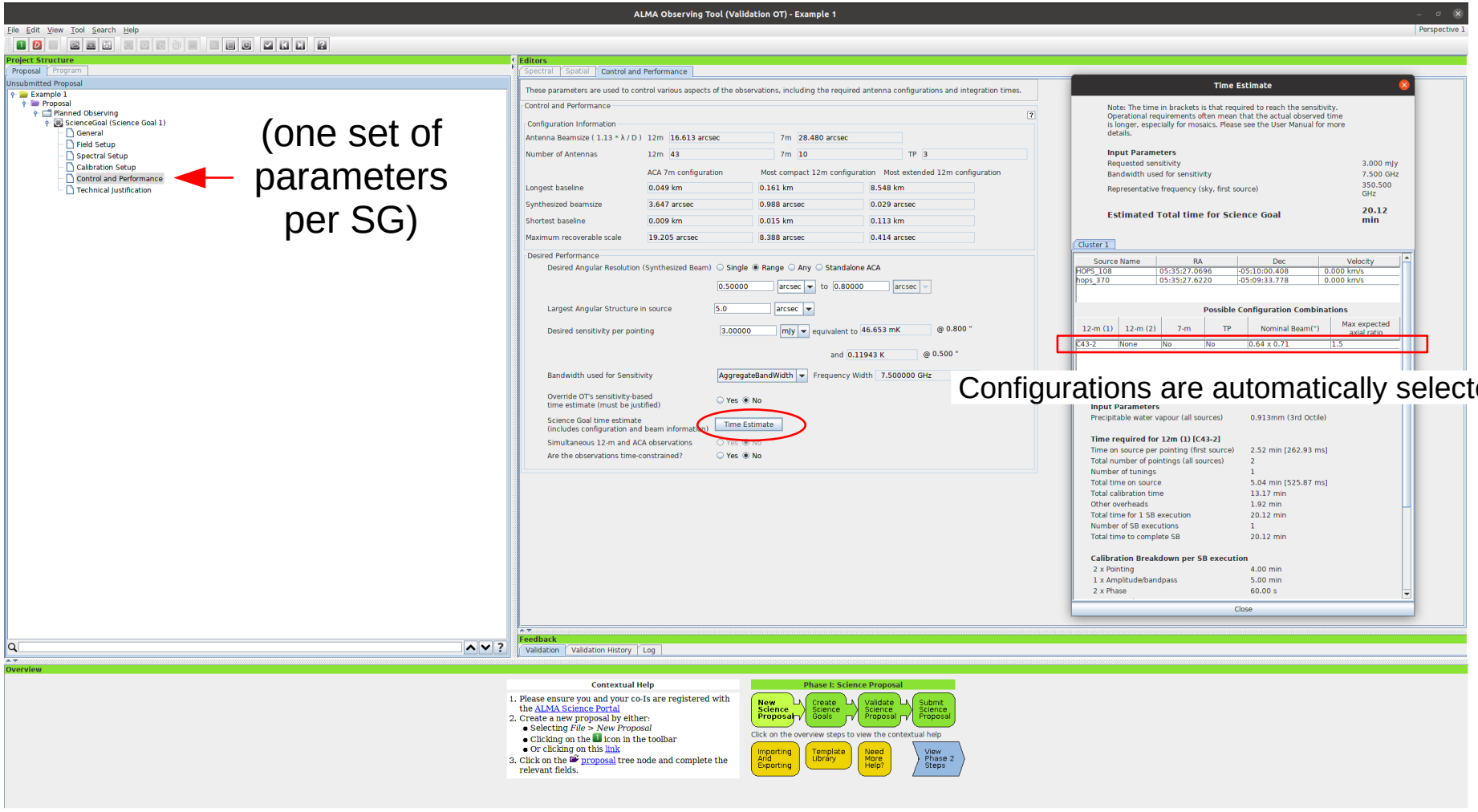
Example 1: Continuum observations of several targets



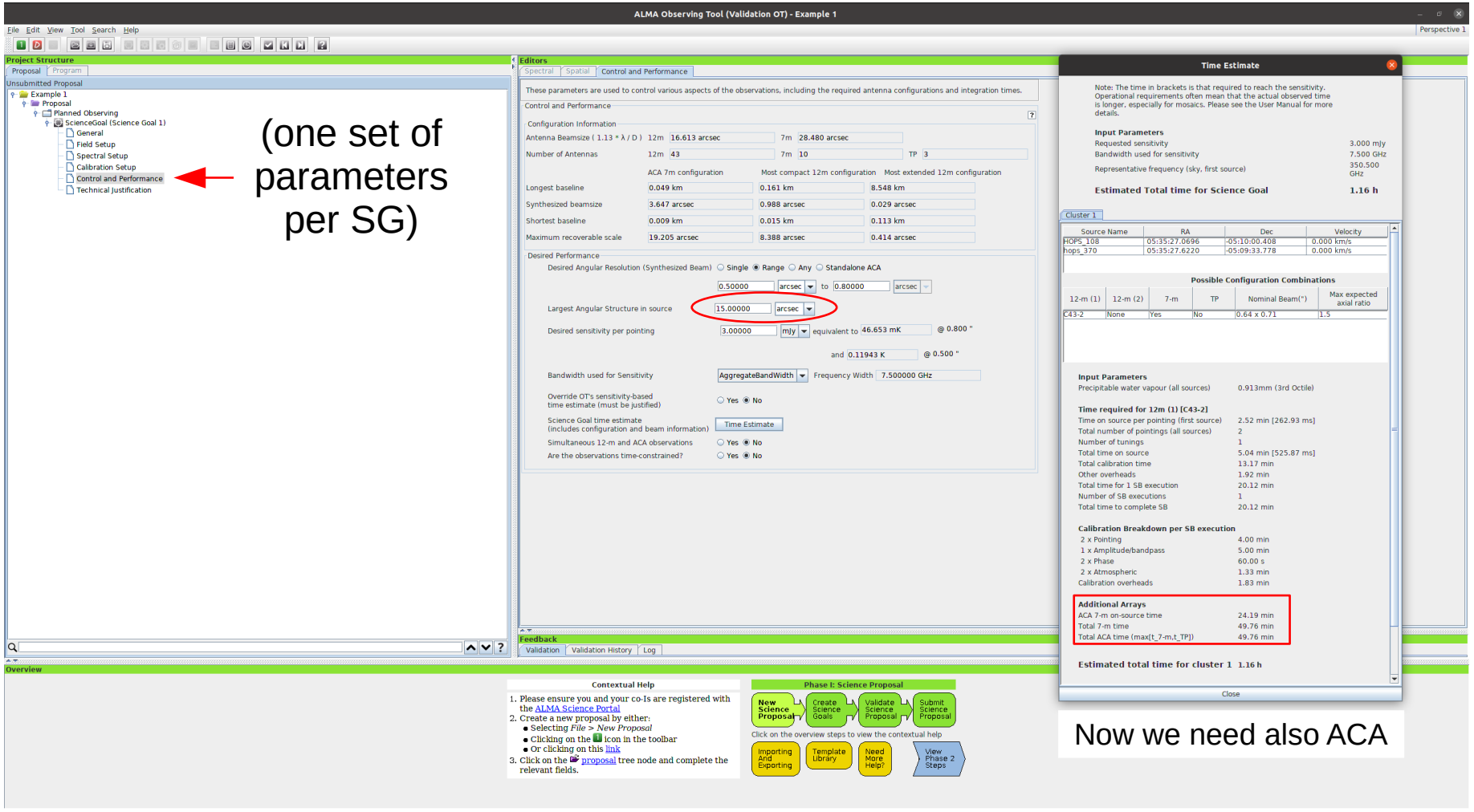
Example 1: Continuum observations of several targets



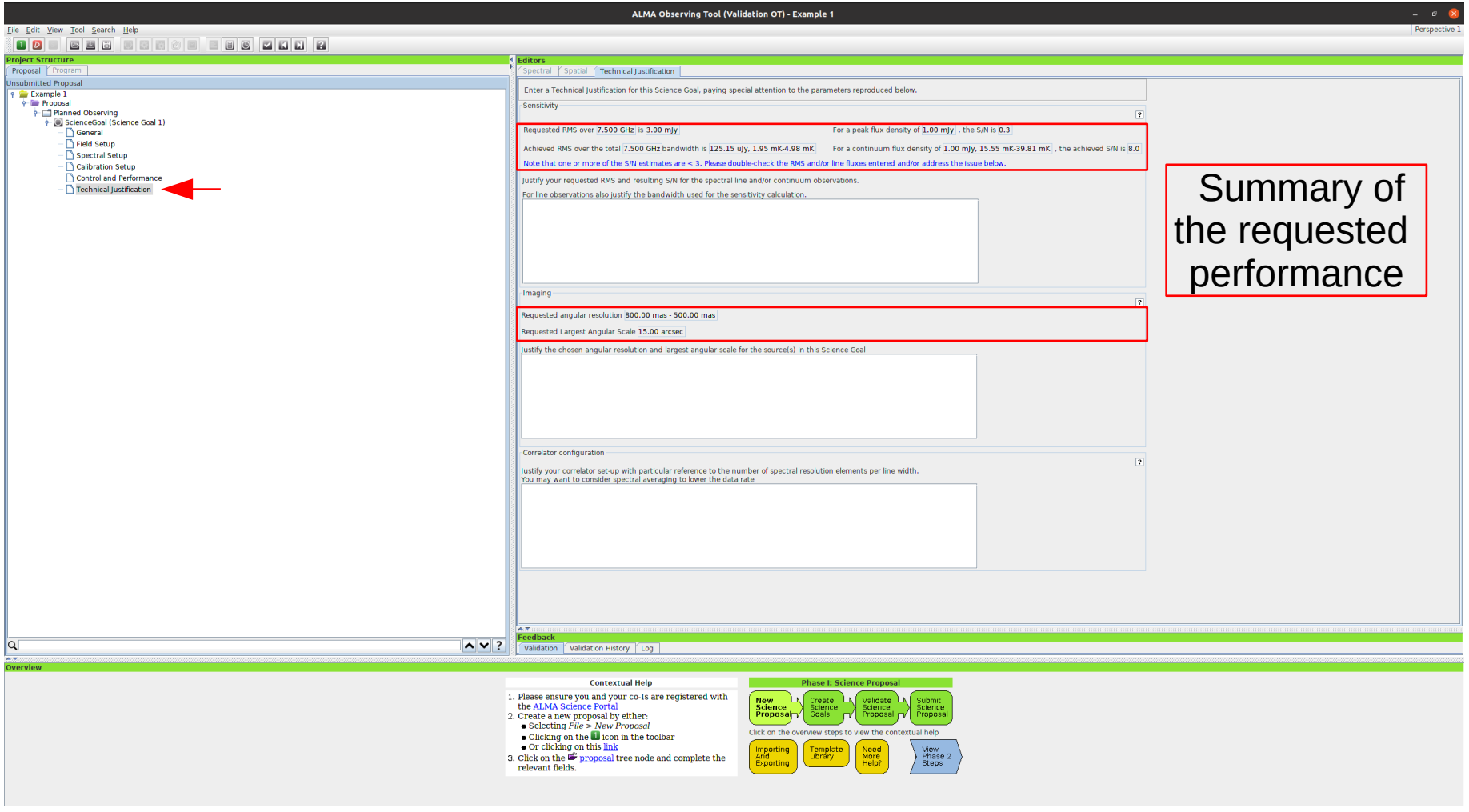
Example 1: Continuum observations of several targets



Example 1: Continuum observations of several targets

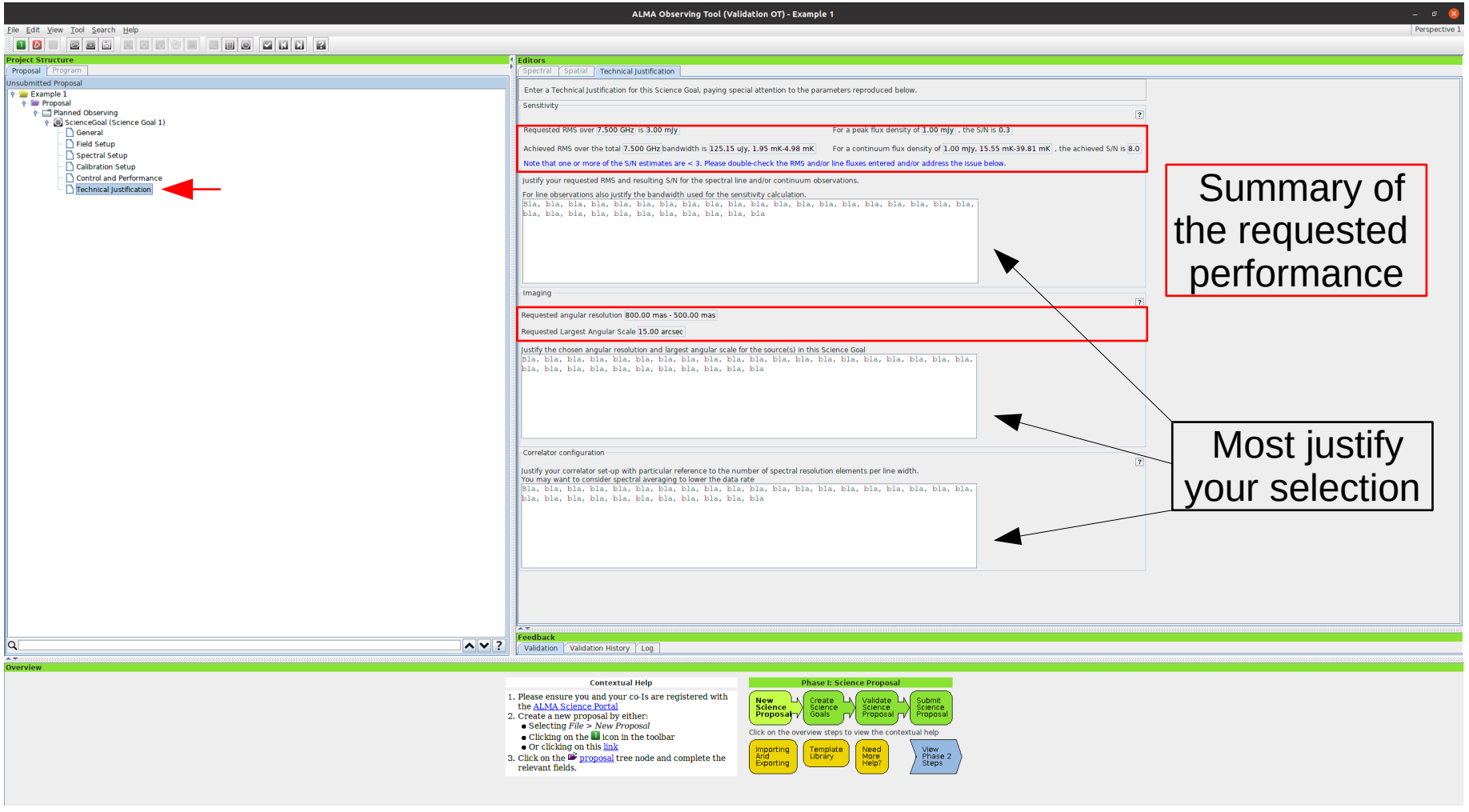


Example 1: Continuum observations of several targets

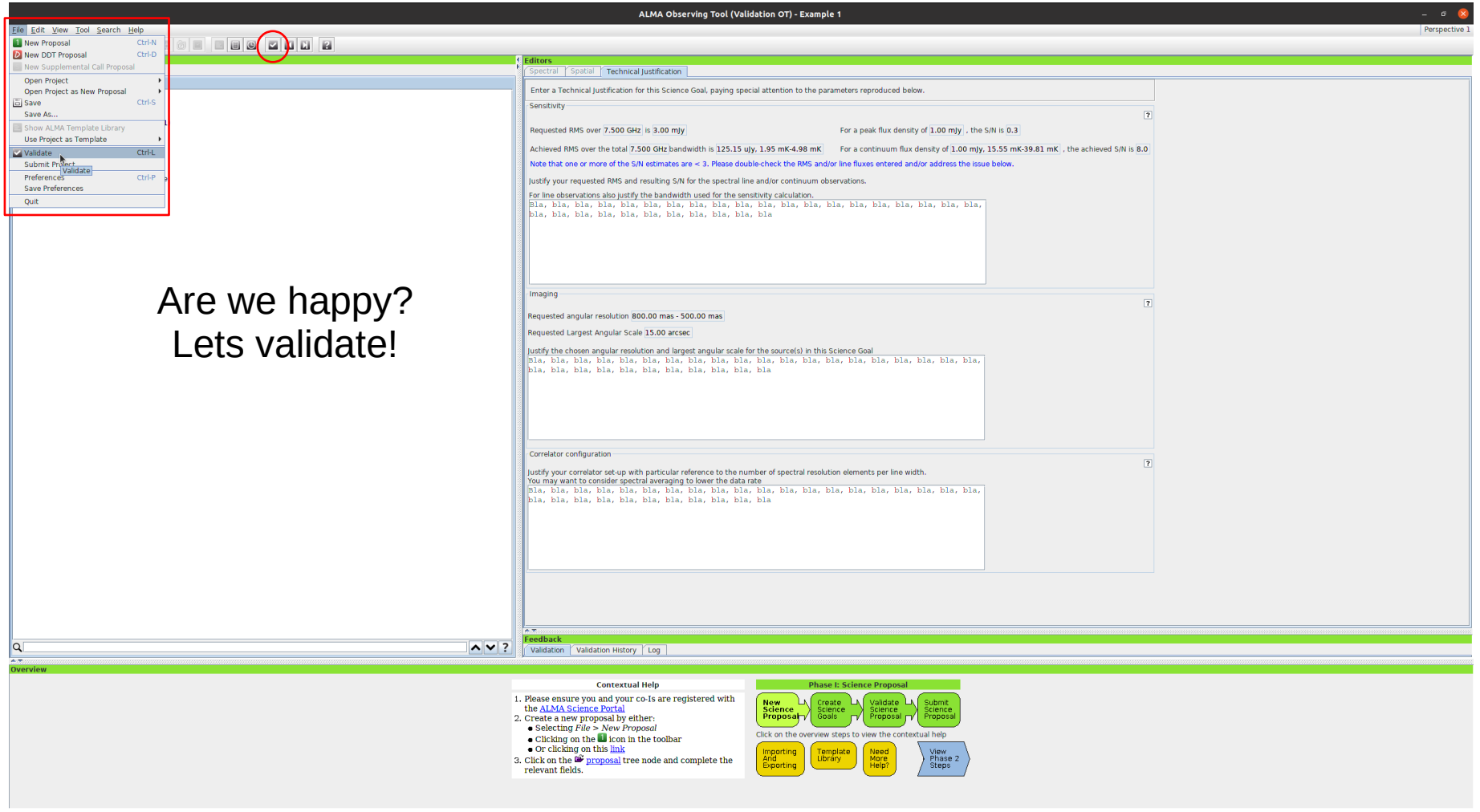


Summary of the requested performance

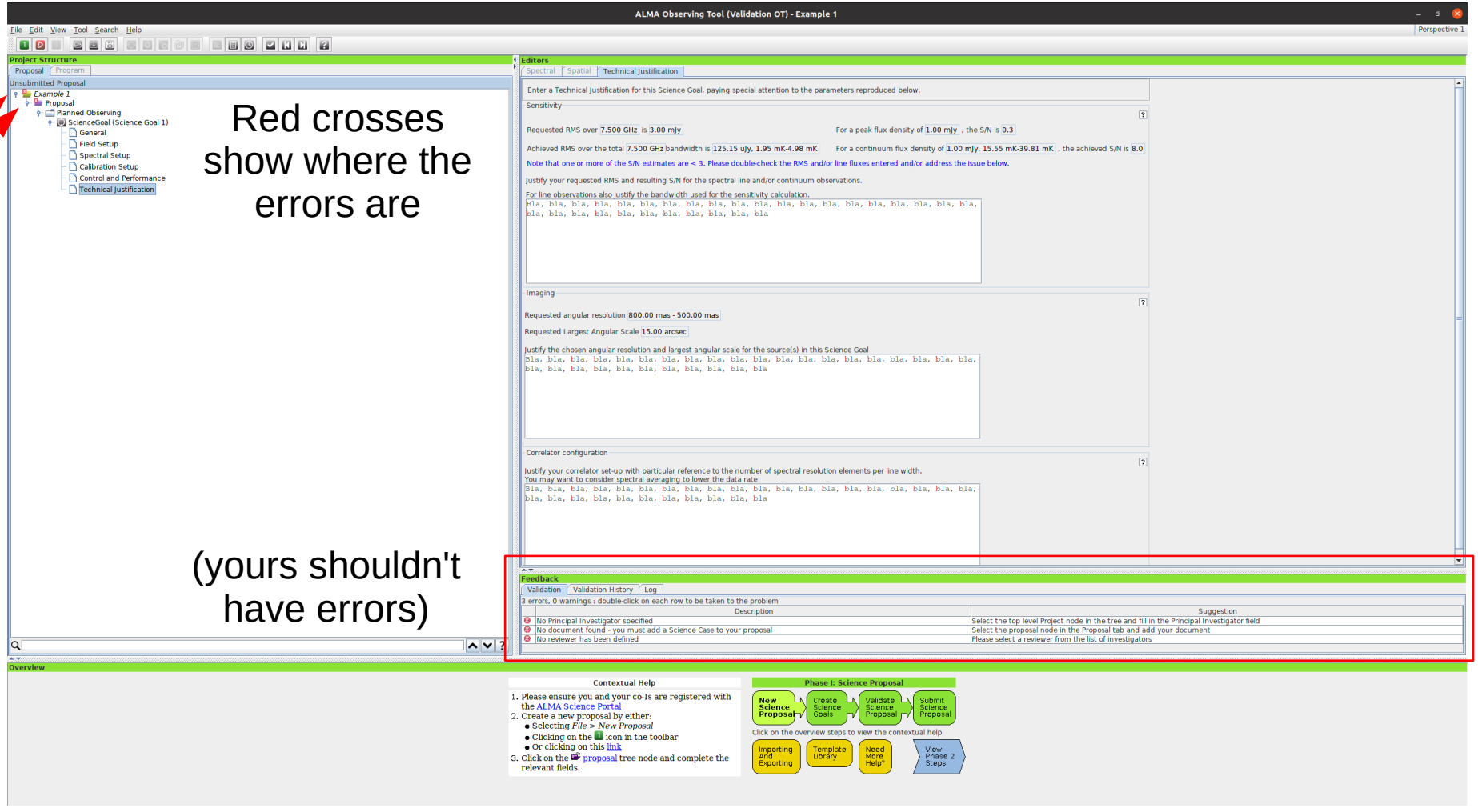
Example 1: Continuum observations of several targets



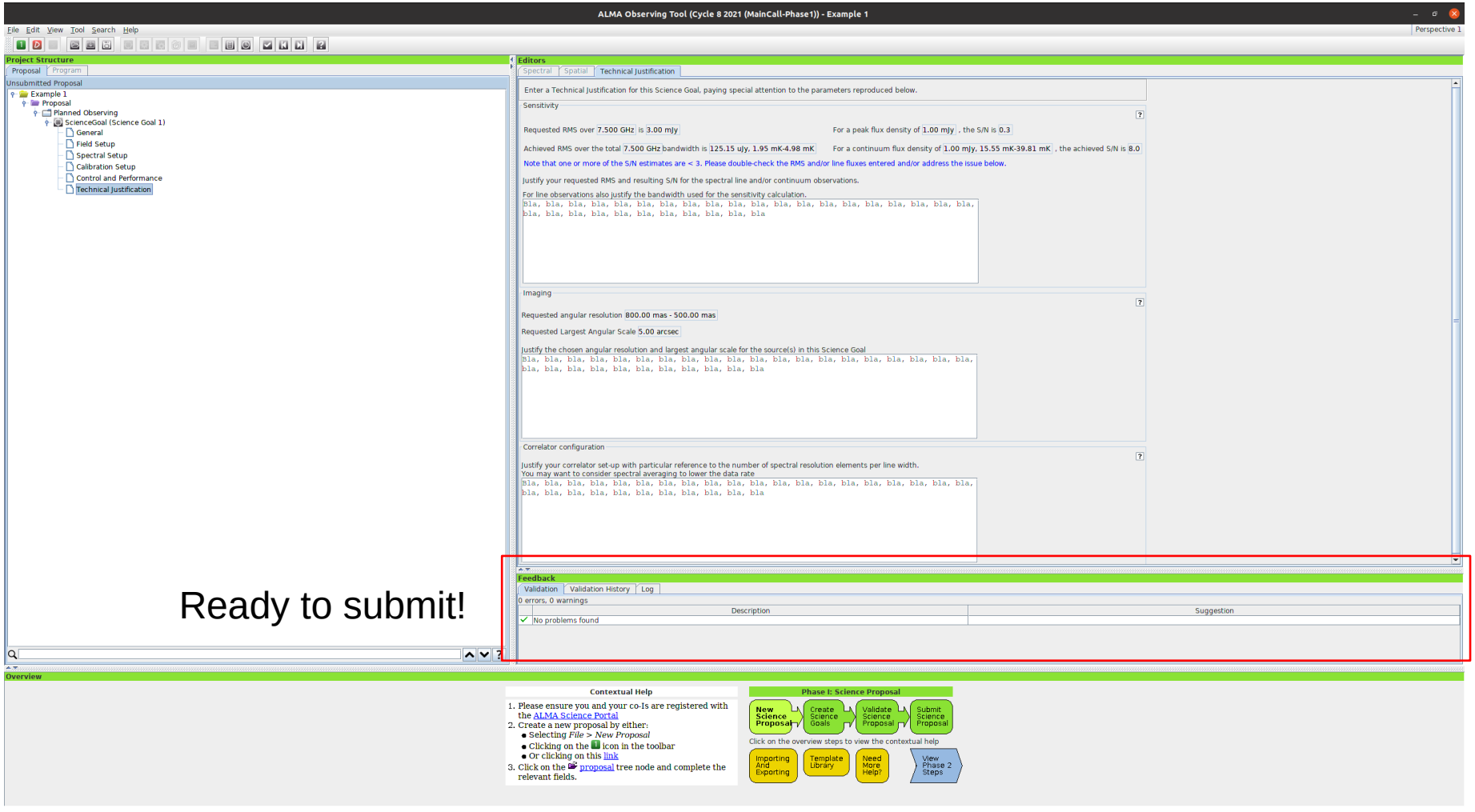
Example 1: Continuum observations of several targets



Example 1: Continuum observations of several targets

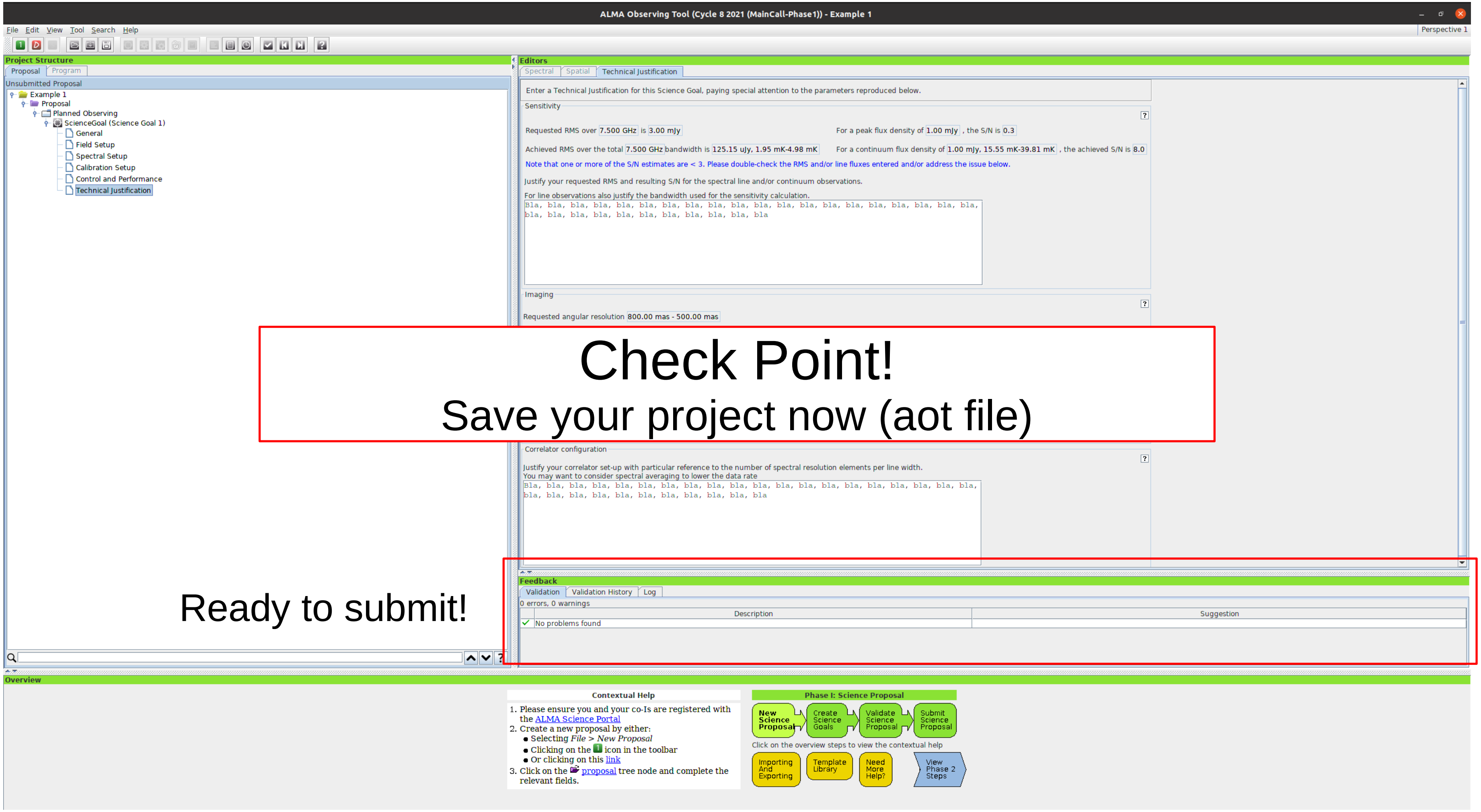


Example 1: Continuum observations of several targets



Ready to submit!

Example 1: Continuum observations of several targets

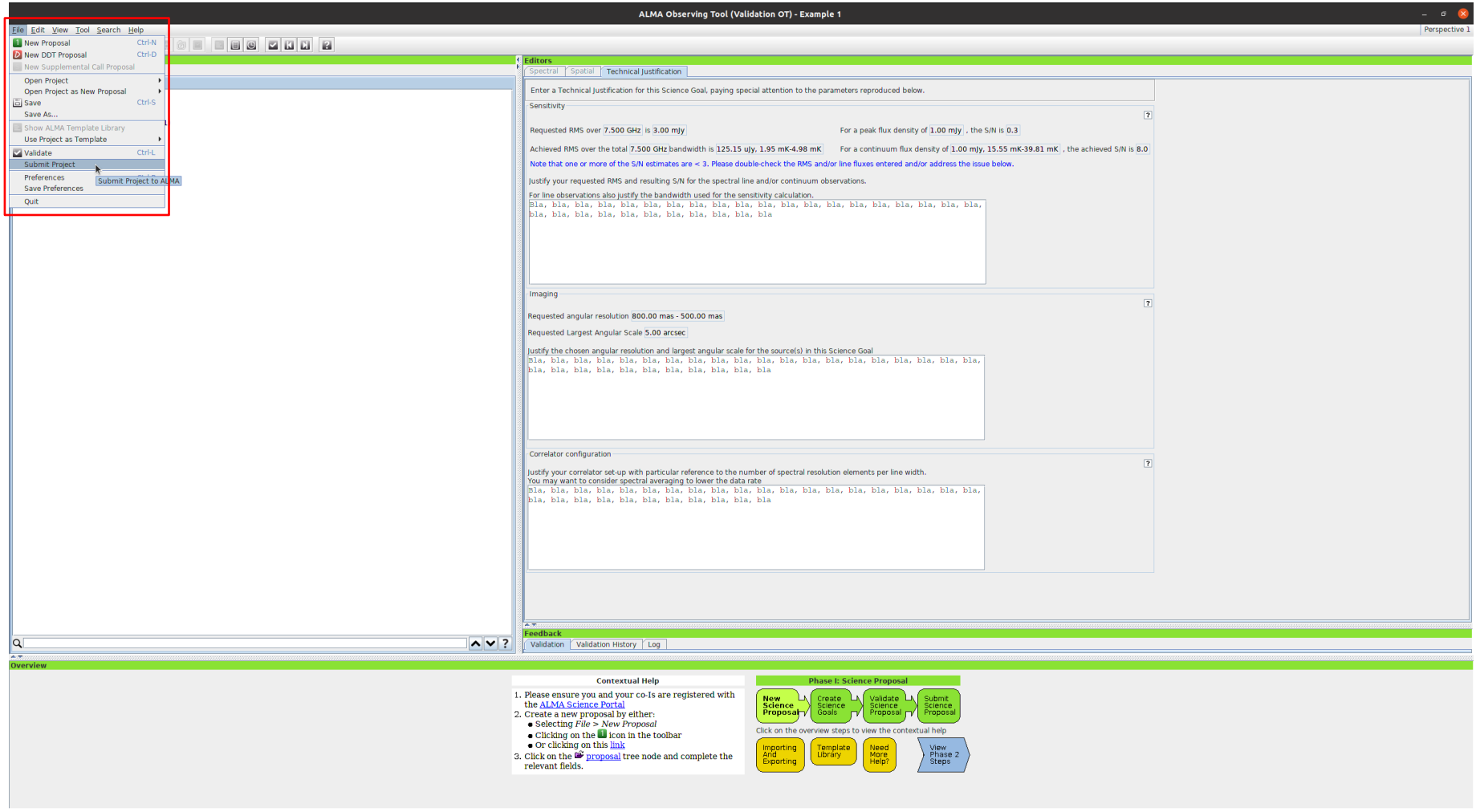


Check Point!

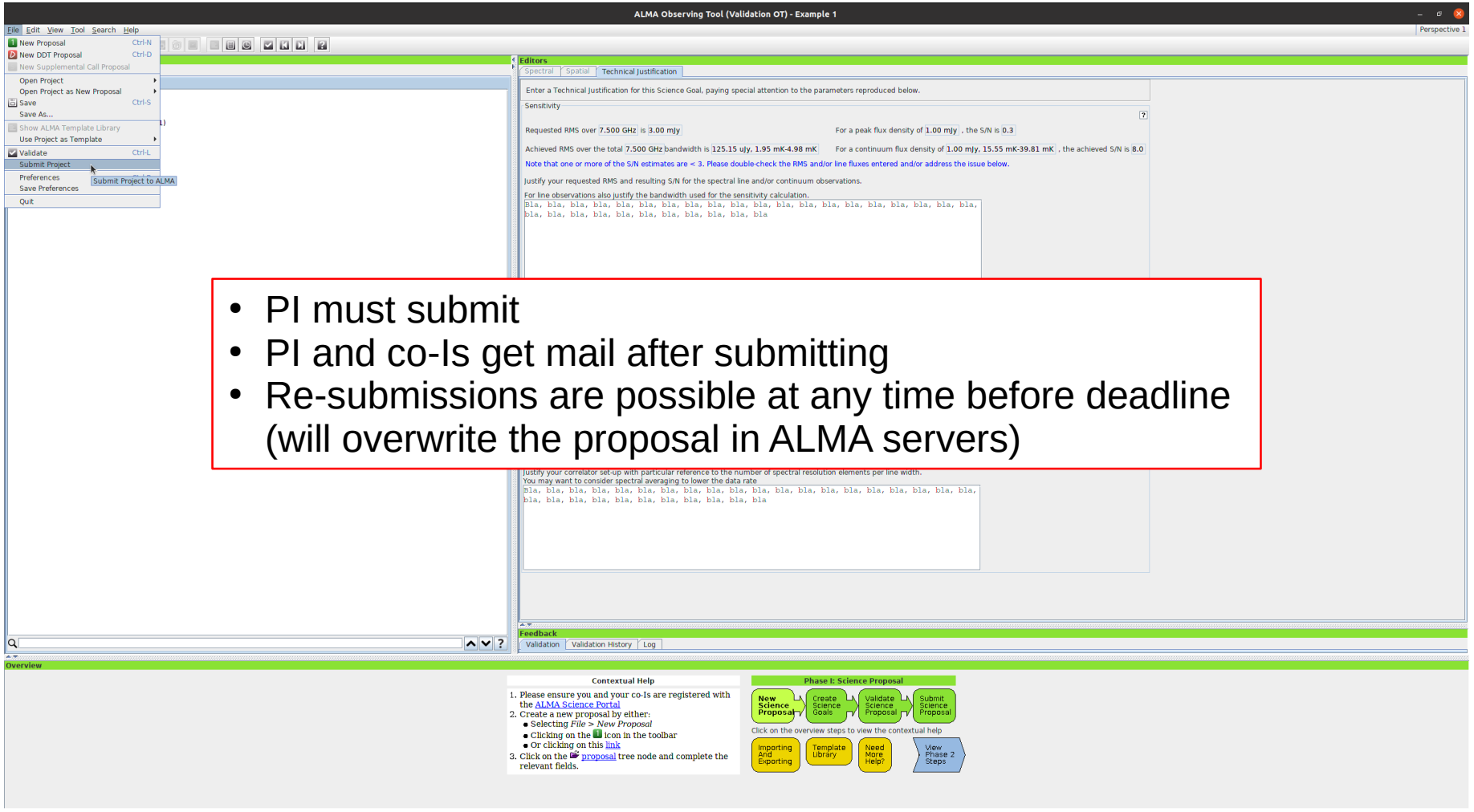
Save your project now (aot file)

Ready to submit!

Example 1: Continuum observations of several targets

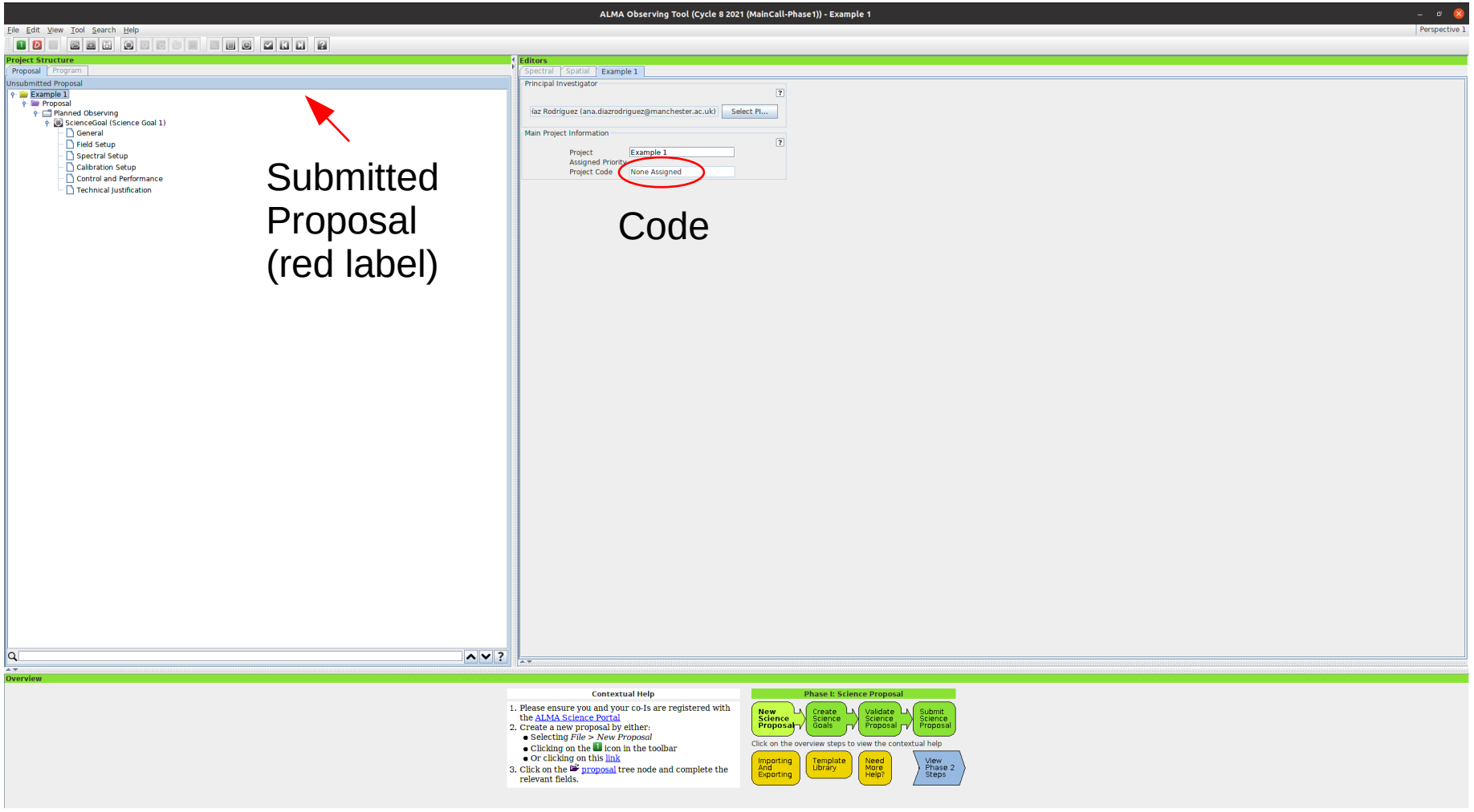


Example 1: Continuum observations of several targets

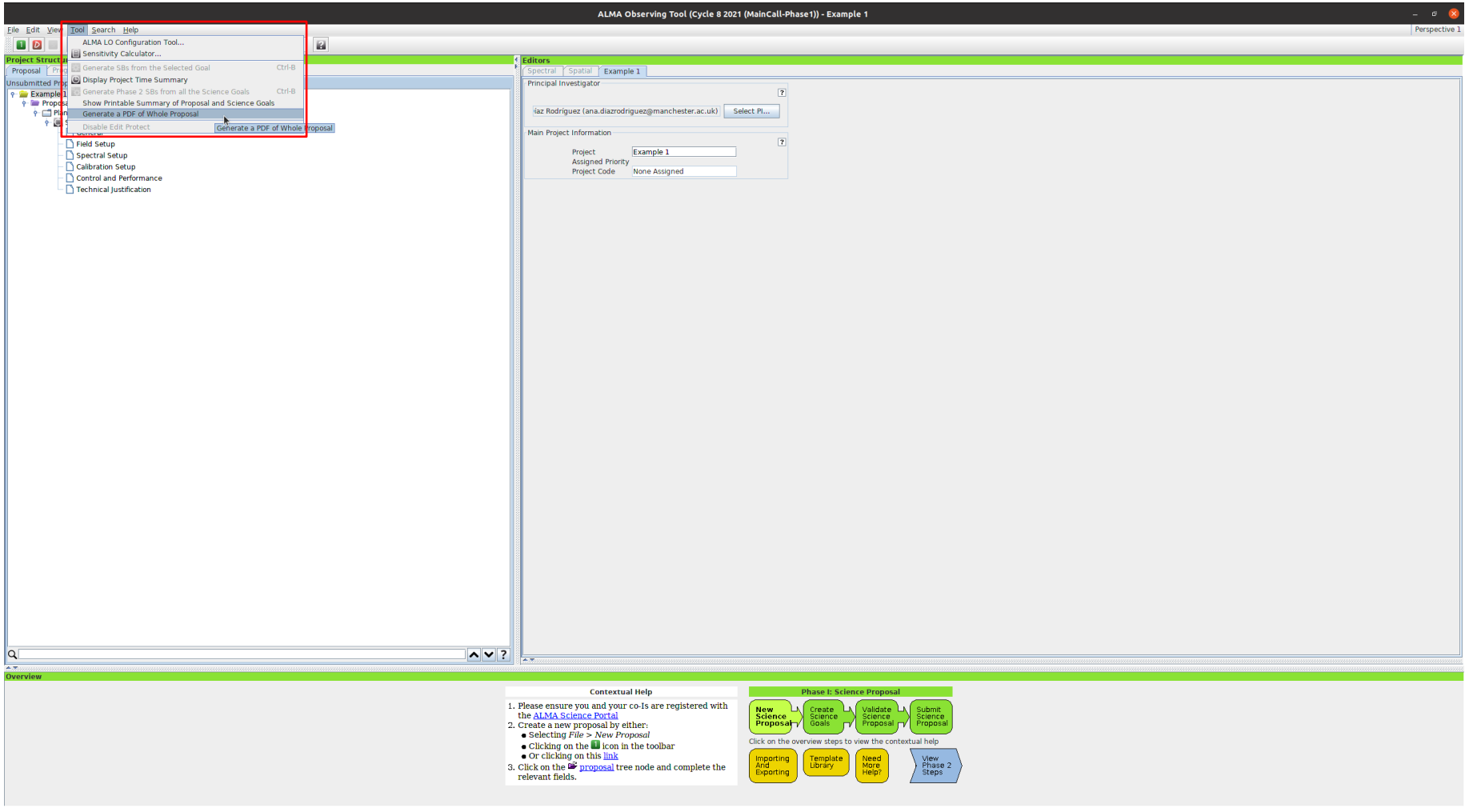


- PI must submit
- PI and co-Is get mail after submitting
- Re-submissions are possible at any time before deadline (will overwrite the proposal in ALMA servers)

Example 1: Continuum observations of several targets



Example 1: Continuum observations of several targets



Example 1: Continuum observations of several targets

C-1

Example 1 — **None Assigned**

ABSTRACT

Bla bla

No info about the proposal team

SCIENCE CATEGORY:	ISM, star formation and astrochemistry				
ESTIMATED 12-M TIME:	0.3 h	ESTIMATED 7-M TIME:	0.0 h	ESTIMATED TP TIME:	0.0 h
DUPLICATE OBSERVATION JUSTIFICATION:					

REPRESENTATIVE SCIENCE GOALS (UP TO FIRST 30)

SCIENCE GOAL	POSITION	BAND	ANG.RES.(")	LAS.(")	ACA?
Science Goal 1	ICRS 05:35:27.0696, -05:10:00.408	7	0.800 - 0.500	5.000	N
Total # Science Goals : 1					

SCHEDULING TIME CONSTRAINTS	NONE	TIME ESTIMATES OVERRIDDEN ?	No

SG-1

None Assigned

SG : 1 of 1 Science Goal 1 Band 7

Bla bla

Science Goal Parameters

Ang.Res.	LAS	Requested RMS	RMS Bandwidth	Rep.Freq.	Cont. RMS	Cont. Bandwidth	Poln.Prod.
0.8000" - 0.5000"	5.0"	3 mJy, 46.7 mK-119.4 mK	6414.96 km/s, 7.5 GHz	350.500000 GHz	125.144 µJy, 1.9 mK-5 mK	7.500 GHz	XX,YY

Use of 12m Array (43 antennas)

t_total(all configs)	t_science(C43-2)	t_total()	Imaged area	#12m pointing	12m Mosaic spacing	HPBW	t_per_point	Data Vol	Avg. Data Rate
0.3 h	0.1 h	0.0 h	5.5 "	2	offset	16.6 "	151.1 s	1.9 GB	1.9 MB/s

Use of ACA 7m Array (10 antennas) and TP Array

t_total(ACA)	t_total(7m)	t_total(TP)	Imaged area	#7m pointing	7m Mosaic spacing	HPBW	t_per_point	Data Vol	Avg. Data Rate

Spectral Setup : Single Continuum

Center Freq (Sky)	Center Freqs. SPWs	Eff #Ch p.p.	Bandwidth	Resolution	Vel. Bandwidth	Vel. Resolution	RMS
343.500000	336.500000	128	1875.00 MHz	31.250 MHz	1670.5 km/s	27.841 km/s	241.31 µJy, 10.4 mK
	338.500000	128	1875.00 MHz	31.250 MHz	1660.6 km/s	27.677 km/s	238.01 µJy, 10.2 mK
	348.500000	128	1875.00 MHz	31.250 MHz	1612.9 km/s	26.882 km/s	246.24 µJy, 9.9 mK
	350.500000	128	1875.00 MHz	31.250 MHz	1603.7 km/s	26.729 km/s	251.2 µJy, 10.0 mK

2 Targets

No.	Target	Ra,Dec (ICRS)	V,def,frame --OR--z
1	1-HOPS_108	05:35:27, -05:10:00	0.00 km/s,lsrk,RADIO
2	2-hops_370	05:35:27, -05:09:33	0.00 km/s,lsrk,RADIO

Expected Source Properties

	Peak Flux	SNR	Linewidth	RMS (over 1/3 linewidth)	linewidth / bandwidth used for sensitivity	Pol.	Pol. SNR
Line	0.00 uJy	0.0	0 km/s			0.0%	0.0
Continuum	1.00 mJy	8.0				0.0%	0.0

Dynamic range (cont flux/line rms): N/A

Share PDF (and aot file) with Co-PIs

Science Case

Testing

Testing

SG-1

Sensitivity Comments

Note that one or more of the S/N estimates are < 3. Please double-check the RMS and/or line fluxes entered and/or address the issue below.

Justification for requested RMS and resulting S/N (and for spectral lines the bandwidth selected) for the sensitivity calculation.

Bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla

Justification of the chosen angular resolution and largest angular scale for the source(s) in this Science Goal.

Bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla

Justification of the correlator set-up with particular reference to the number of spectral resolution elements per line width.

Bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla, bla

Lets propose!

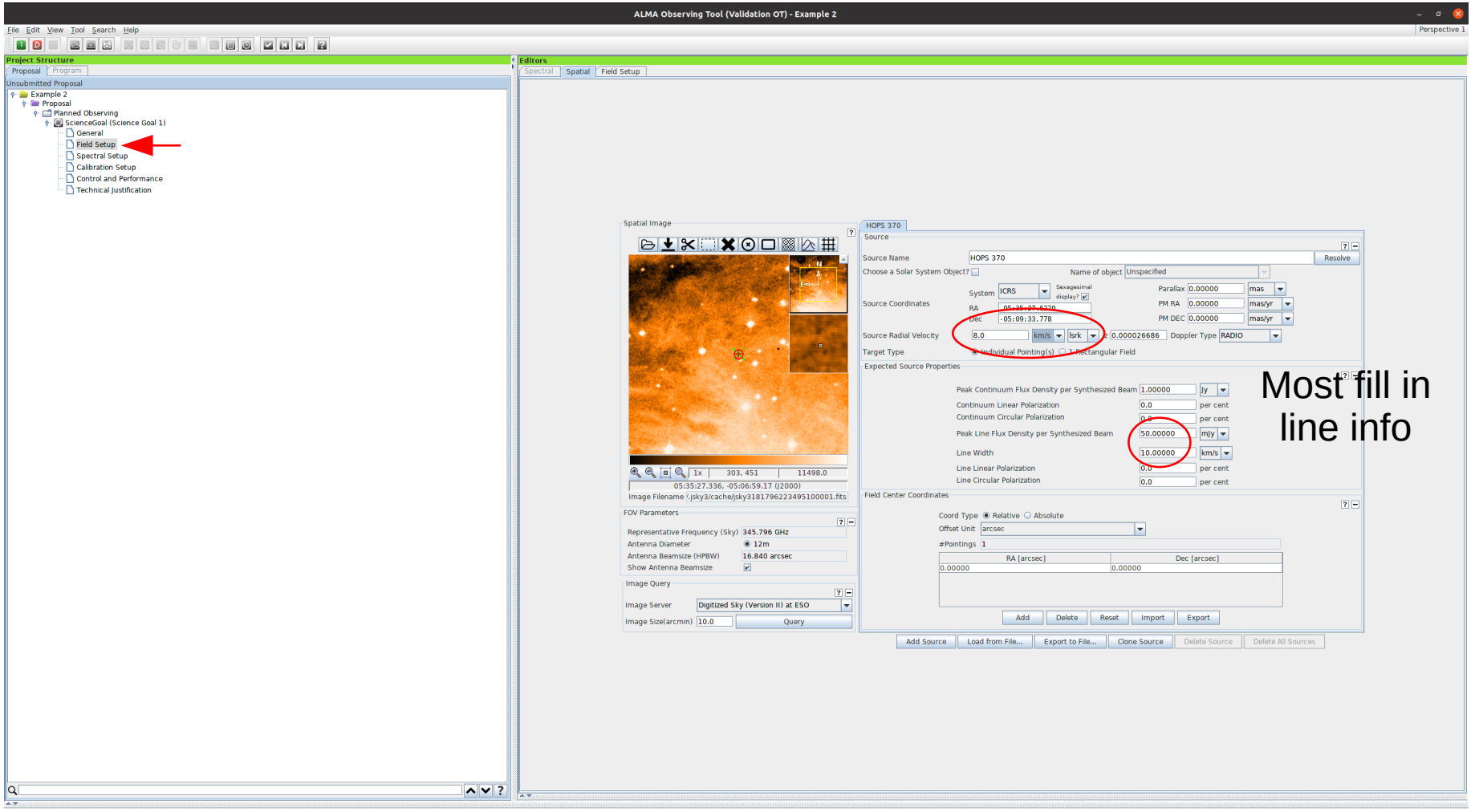
Example 2: Line observations of single target (e.g. study kinematics of a protostellar disk)

- 1 Science Goal with 1 target

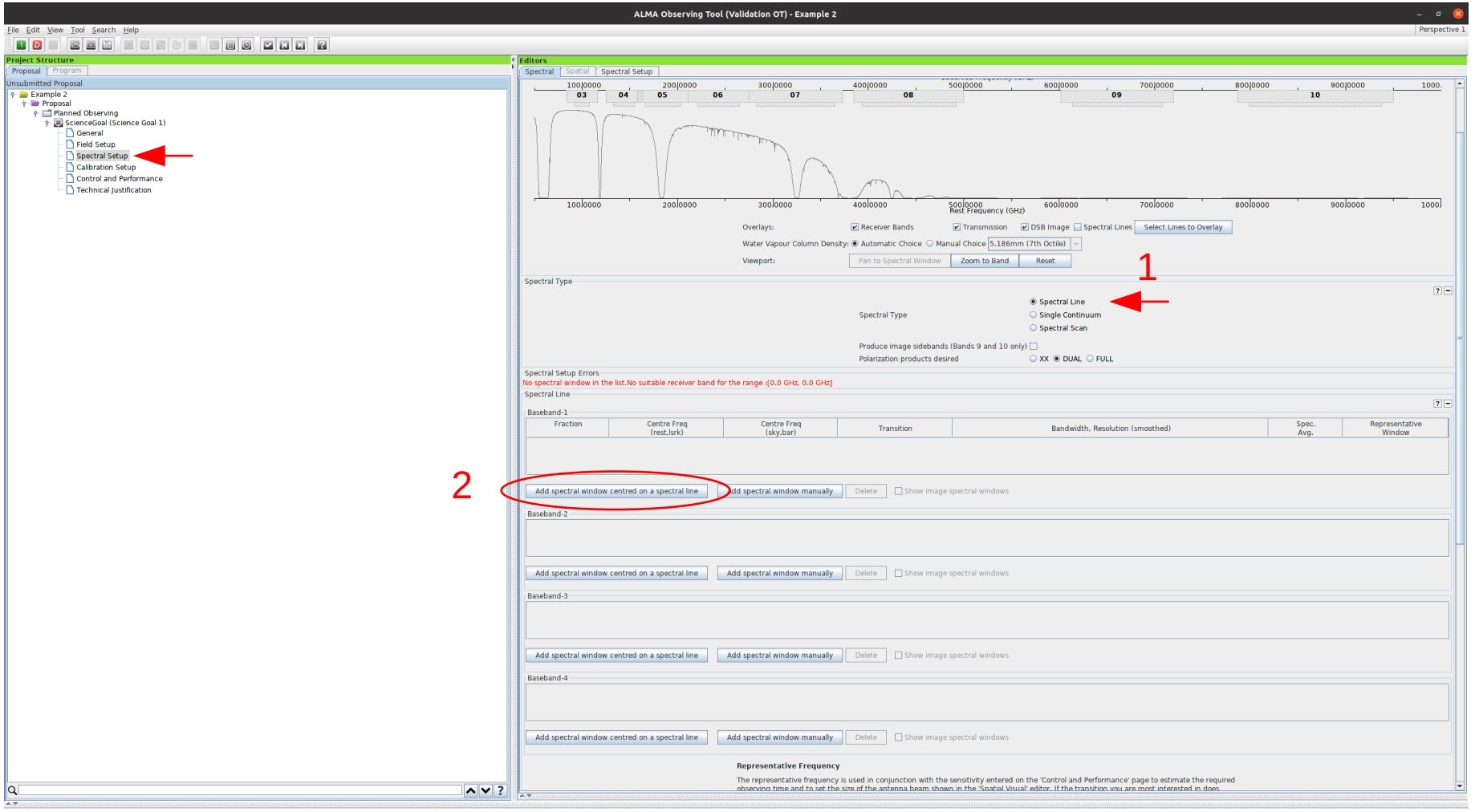
To do:

1) Open template created before
2) Add Science Goal
3) Fill in General and Source Setup fields
4) Save it as Example 2

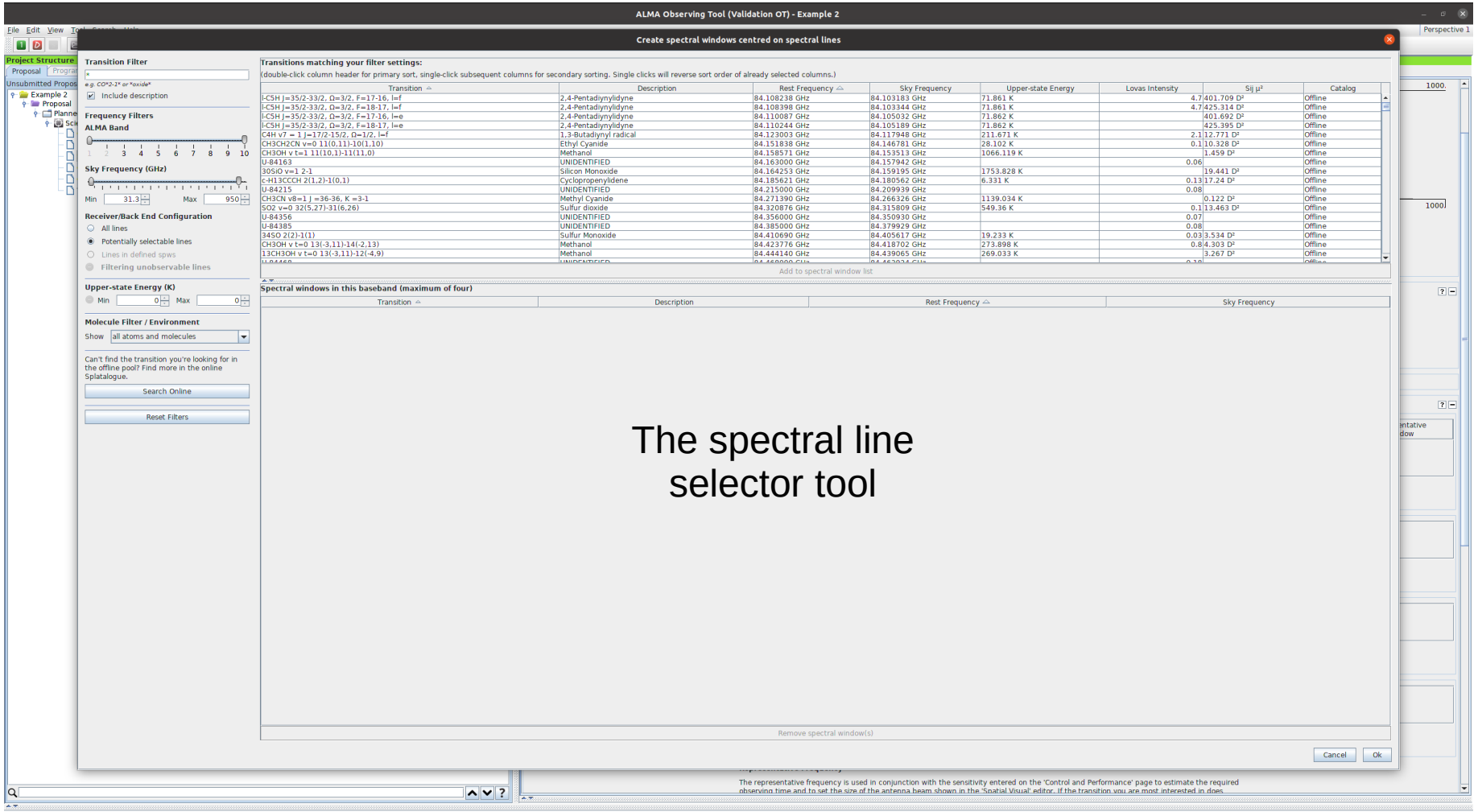
Example 2: Line observations of single target



Example 2: Line observations of single target

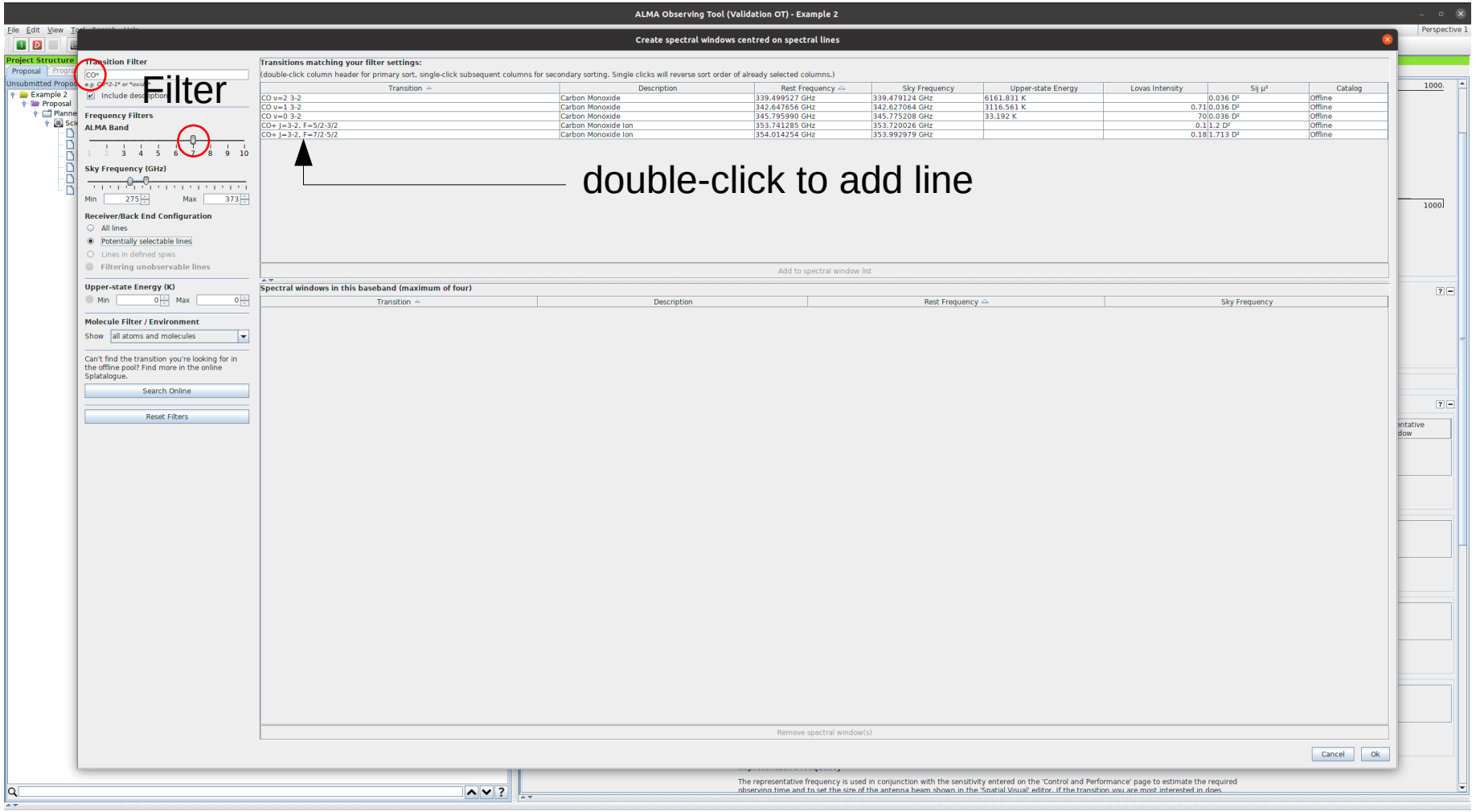


Example 2: Line observations of single target

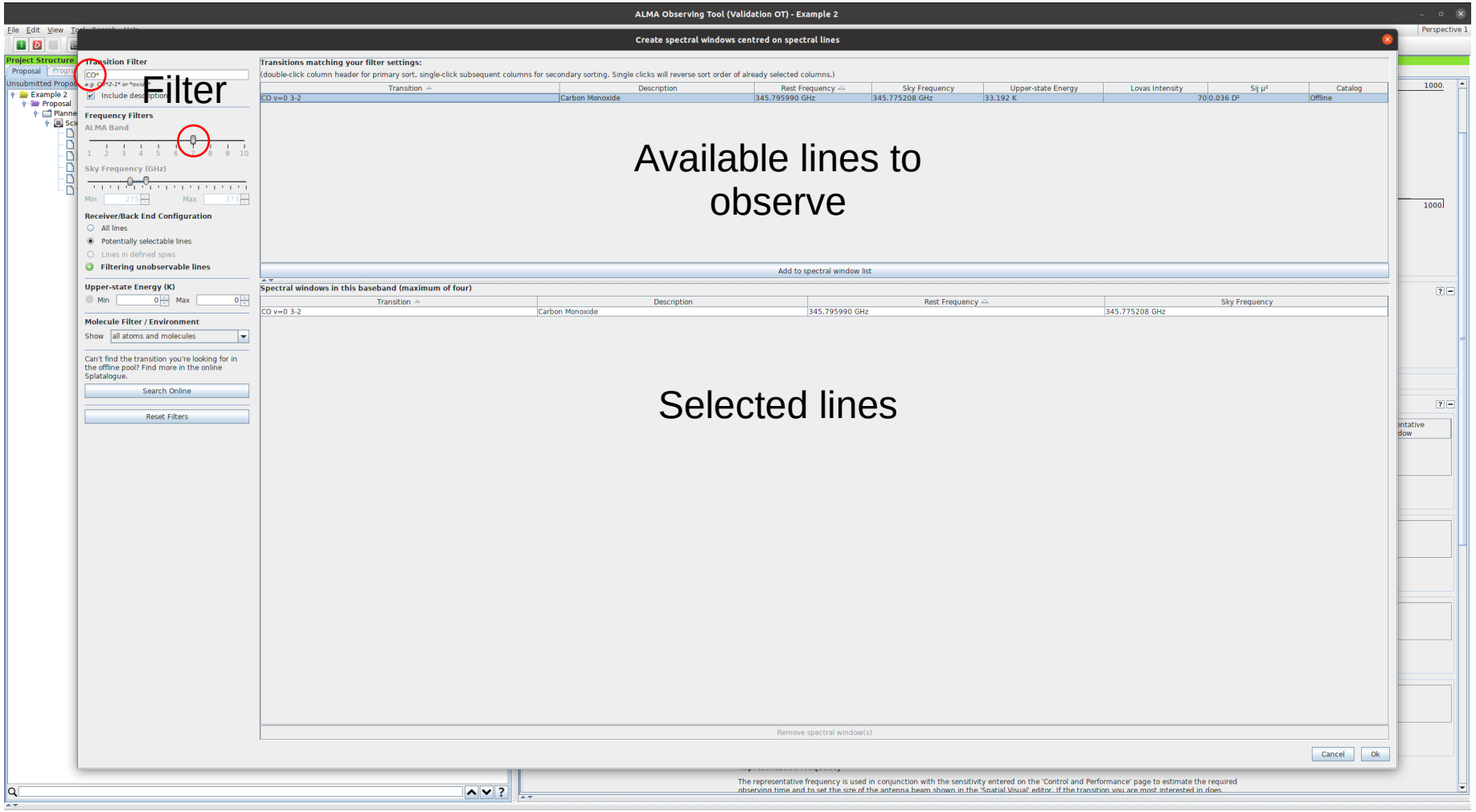


The spectral line selector tool

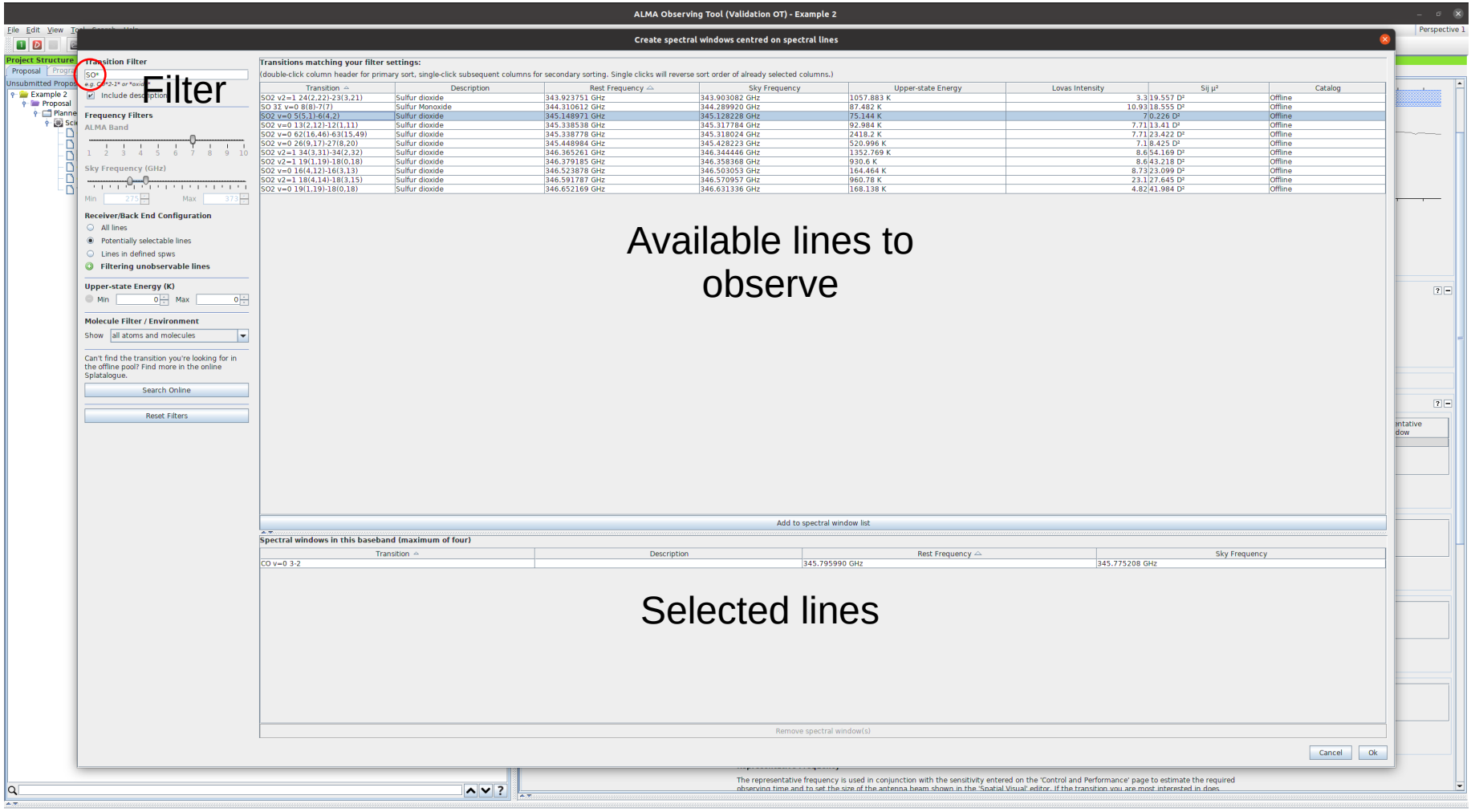
Example 2: Line observations of single target



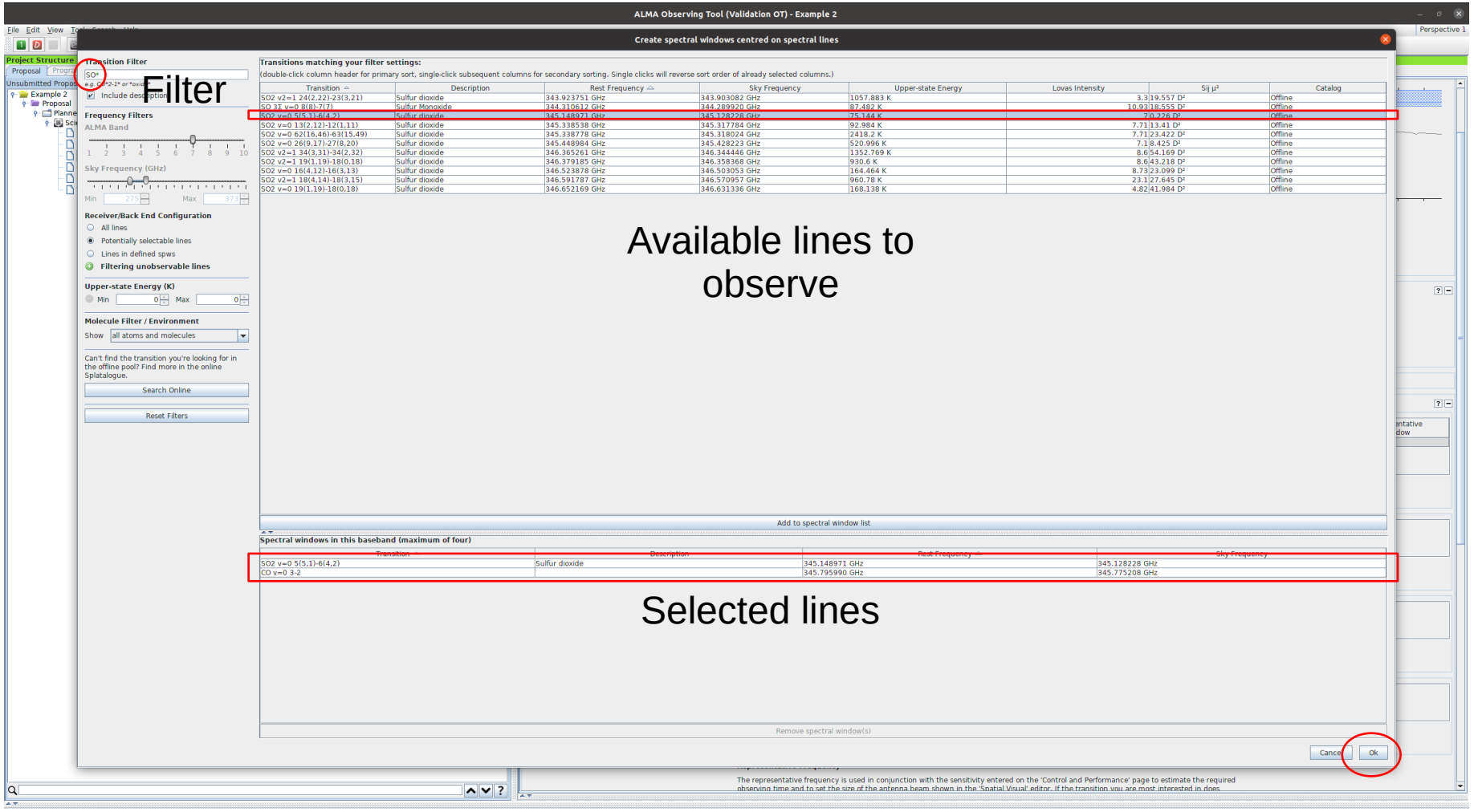
Example 2: Line observations of single target



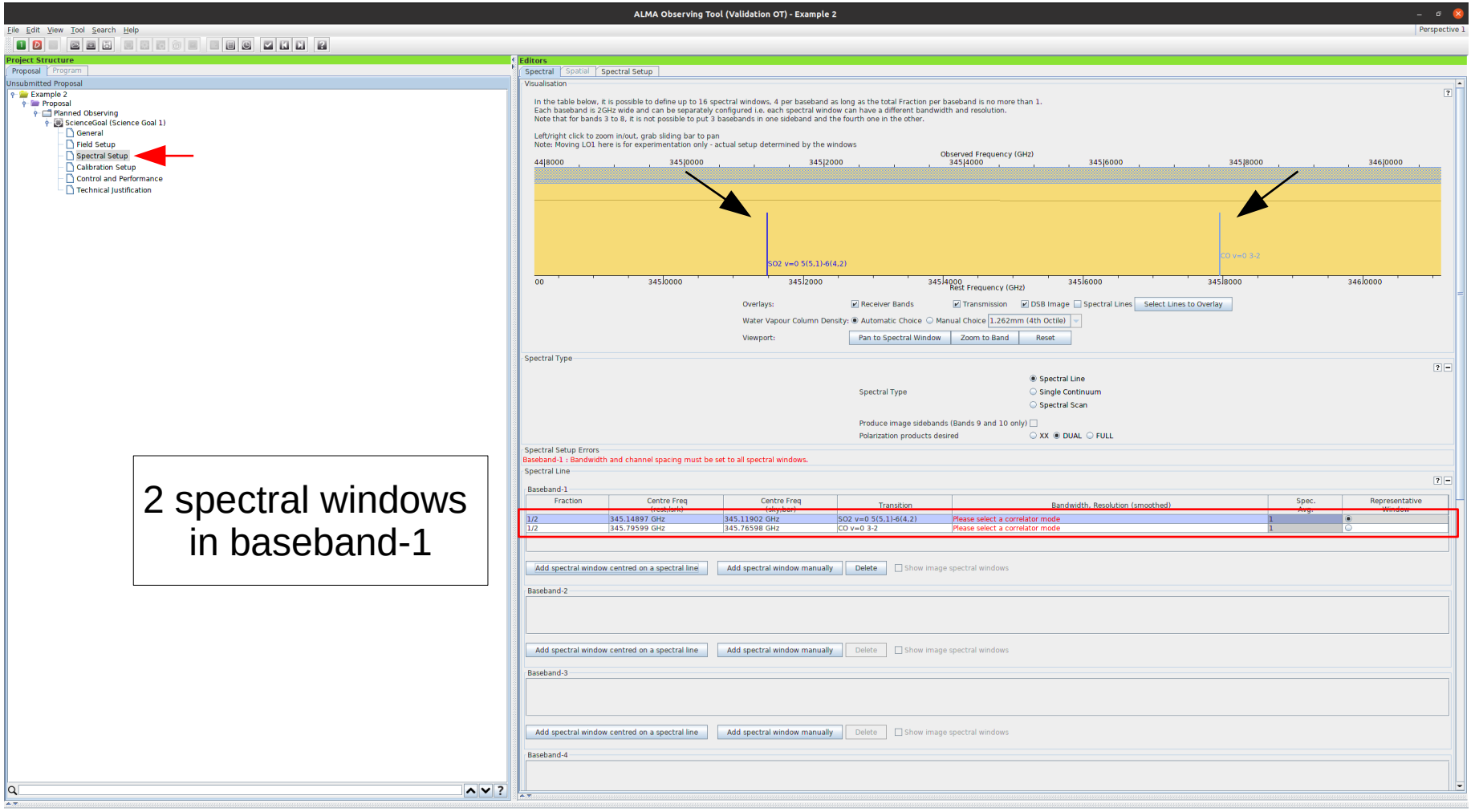
Example 2: Line observations of single target



Example 2: Line observations of single target

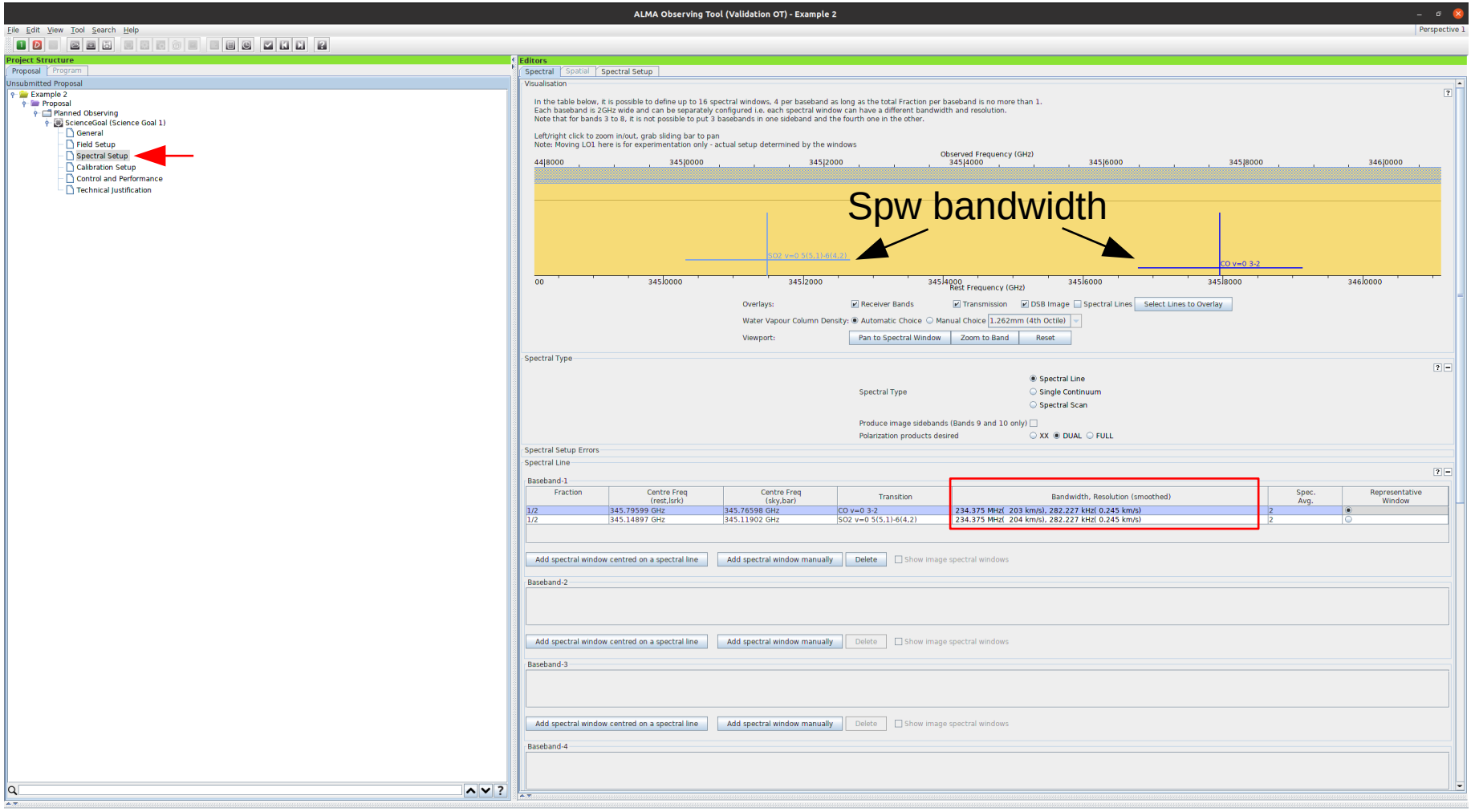


Example 2: Line observations of single target

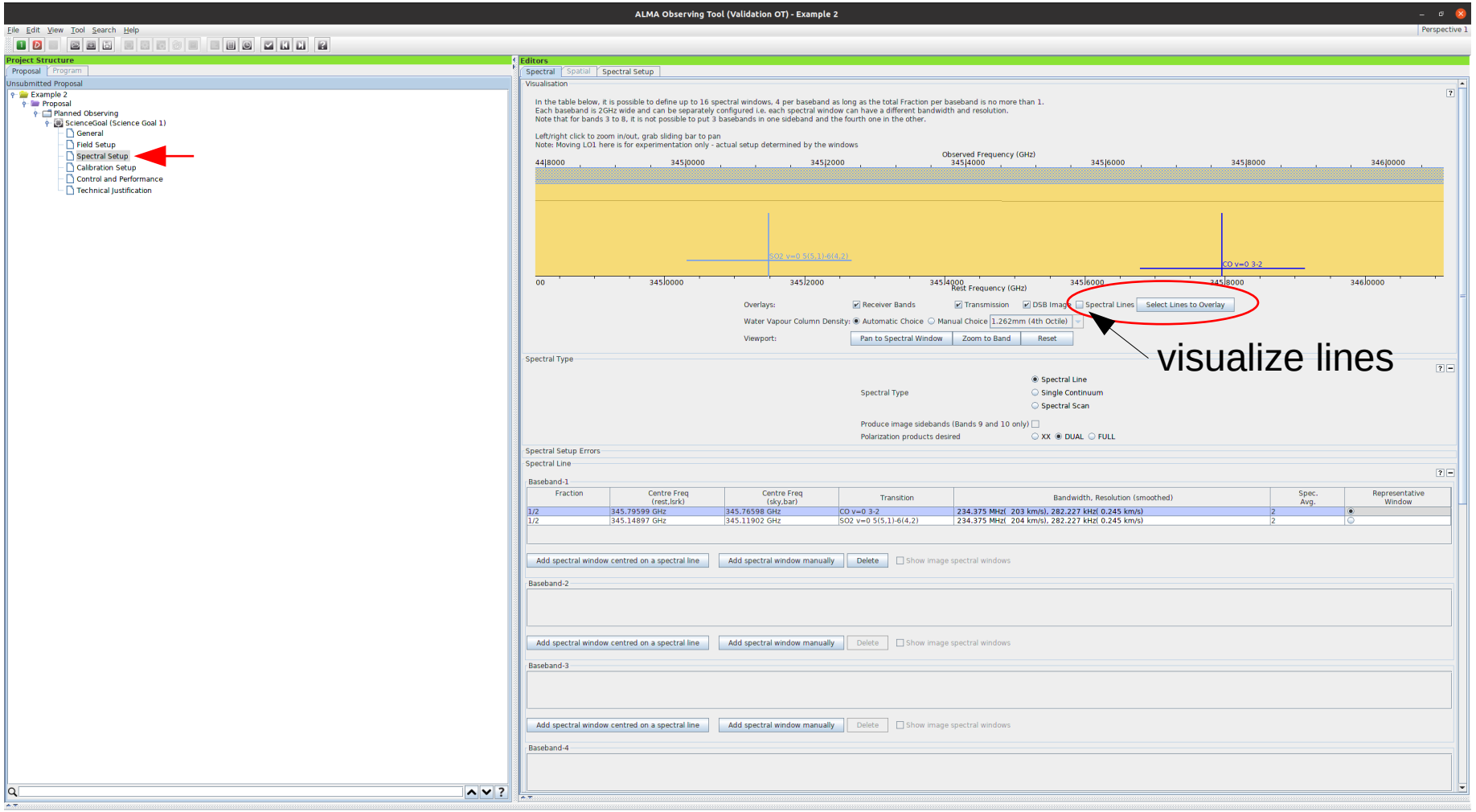


2 spectral windows in baseband-1

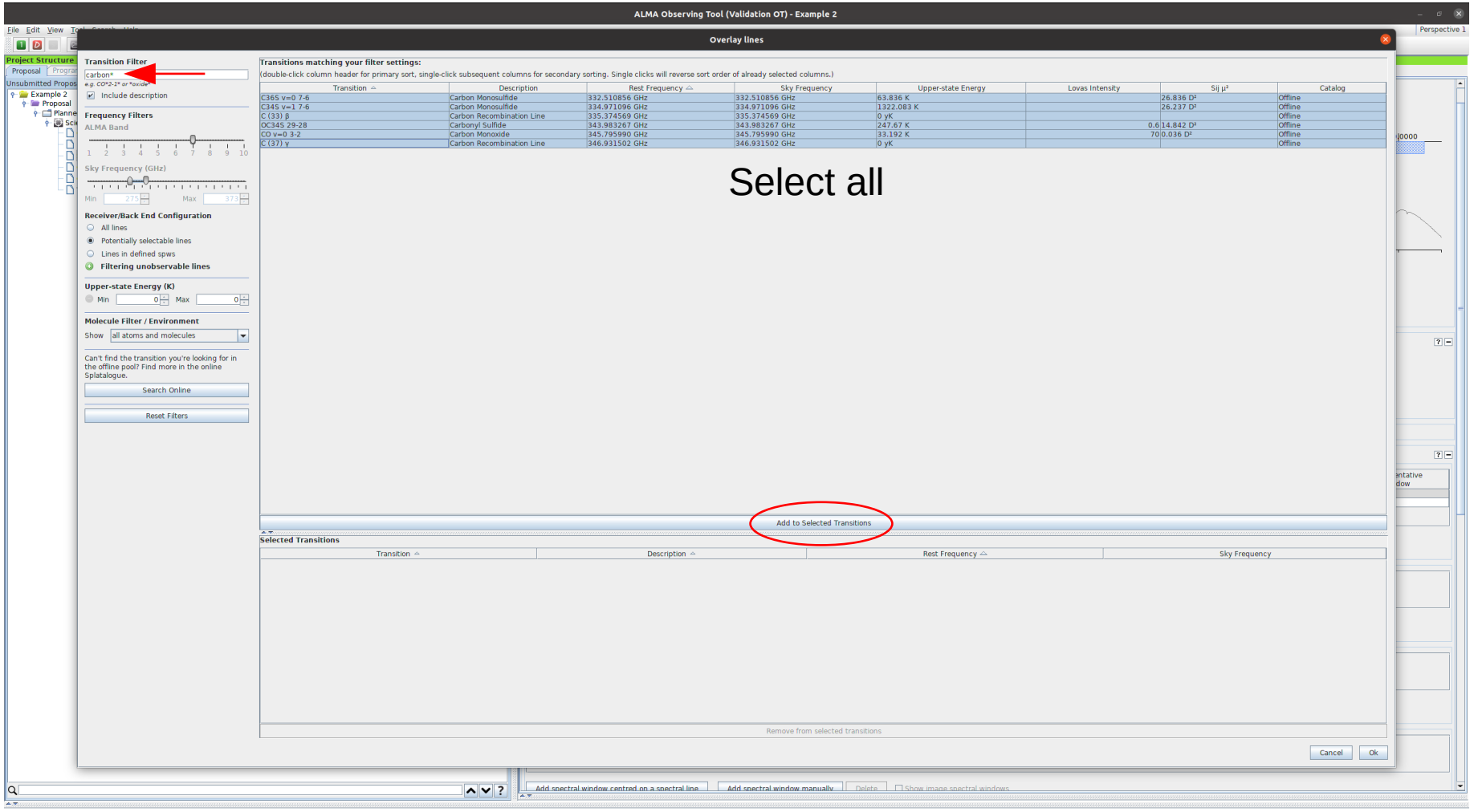
Example 2: Line observations of single target



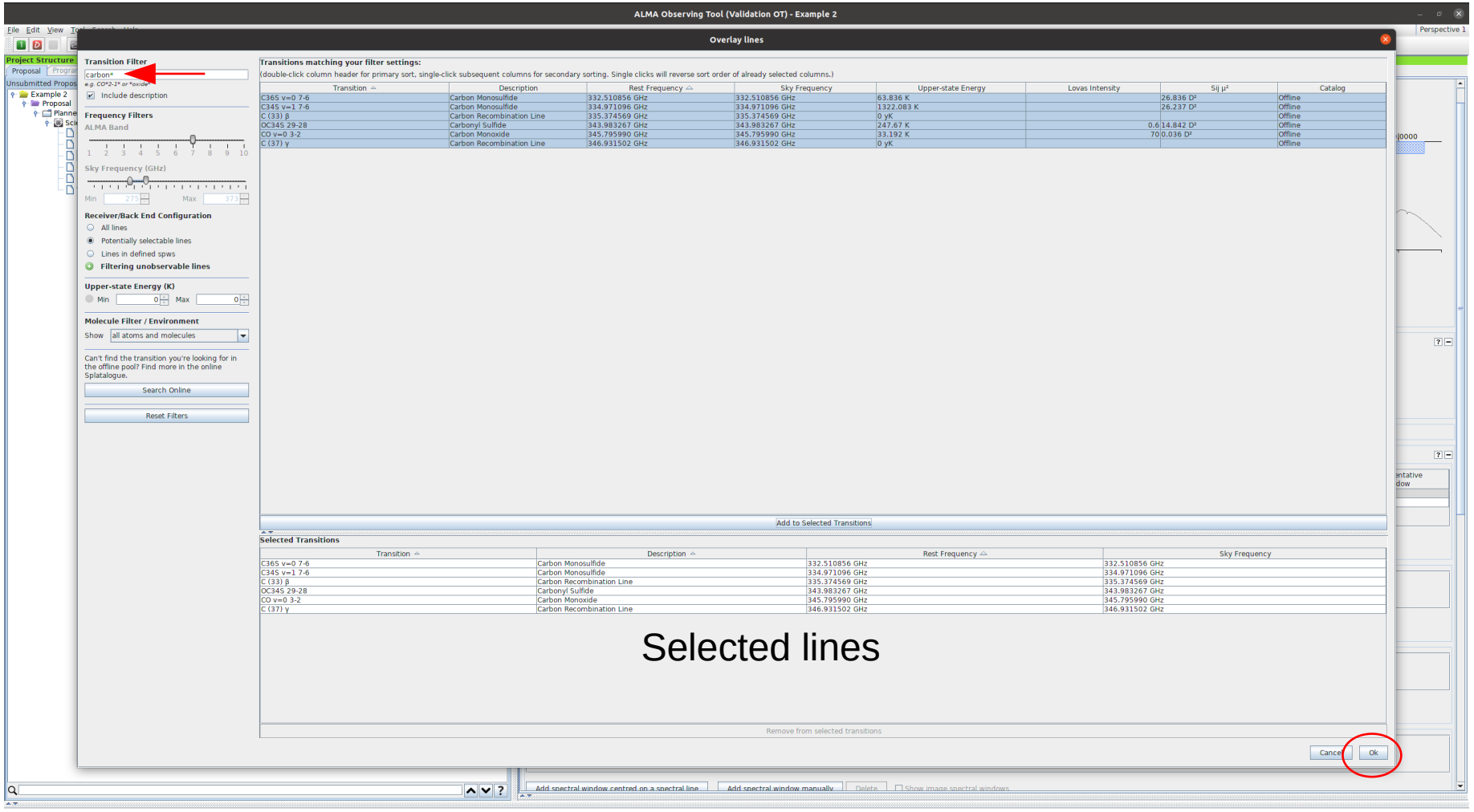
Example 2: Line observations of single target



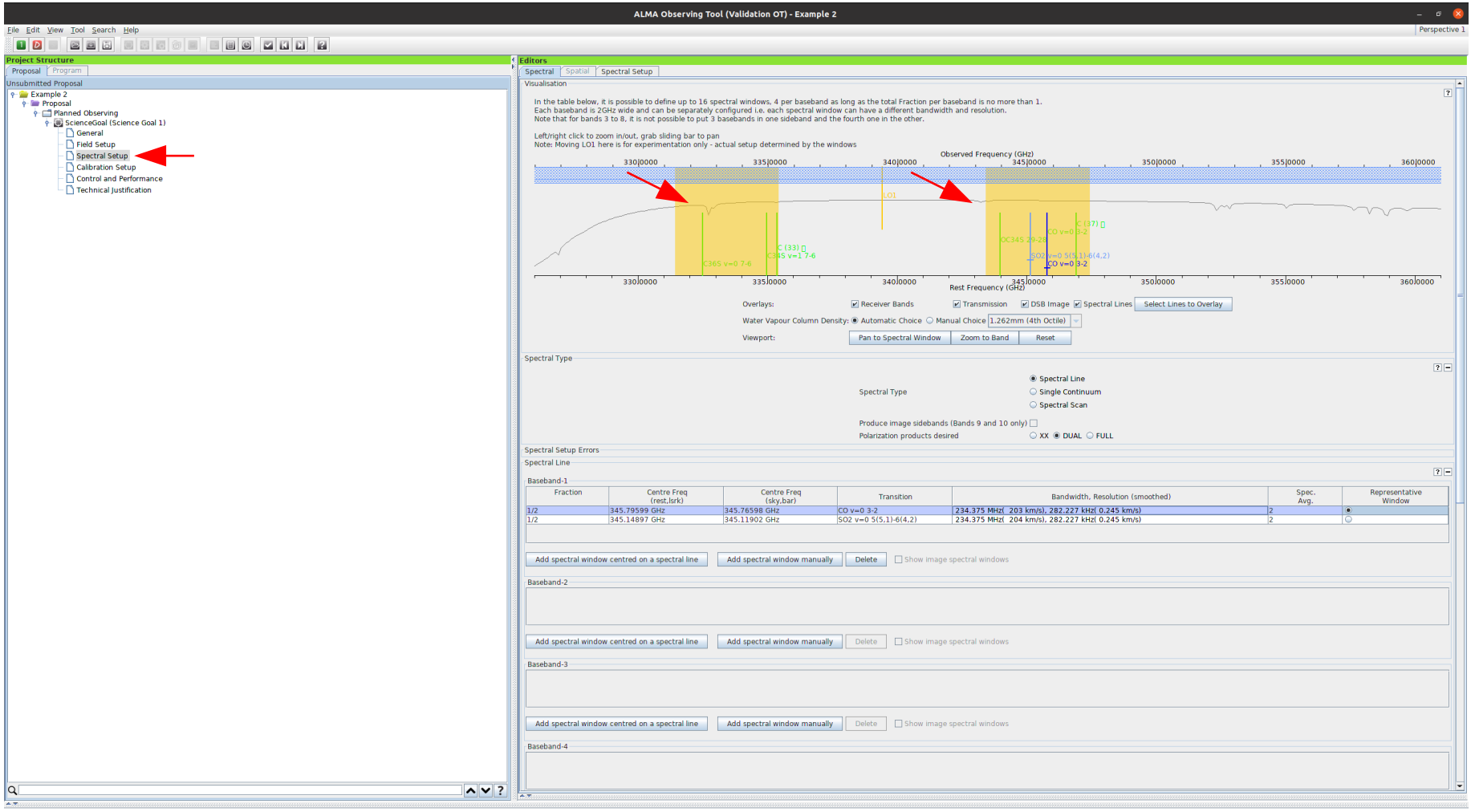
Example 2: Line observations of single target



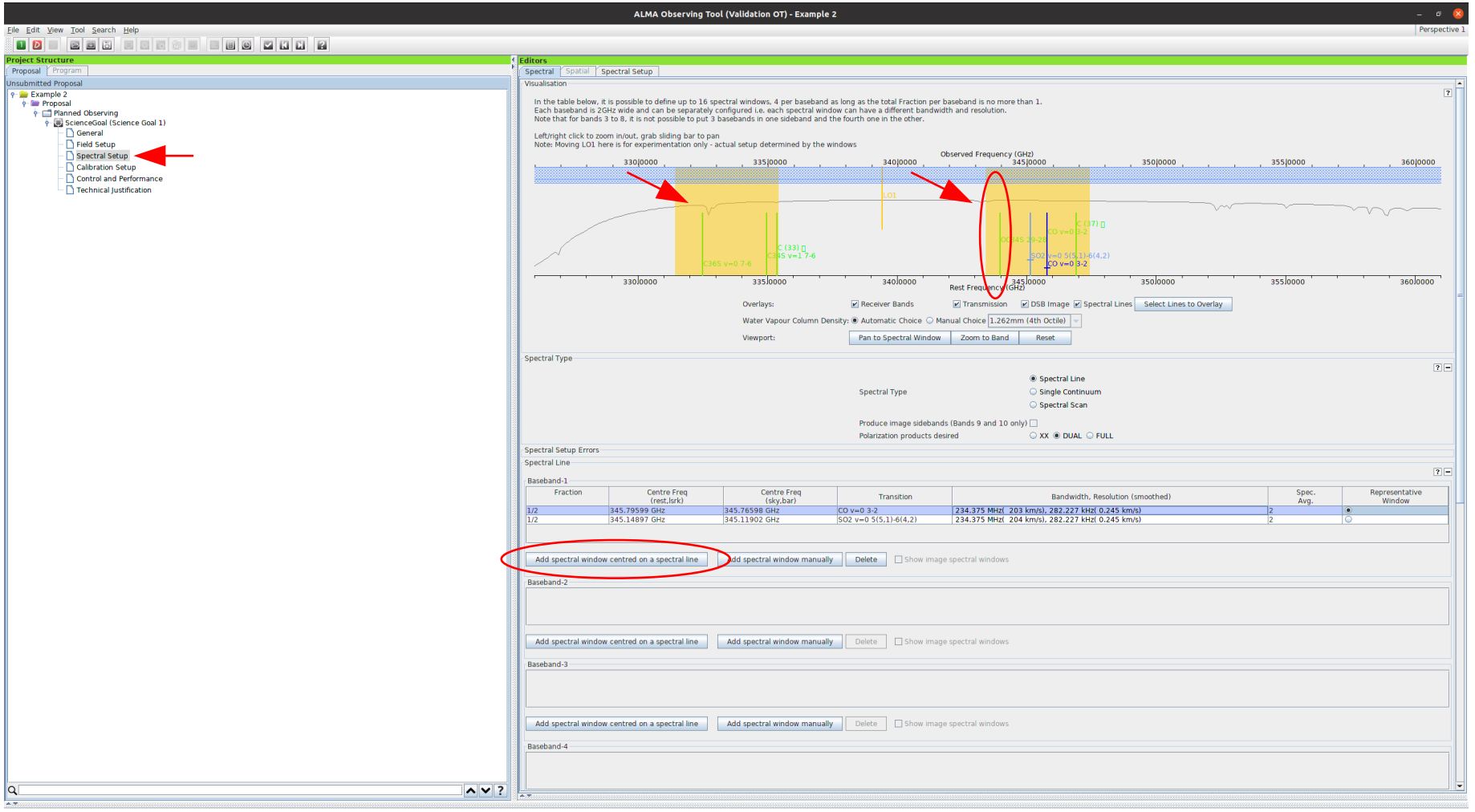
Example 2: Line observations of single target



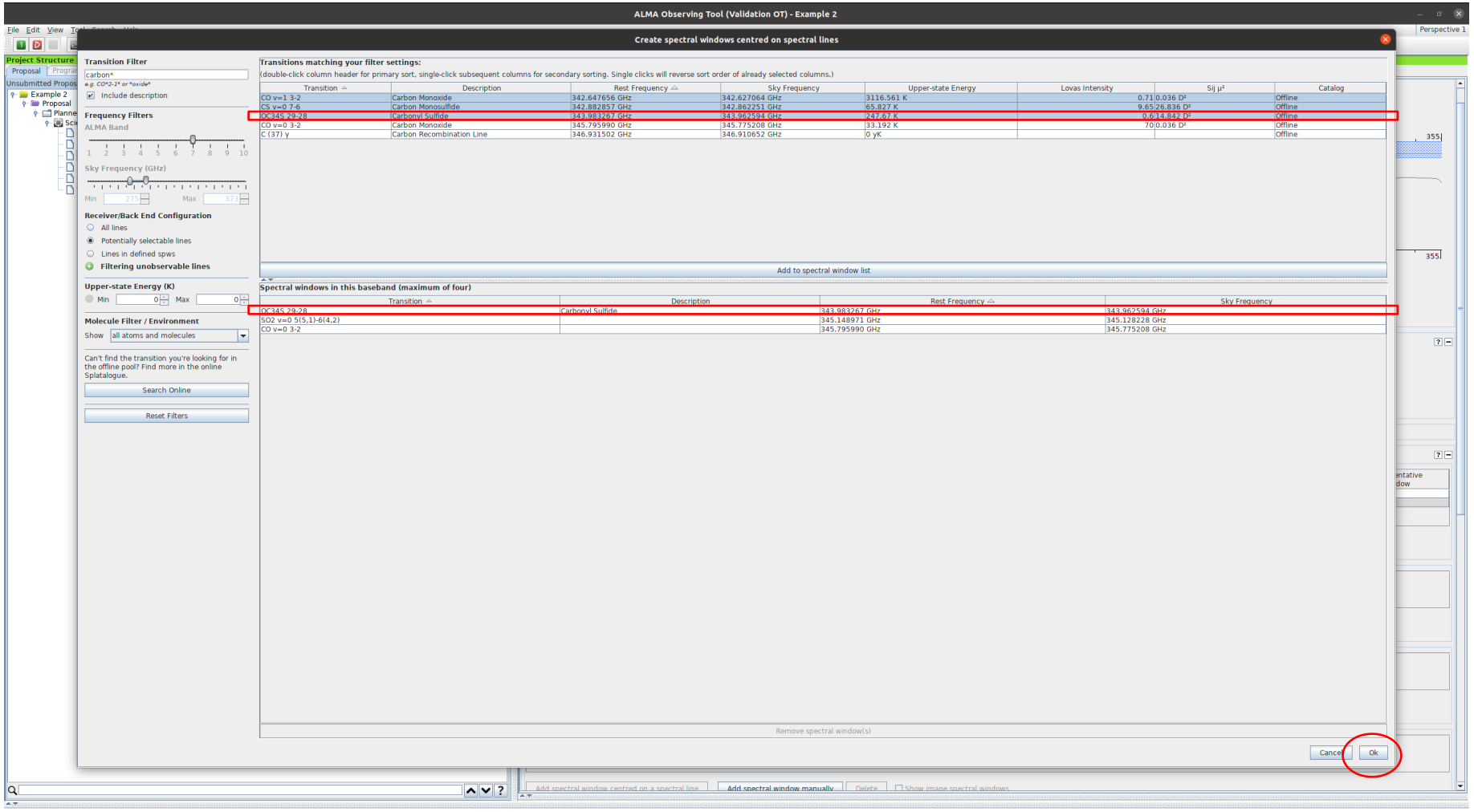
Example 2: Line observations of single target



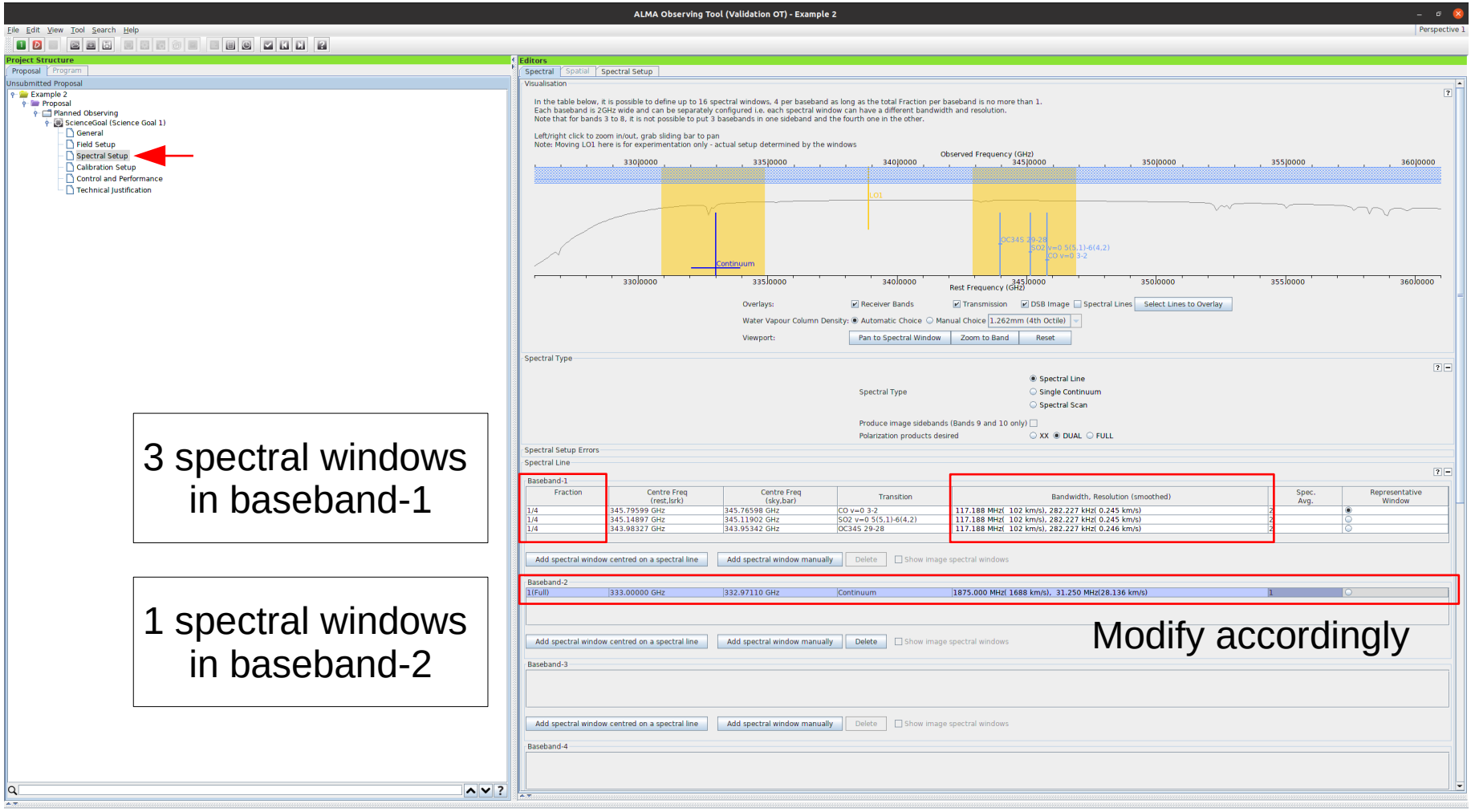
Example 2: Line observations of single target



Example 2: Line observations of single target



Example 2: Line observations of single target

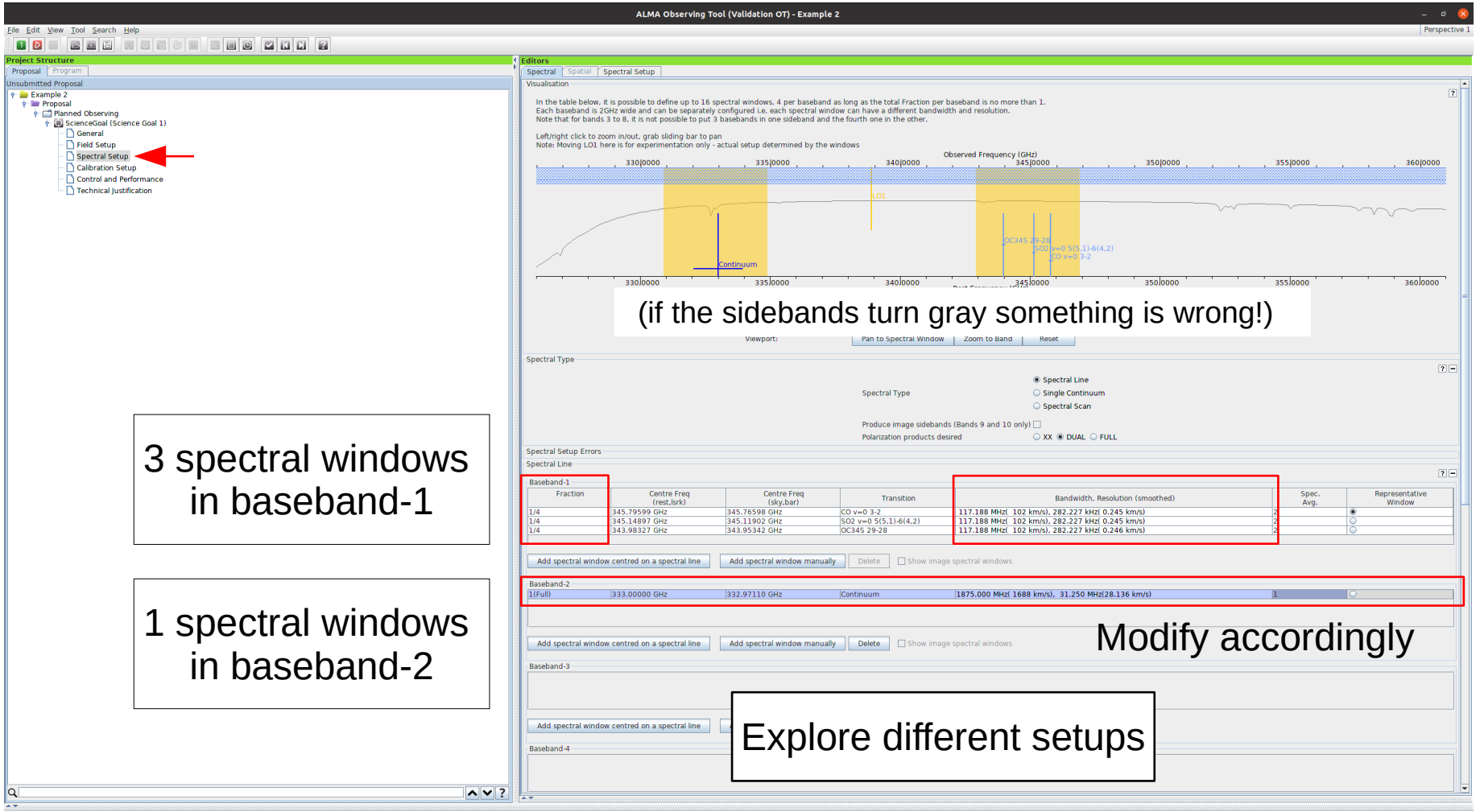


3 spectral windows in baseband-1

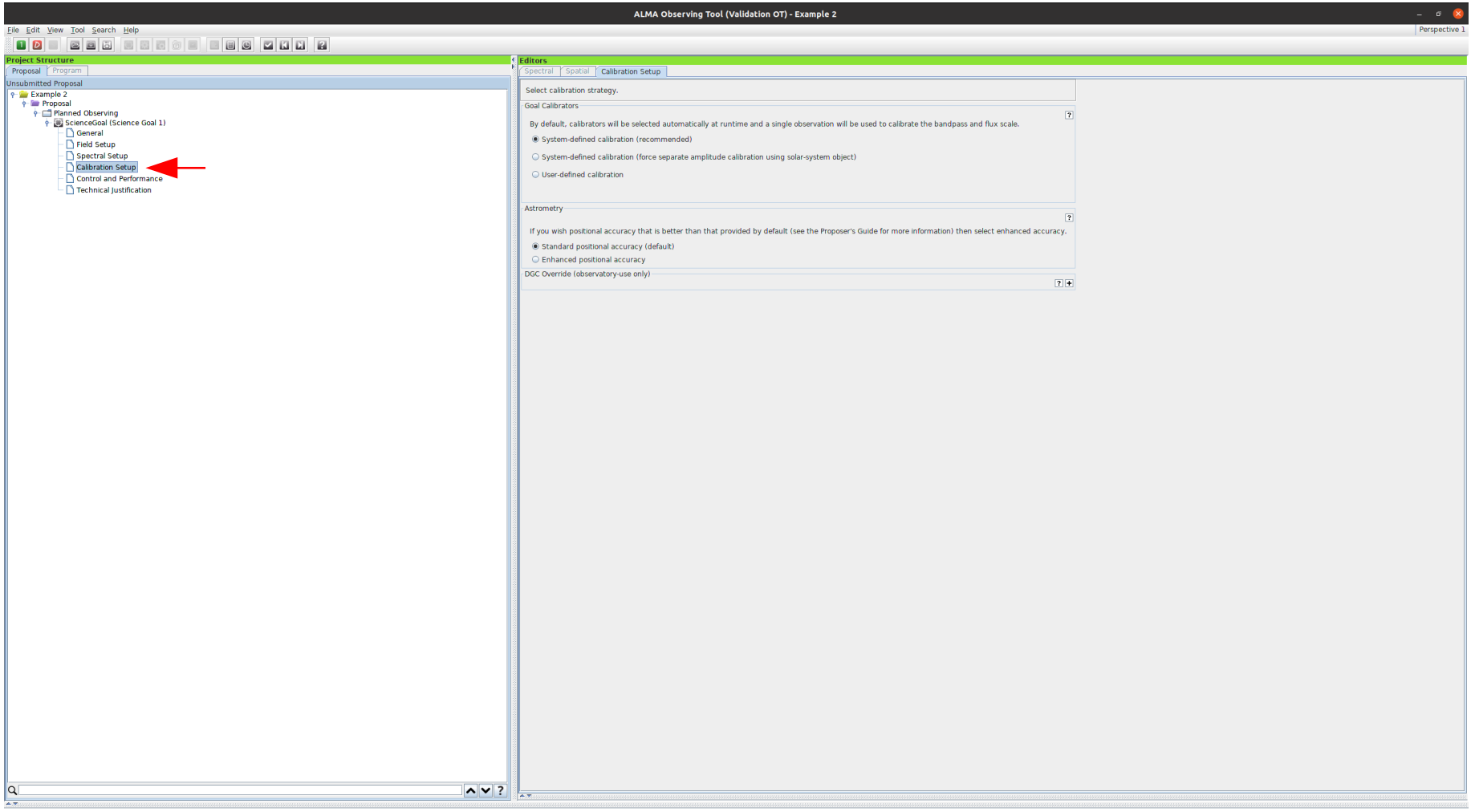
1 spectral windows in baseband-2

Modify accordingly

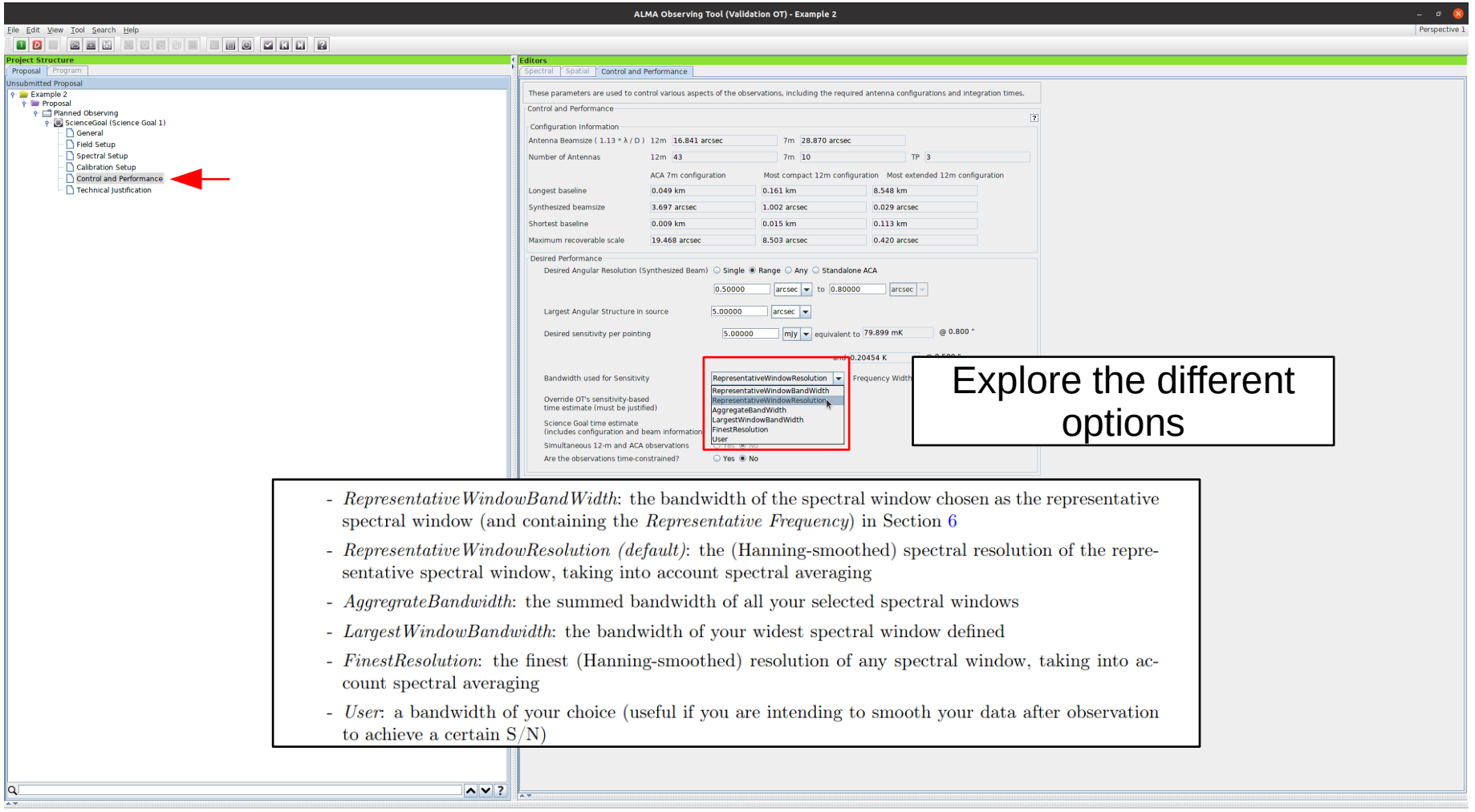
Example 2: Line observations of single target



Example 2: Line observations of single target



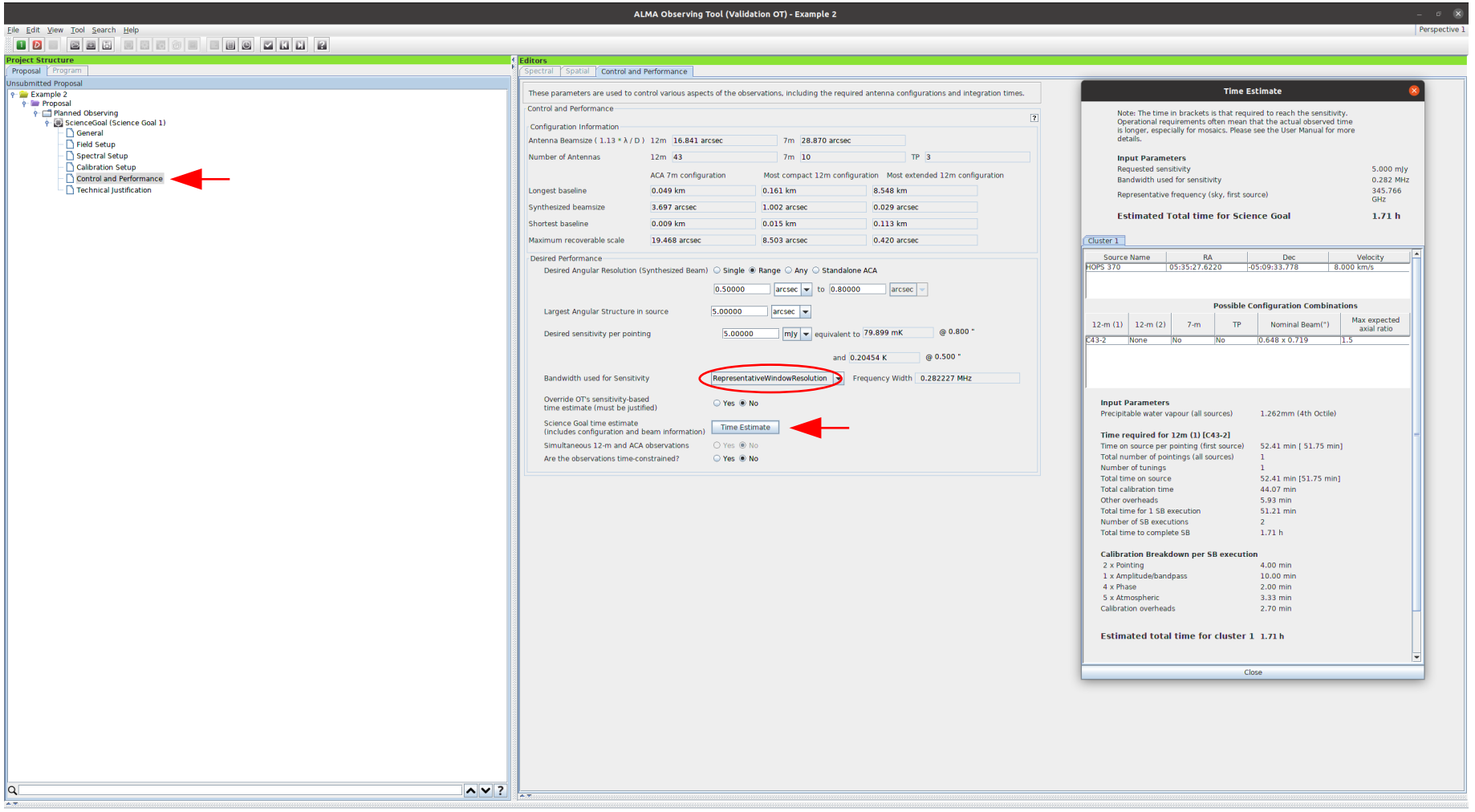
Example 2: Line observations of single target



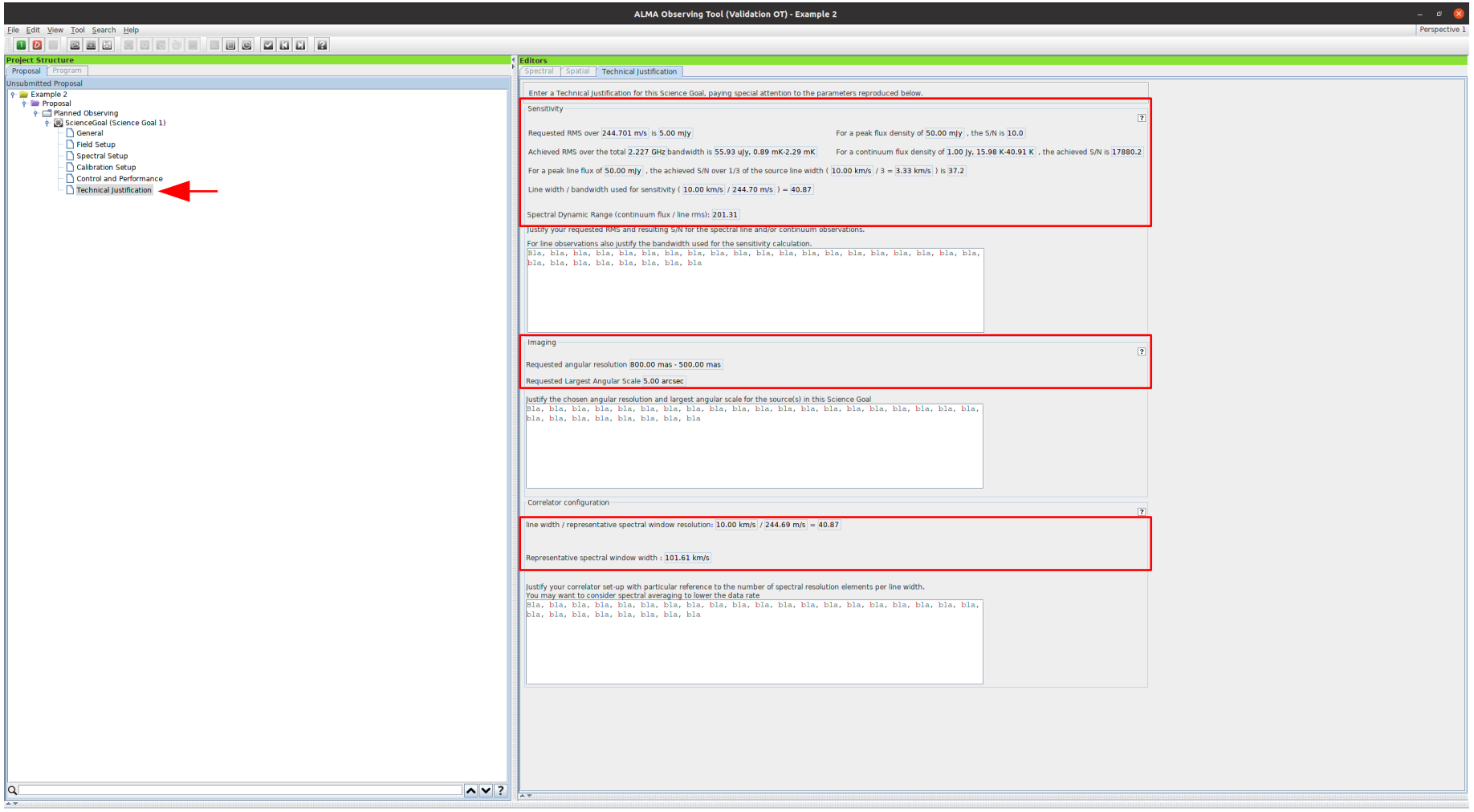
Explore the different options

- *RepresentativeWindowBandWidth*: the bandwidth of the spectral window chosen as the representative spectral window (and containing the *Representative Frequency*) in Section 6
- *RepresentativeWindowResolution (default)*: the (Hanning-smoothed) spectral resolution of the representative spectral window, taking into account spectral averaging
- *AggregrateBandwidth*: the summed bandwidth of all your selected spectral windows
- *LargestWindowBandwidth*: the bandwidth of your widest spectral window defined
- *FinestResolution*: the finest (Hanning-smoothed) resolution of any spectral window, taking into account spectral averaging
- *User*: a bandwidth of your choice (useful if you are intending to smooth your data after observation to achieve a certain S/N)

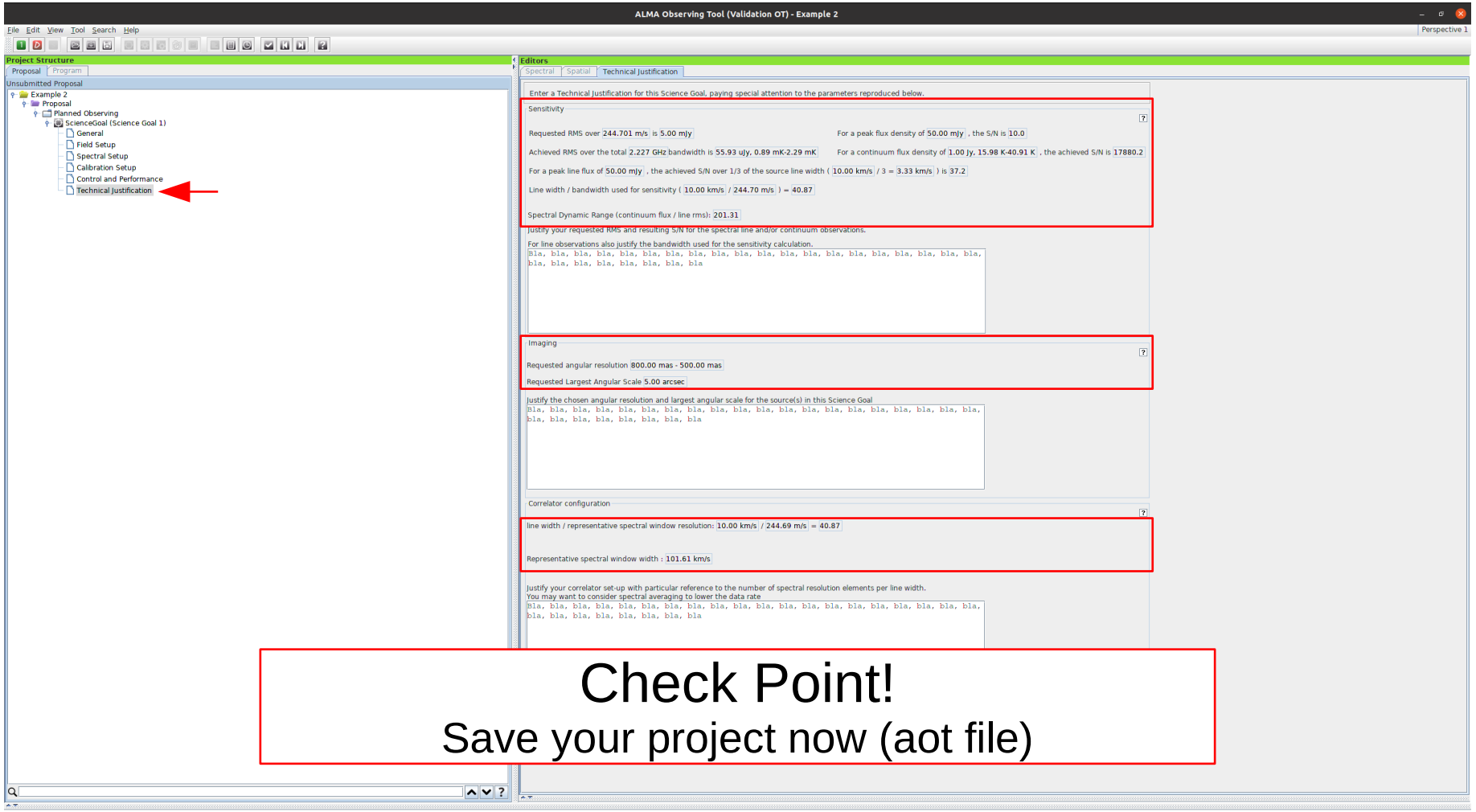
Example 2: Line observations of single target



Example 2: Line observations of single target



Example 2: Line observations of single target



Check Point!

Save your project now (aot file)

Lets propose!

(Phase 1)

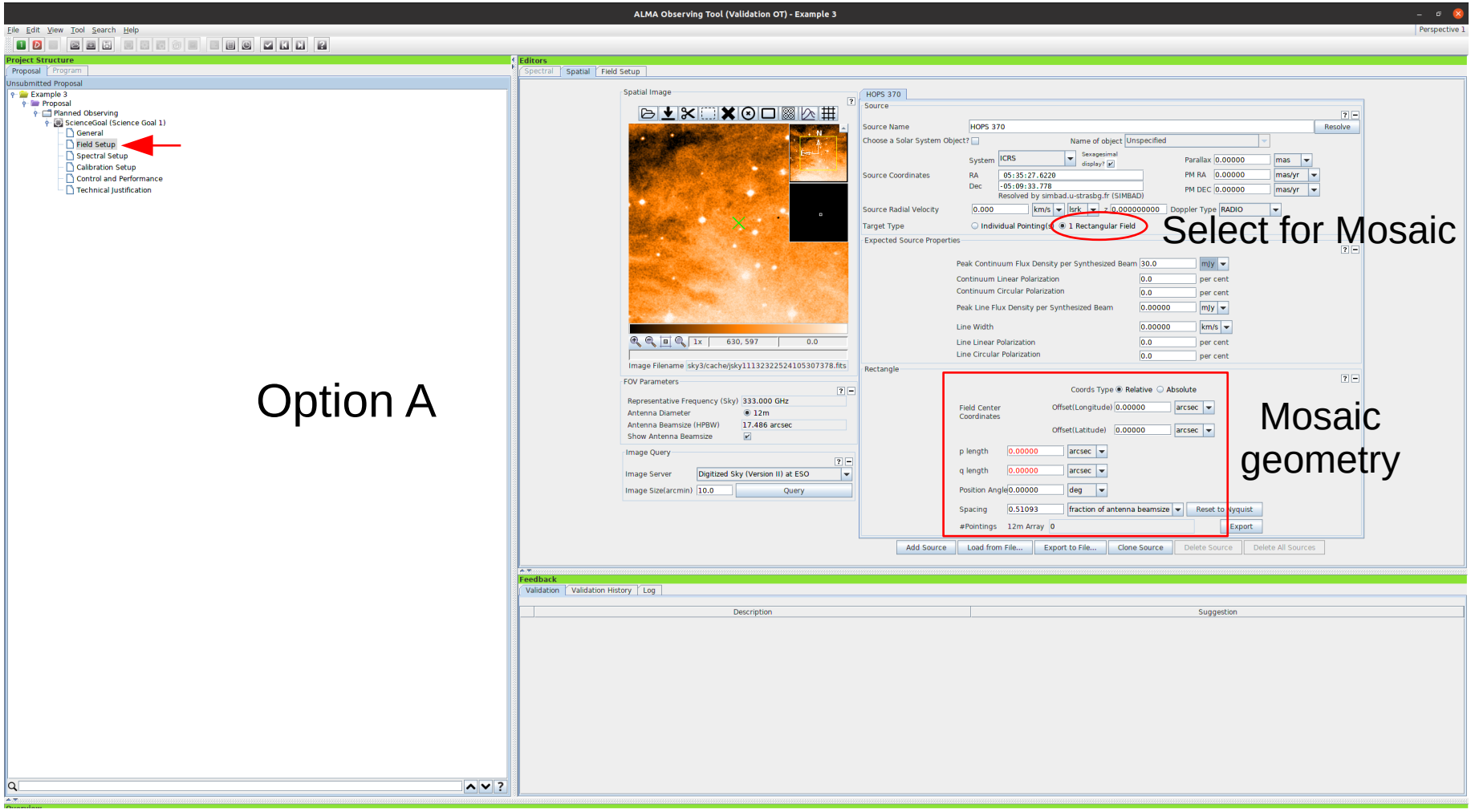
Example 3: Mosaic observations (e.g. mapping a star-forming filament)

- 1 Science Goal with 1 mosaic target

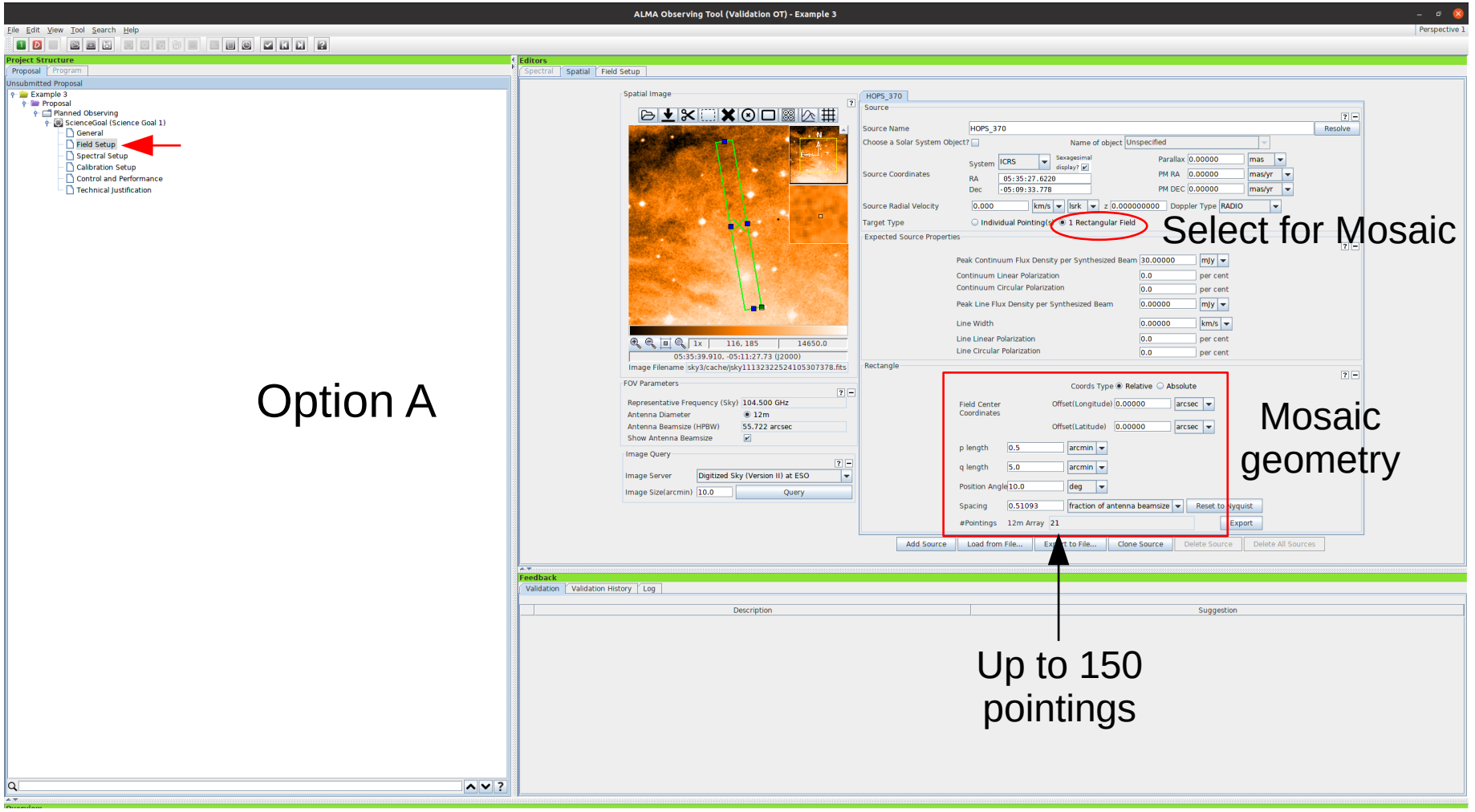
To do:

1) Open template created before
2) Add Science Goal
3) Fill in General field
4) Save it as Example 3

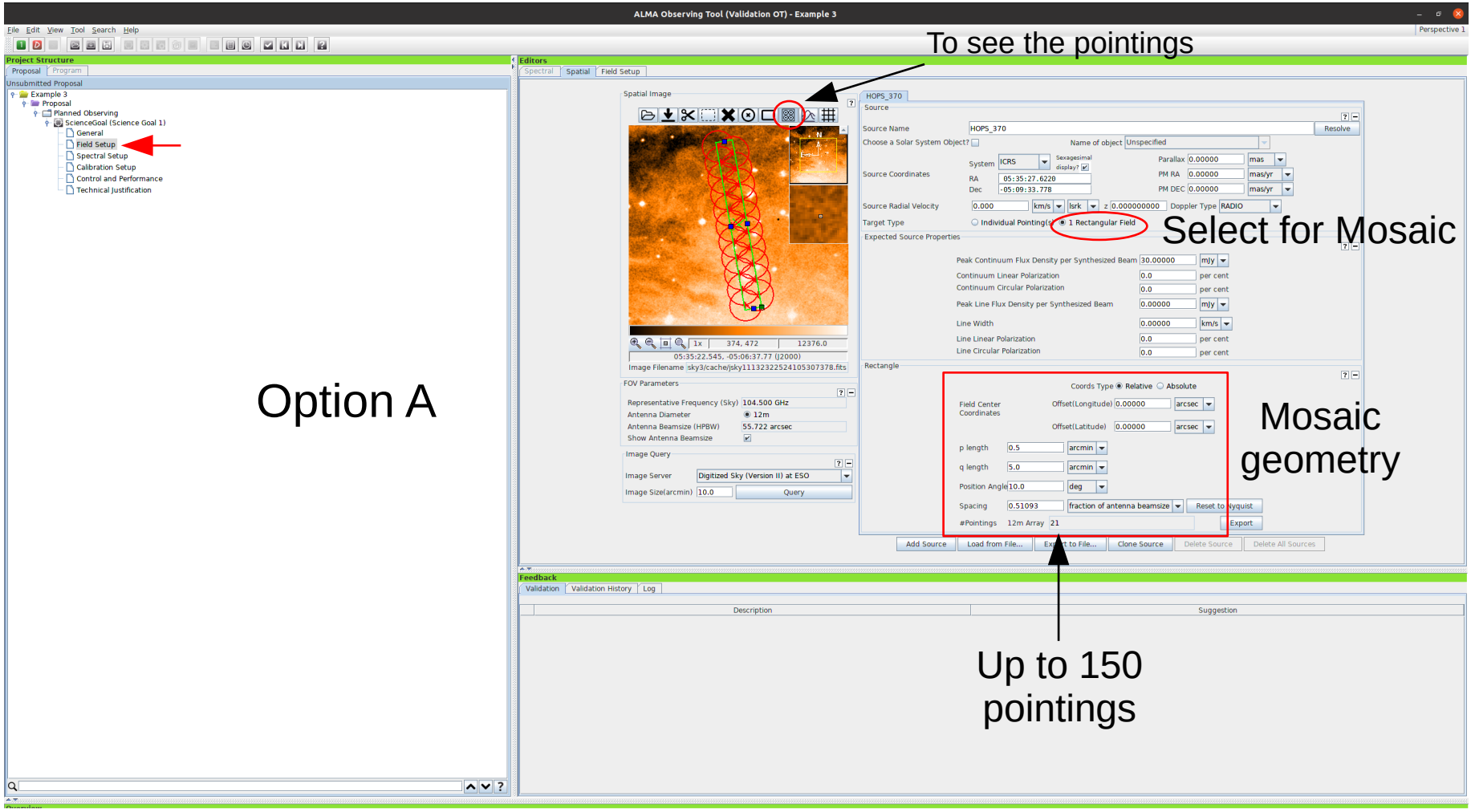
Example 3: Mosaic observations



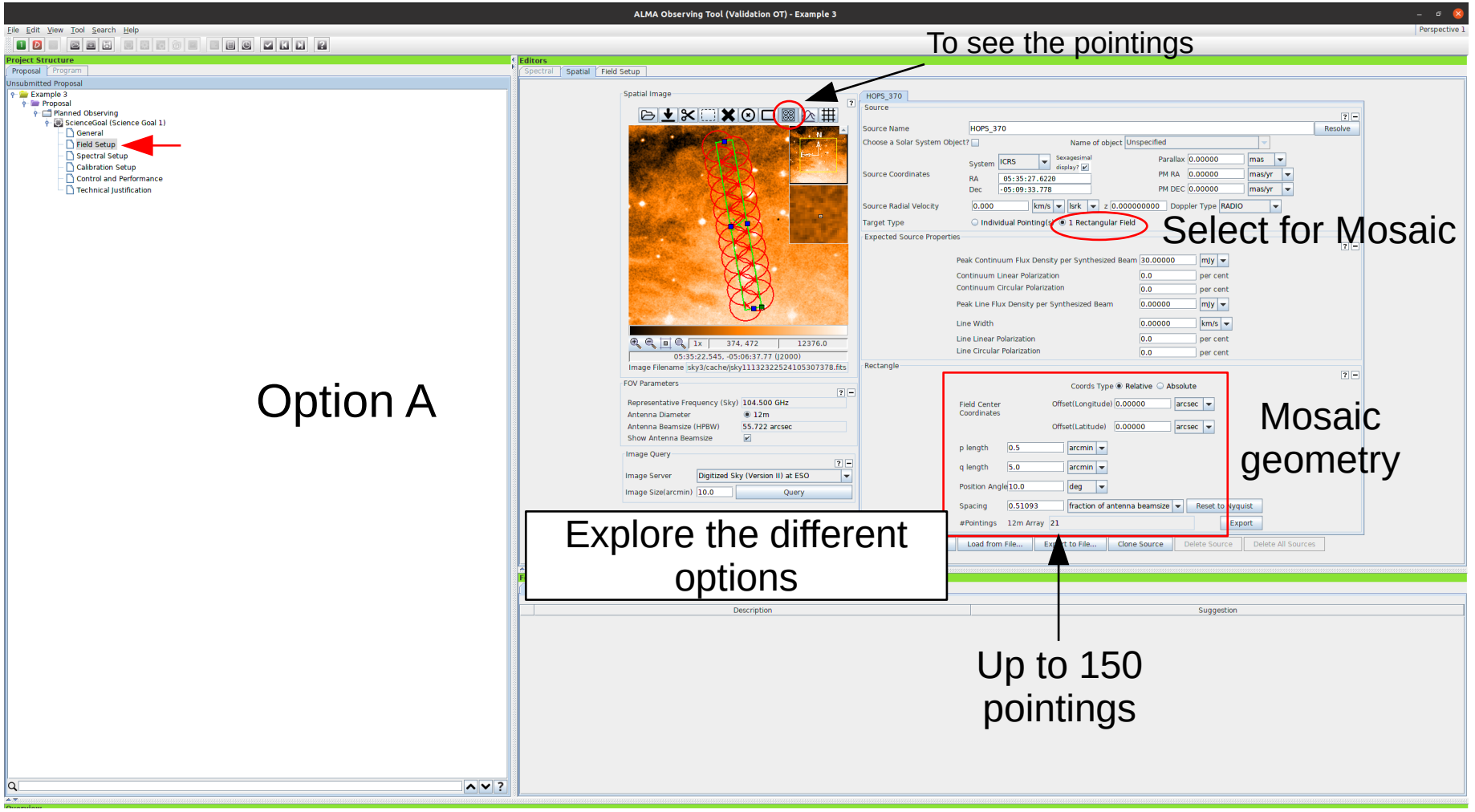
Example 3: Mosaic observations



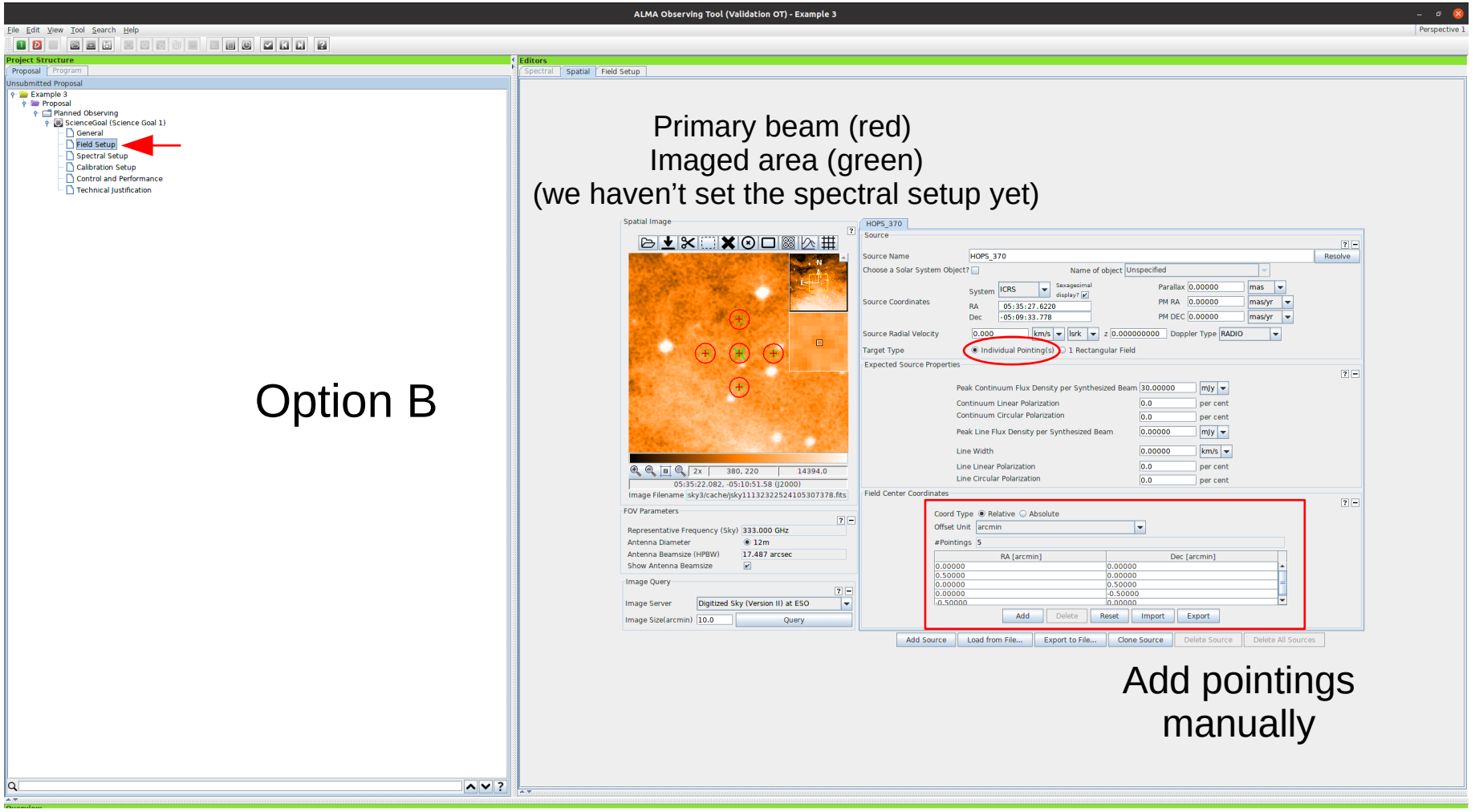
Example 3: Mosaic observations



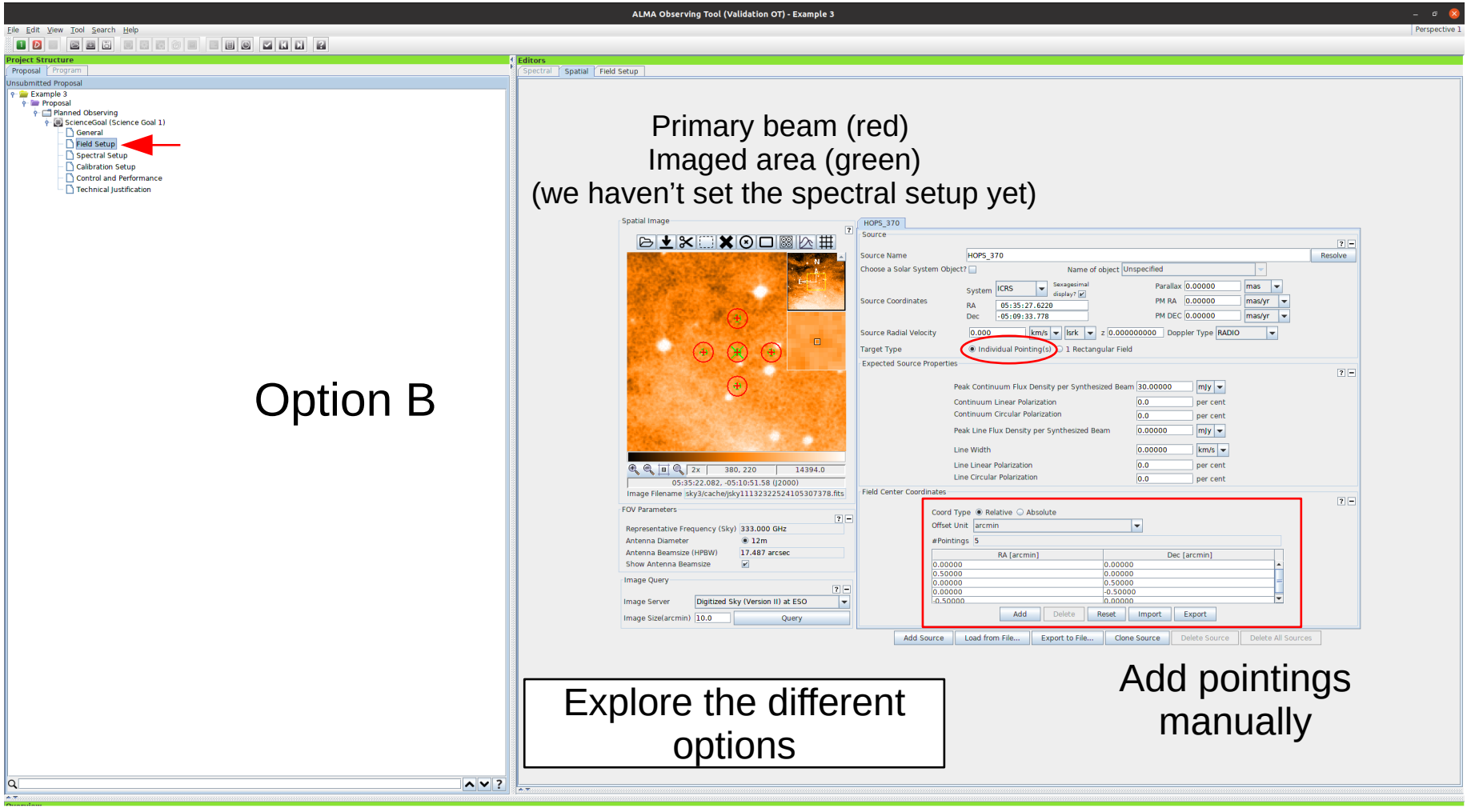
Example 3: Mosaic observations



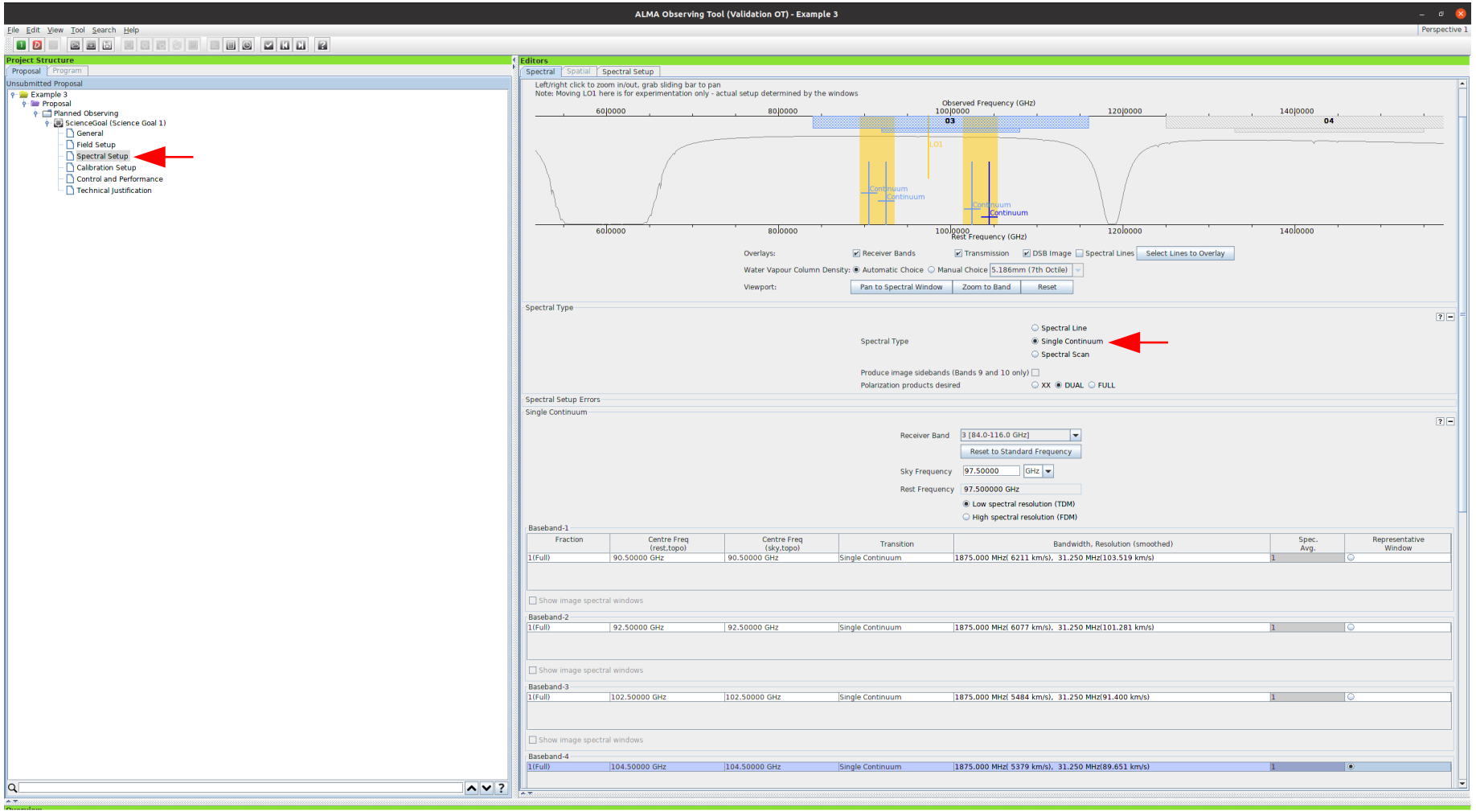
Example 3: Mosaic observations



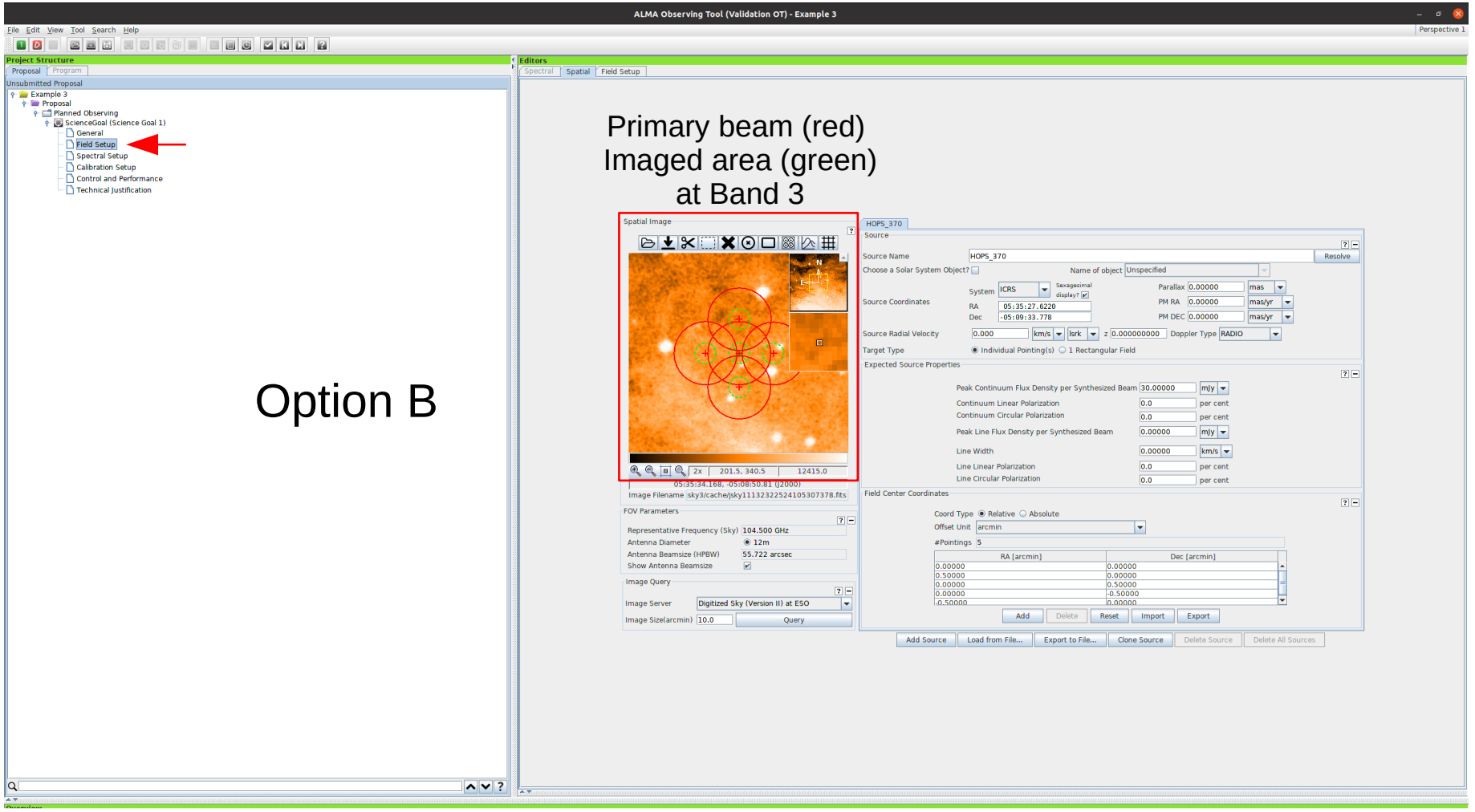
Example 3: Mosaic observations



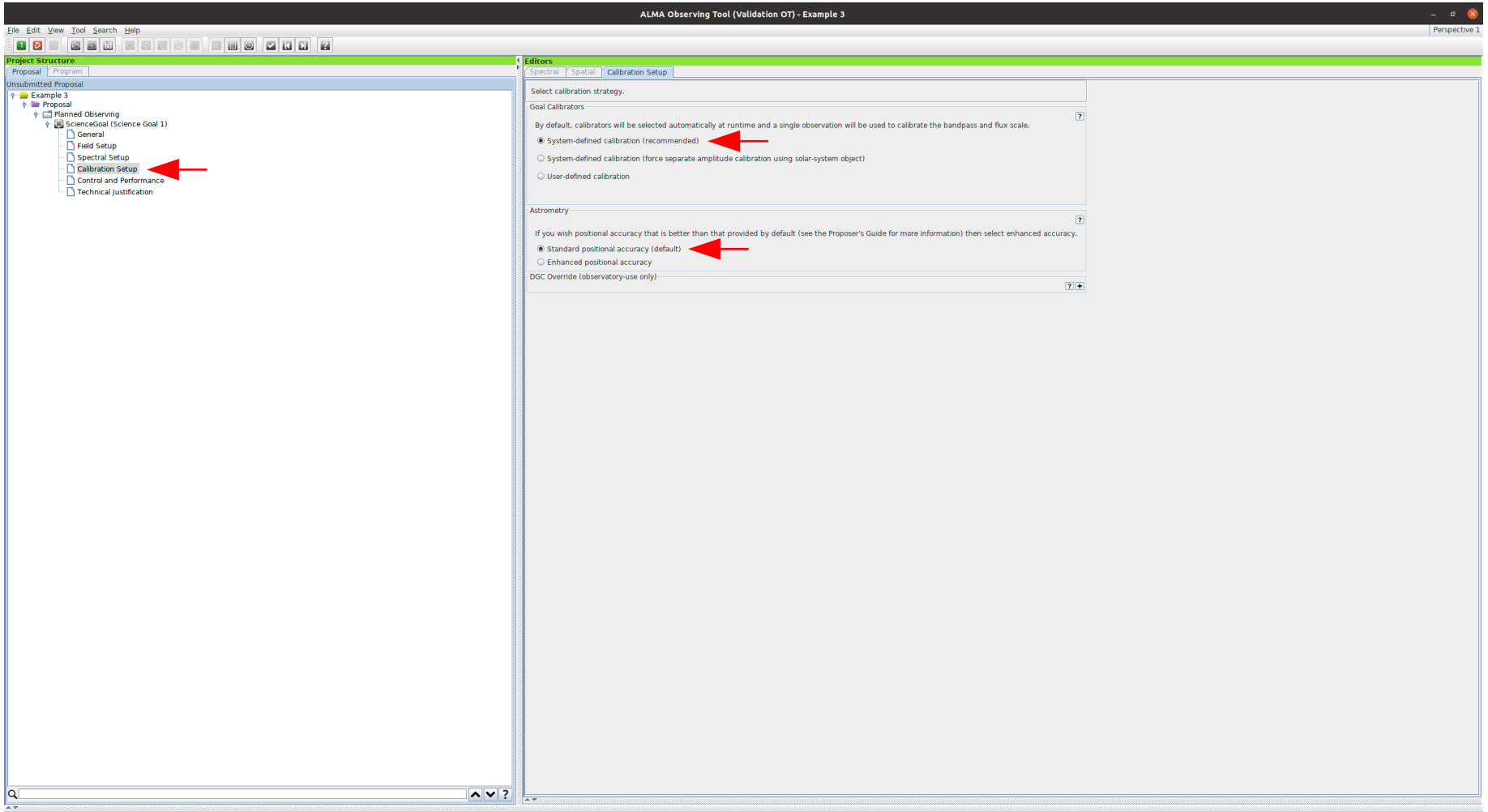
Example 3: Mosaic observations



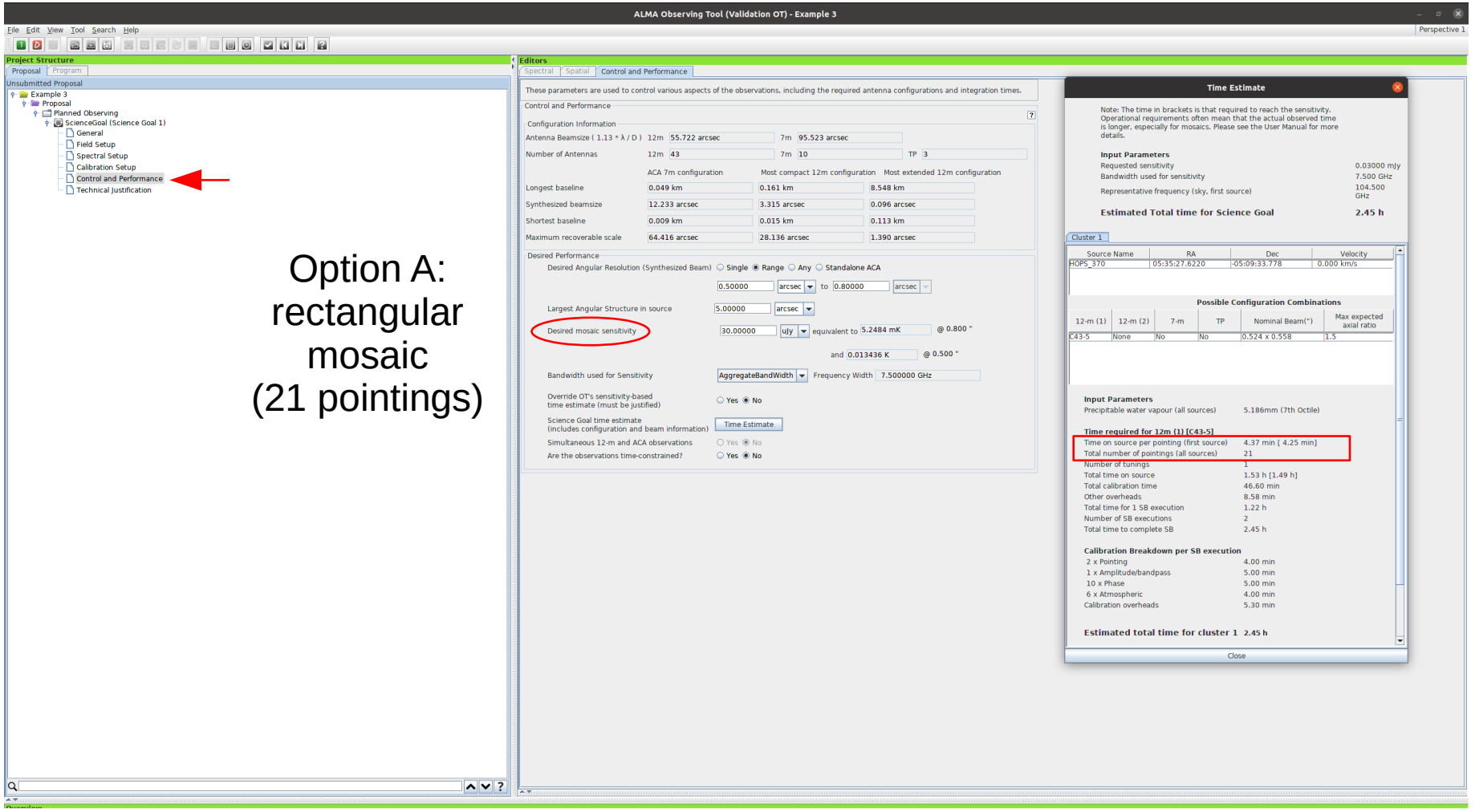
Example 3: Mosaic observations



Example 3: Mosaic observations

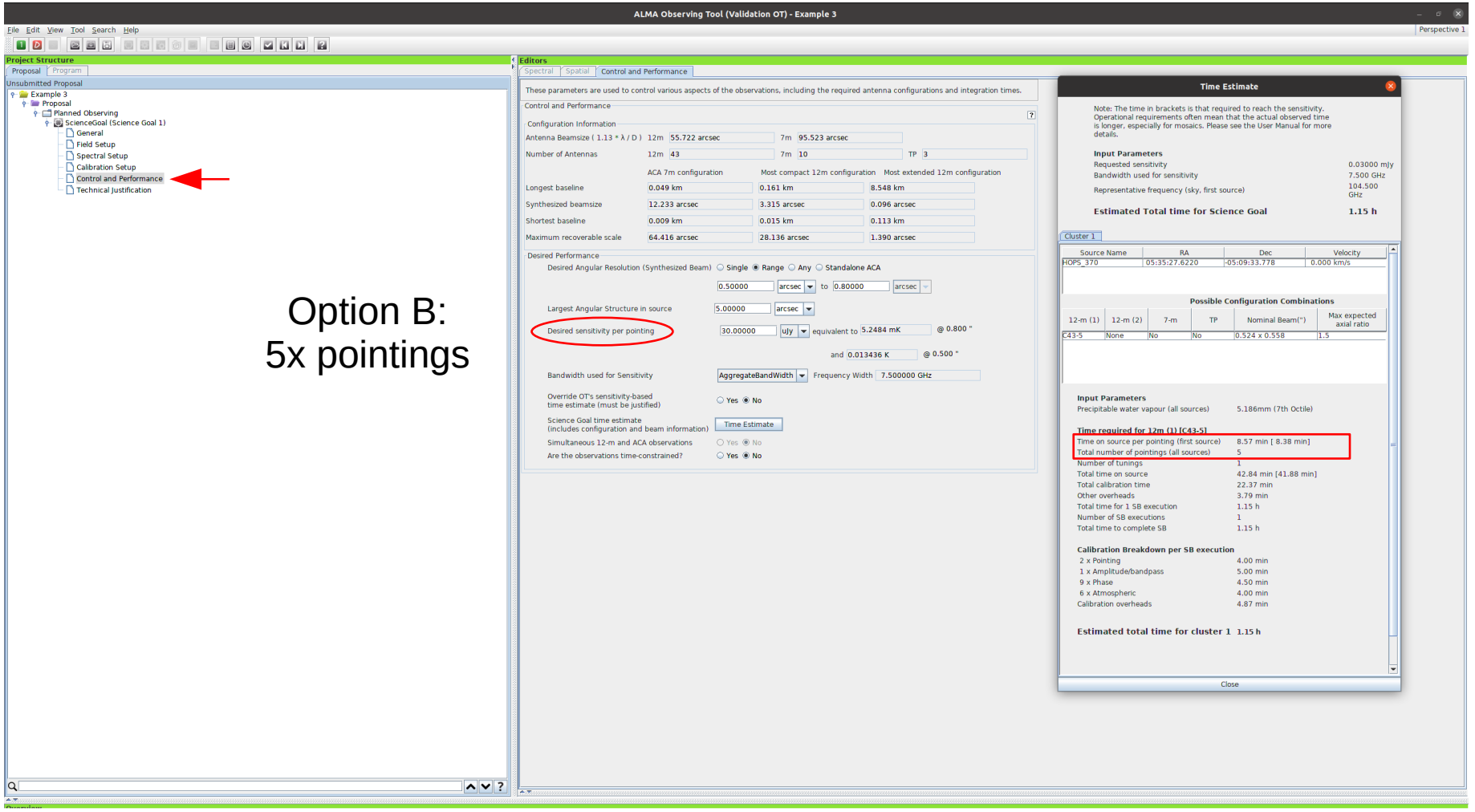


Example 3: Mosaic observations



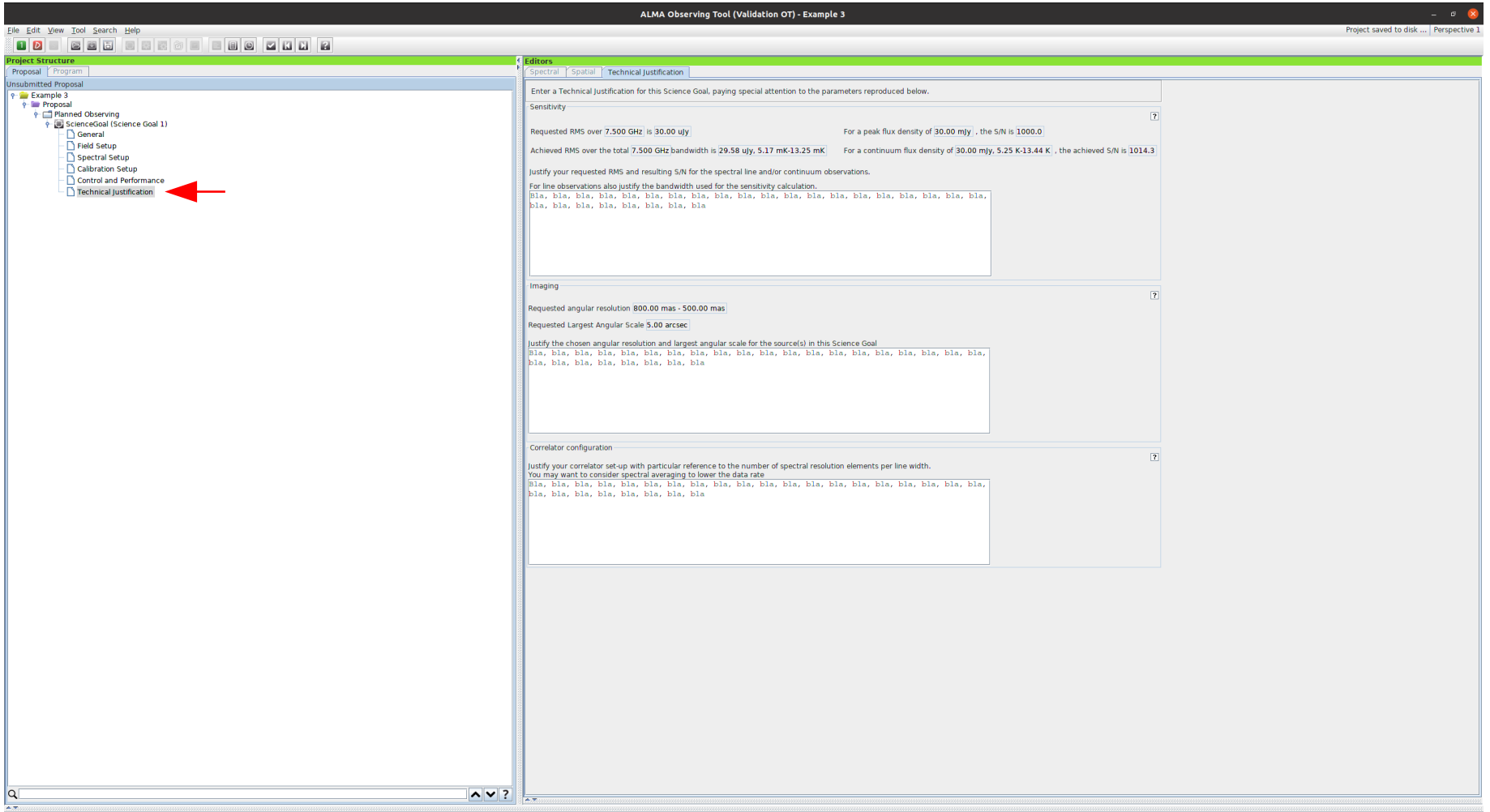
Option A: rectangular mosaic (21 pointings)

Example 3: Mosaic observations

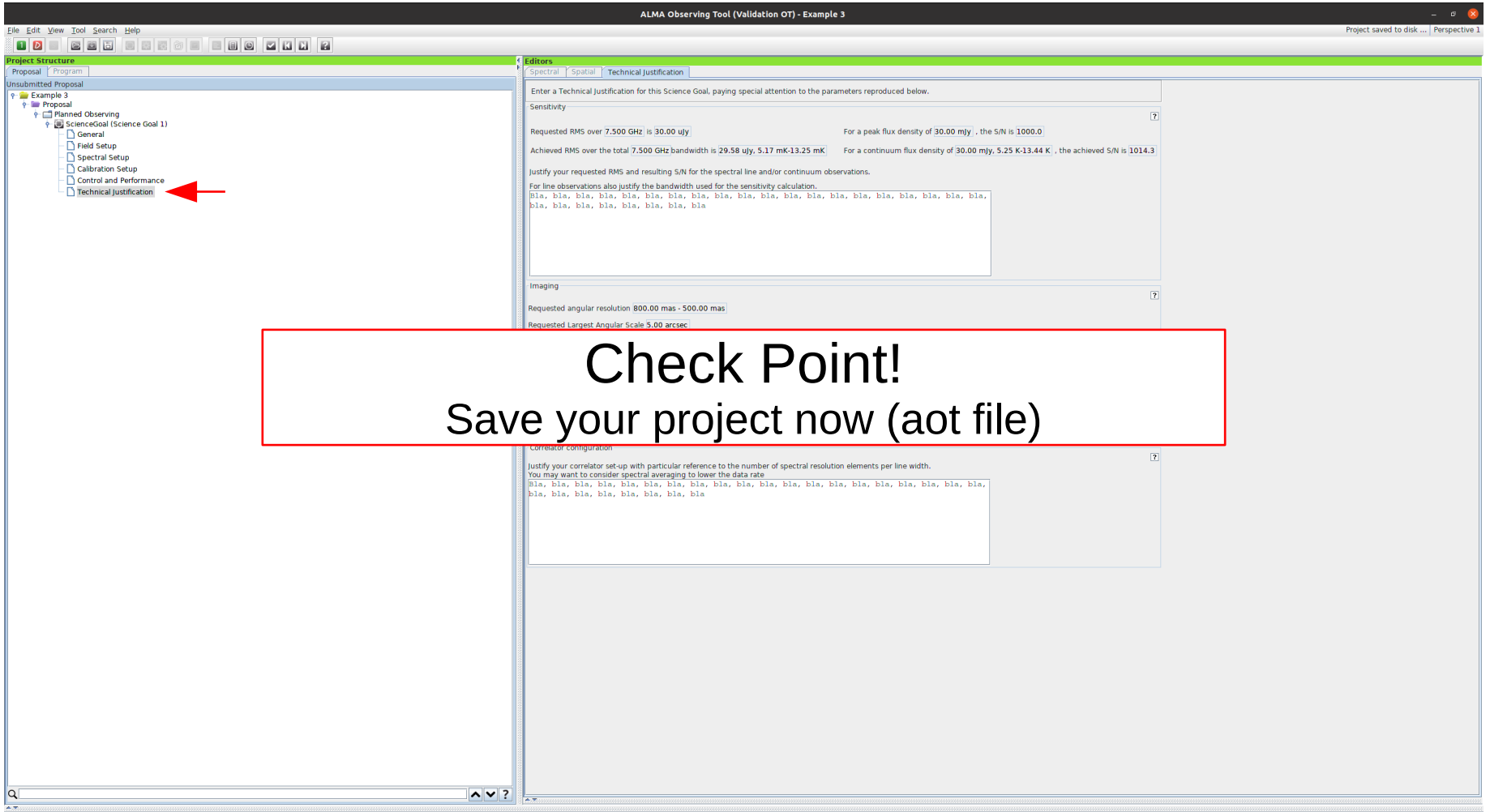


Option B:
5x pointings

Example 3: Mosaic observations



Example 3: Mosaic observations



Check Point!

Save your project now (aot file)

Congratulations!

Example 1: Continuum observations of several targets (e.g. survey of protostars)

Example 2: Line observations of single target (e.g. study kinematics of a protostellar disk)

Example 3: Mosaic observations (e.g. mapping a star-forming filament)

Final Recommendations

(thanks George, Adam & Anita!)

- Make sure all Co-Is have registered for an account with ALMA (or ESO) so that they can be listed on the proposal.
- Check the source coordinates, velocities and/or redshifts, and spectral settings before proposal submission. These can be updated later, but if more changes need to be made, more errors can be introduced.
- Use at least four spectral windows. Any spectral window not covering a line of scientific interest can be used for serendipitous continuum and spectral line detection.
- Use 1920 channels per baseband. The extra channels provide extra spectral resolution if needed, and if the higher resolution is not needed, the channels can be averaged together after observing to improve sensitivity.
- Do not use 3840 channels per spectral window. The effective spectral resolution will still be equivalent to 1920 channels.
- Do not place important spectral lines near the edges of spectral windows where the sensitivity of the detectors decreases.

- Do not try to gain sensitivity by overlapping the spectral windows. The instrument doesn't work that way.
- Do not change anything under Calibration Setup unless you know what you are doing.
- Do not specify a single angular resolution unless you absolutely need to. A program that specifies a range is more likely to be observed.
- Use "Any" for the desired angular resolution if you only need to detect the source.
- Do not forget to account for extended source emission in terms of uv coverage.
- Do not forget to account for extent of the source emission when estimating the peak surface brightness.