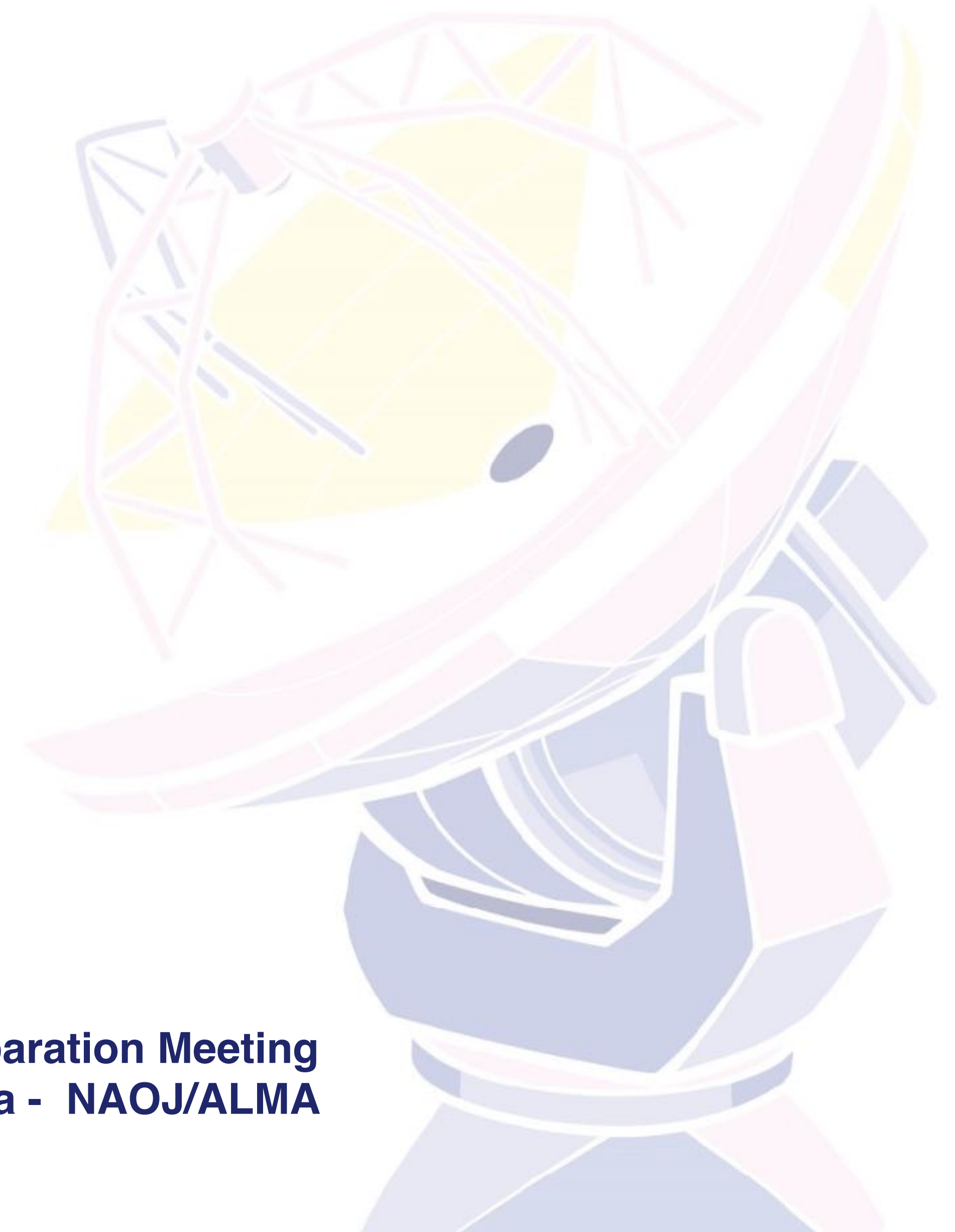


Observing Tool

Quick guide and new in Cycle 9, 2022

ALMA Cycle 9 Proposal Preparation Meeting
Jorge A. Zavala - NAOJ/ALMA

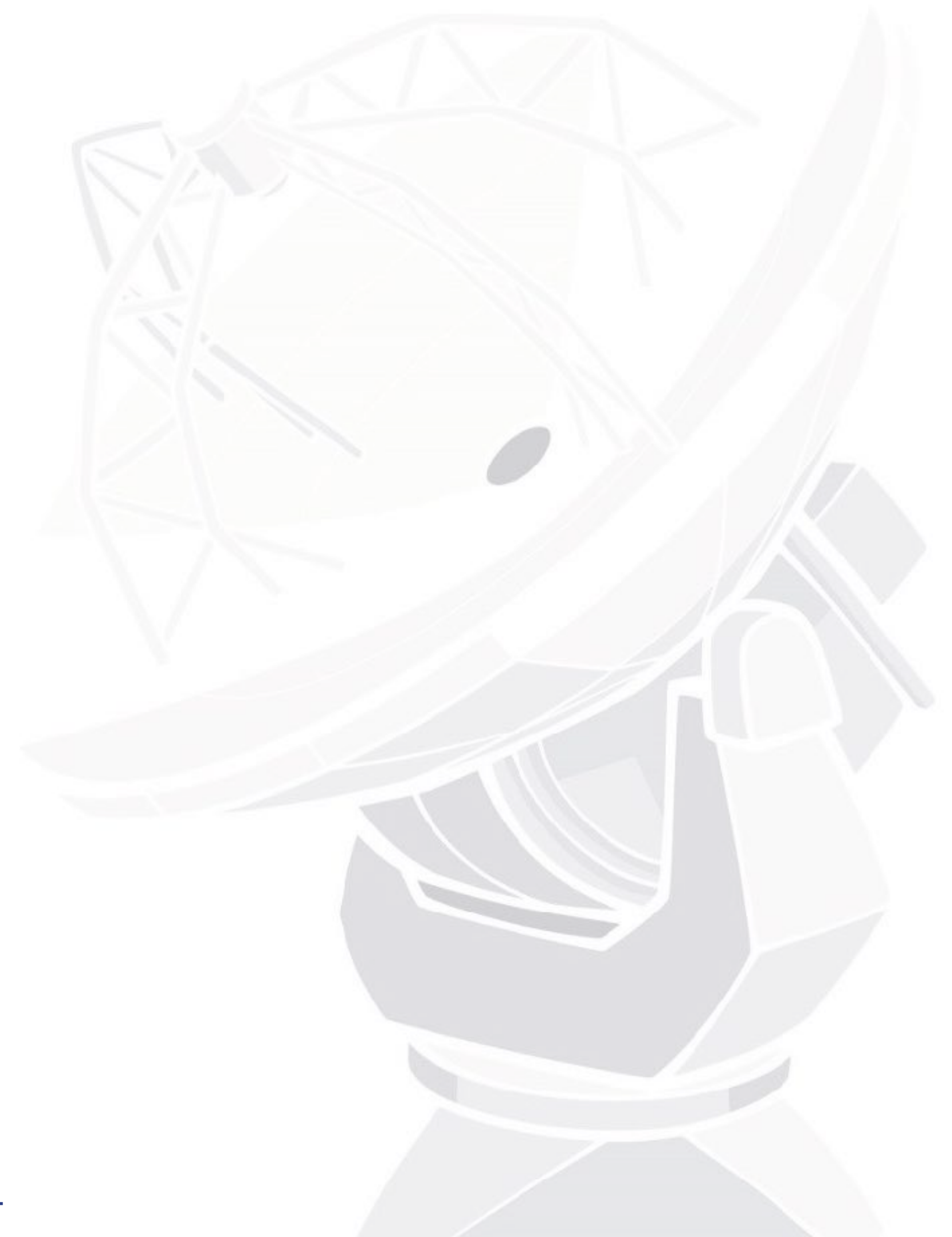


● Note that in order to submit proposals you will have to **register** with the ALMA Science Portal beforehand

● Proposers **must** use the appropriate version of the OT for the cycle 9



<https://almascience.nao.ac.jp/proposing/observing-tool>





Observing Tool

The ALMA Observing Tool (OT) is a Java desktop application used for the preparation and submission of Observing Blocks. It is also used for preparing and submitting Director's Discretionary Time (DDT) proposals and Science and Operations Office (SOO) proposals. The OT is configured for the present capabilities of ALMA as described in the [Cycle 9 Call For Proposals](#). Note that the OT is not available for Cycle 0.

Download & Installation

The OT should run on all common operating systems and depends on a version of Java being available. In previous versions of the OT, a version of Java was installed, but the Cycle 9 version of the OT will come with its own version of Java 11. Since Java 11 does not include Web Start, this version of the OT is no longer available. The Cycle 9 OT can be downloaded from the [ALMA Observing Tool](#) page.

It is recommended that the OT be installed using the ALMA **OT Installer**. This uses a modern graphical installer that allows users to change various settings from their defaults, including the amount of memory the OT may use. The installation will produce an executable file. In previous versions of the OT, the installation of the tool are no longer possible, but the OT will detect if an update is available at start-up and inform the user.

The **tarball** version must be installed manually and the instructions for doing this have not changed.



Documentation


Extensive documentation is available to help you work with the OT and optimally prepare your proposal:

- If you are a novice OT user you should start with the [OT Quickstart Guide](#), which takes you through the basic steps of ALMA proposal preparation.
- Audio-visual illustrations of different aspects of the OT can be found in the [OT video tutorials](#). These are recommended for novices and advanced users alike.
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If you have problems with the OT, particularly with installation and/or startup, please see the [troubleshooting page](#). A list of currently known bugs, their status and possible workarounds can be found on the regularly updated [known OT Issues](#) page. A further source of information is the [OT section of the ALMA Helpdesk Knowledgebase](#) - this contains a number of articles that deal with frequently-asked questions. After exploring these resources, if confusion over some aspect of the OT remains, or if a previously unidentified bug has been uncovered, please file a [Helpdesk ticket](#).

- Observing Tool
- Sensitivity Calculator
- CASA Simulator
- Observation Support Tool
- Splatalogue
- Science Ready Data Products
- Toyama Microwave Atlas
- Community-Developed
- EU ARC network
- Staff Tools
- Japanese Virtual Obs.
- Solar Ephemeris



- [Mac OS Installer](#)
- [Linux Installer](#)
- [Windows Installer](#)

Starting the OT....

The screenshot shows the NAOJ proposal submission software interface. The main window is titled "Perspective" and contains several panels:

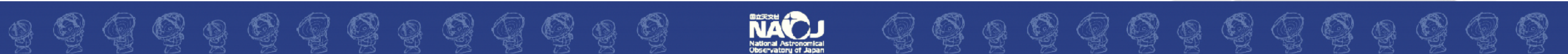
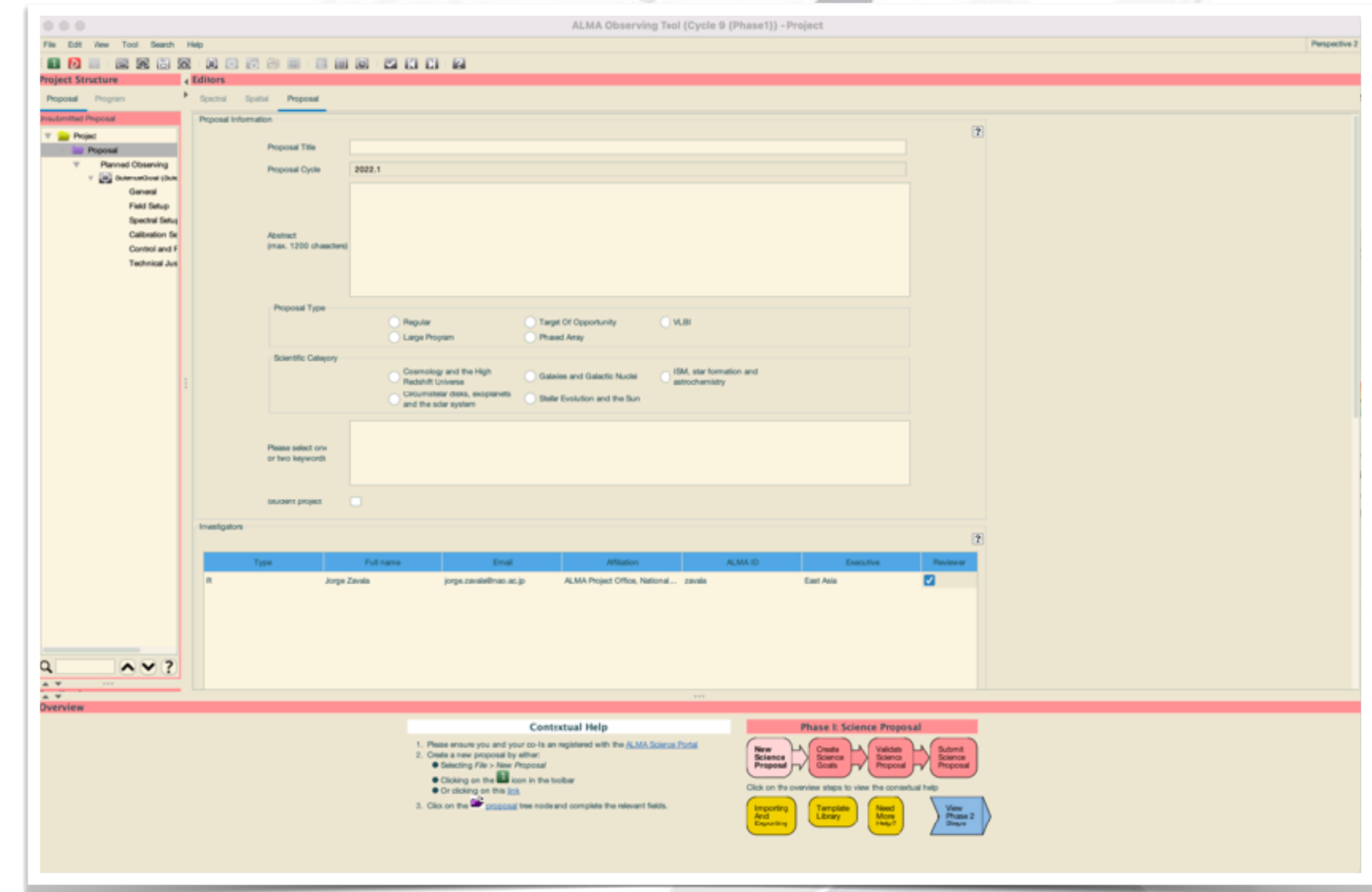
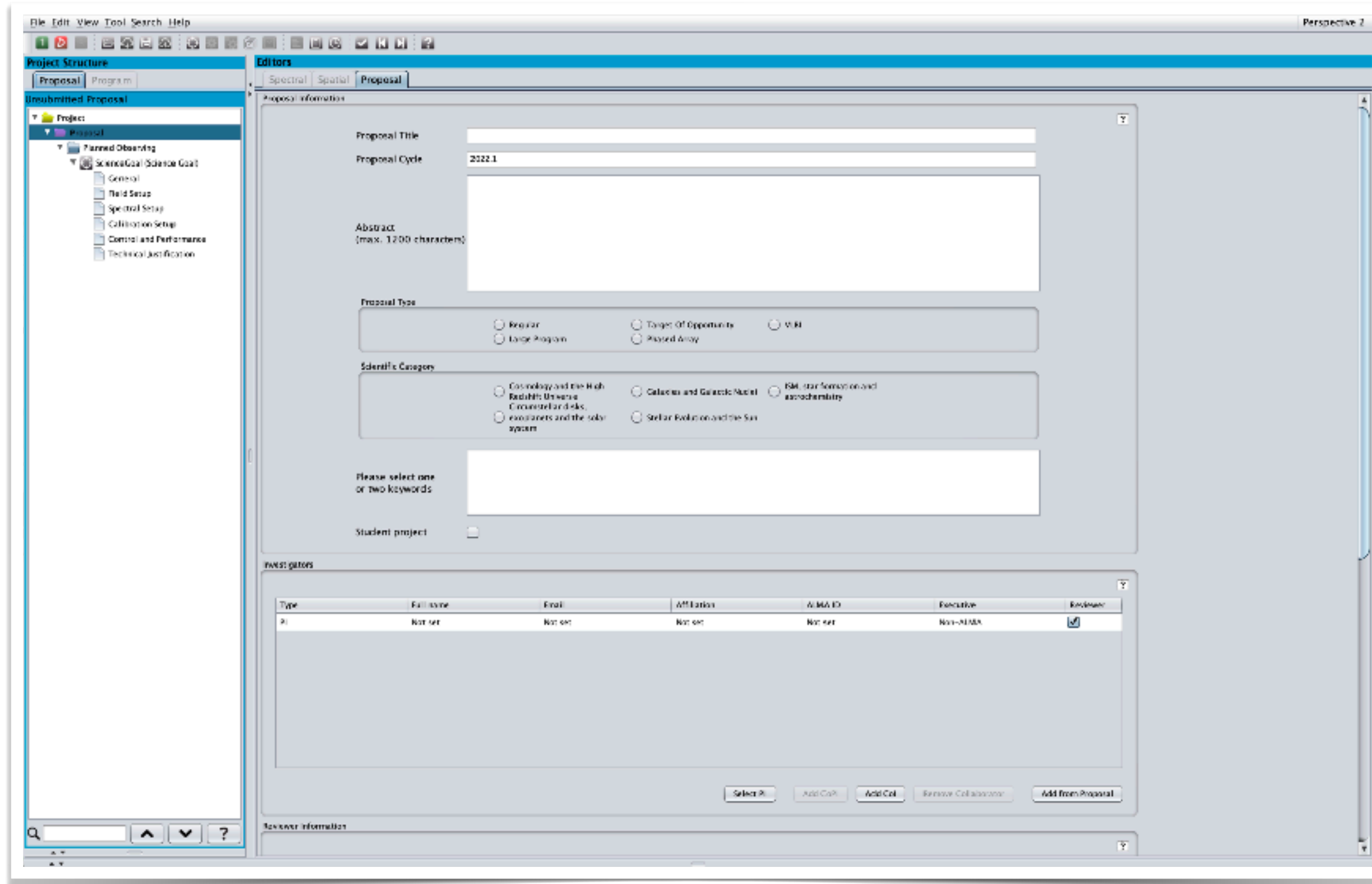
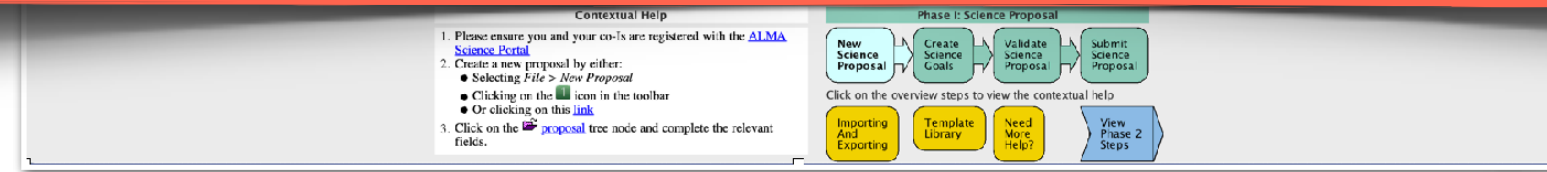
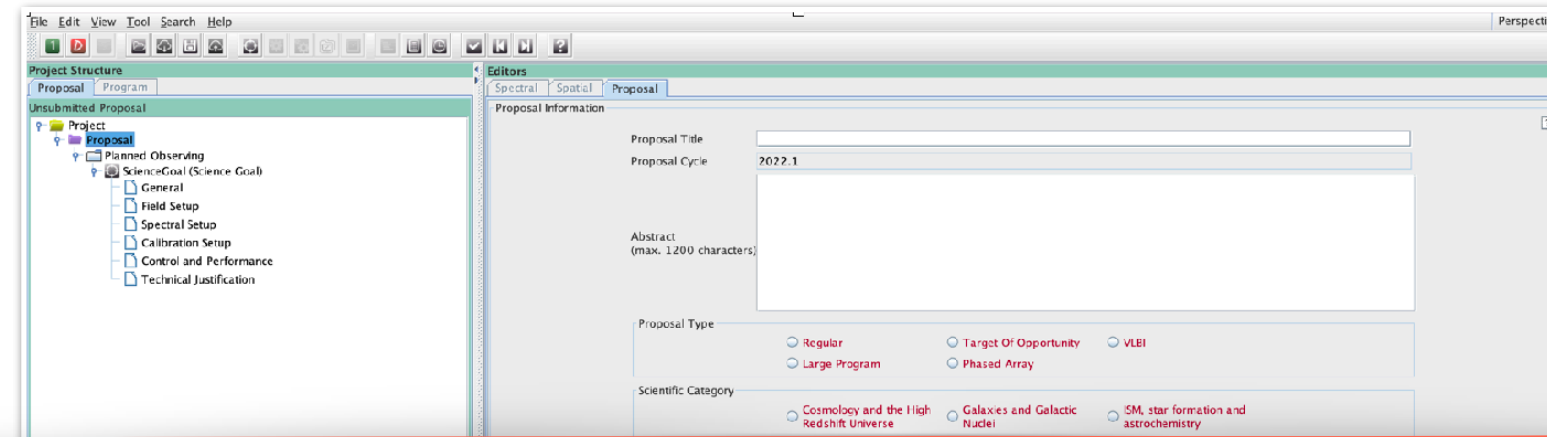
- Project Structure:** A tree view on the left showing the hierarchy: Project > Proposal > Planned Observing > ScienceGoal (Science Goal) > General, Field Setup, Spectral Setup, Calibration Setup, Control and Performance, Technical Justification.
- Editors:** A central panel with tabs for "Spectral", "Spatial", and "Proposal". The "Proposal" tab is active, showing "Proposal Information" with fields for:
 - Proposal Title: [Text Input]
 - Proposal Cycle: 2022.1
 - Abstract (max. 1200 characters): [Text Area]
 - Proposal Type: Radio buttons for Regular, Target Of Opportunity, VLEI, Large Program, Phased Array.
 - Scientific Category: Radio buttons for Cosmology and the High Redshift Universe, Galaxies and Galactic Nuclei, ISM, star formation and astrochemistry, Circumstellar disks, exoplanets and the solar system, Stellar Evolution and the Sun.
 - Please select one or two keywords: [Text Input]
 - Student project:
- Feedback:** A panel at the bottom with tabs for "Validation", "Validation History", and "Log". It contains a table with columns "Description" and "Suggestion".
- Overview:** A panel at the bottom with:
 - Contextual Help:** A list of instructions: 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:** A flowchart showing the steps: New Science Proposal -> Create Science Goals -> Validate Science Proposal -> Submit Science Proposal. Below it are buttons for "Importing And Exporting", "Template Library", "Need More Help?", and "View Phase 2 Steps".



Preferences...



The OT GUI can be made more modern by selecting a 'flat' look and feel. You can customise the look and feel by selecting *File > Preferences > Appearance > Look and Feel*. This also appears to speed up the GUI's response times.



Proposal editor...

Create new Science Goal



It is now possible to select a predefined continuum setup in Band 7 – in addition to Band 3 and Band 6, that were already available – for VLBI proposals. VLBI spectral-line observing is now also allowed only in Band 3, even though this is significantly different to the standard ALMA case. The VLBI data are only taken in a single spectral window at a fixed sky frequency of 86.268 GHz, this being used to observe the SiO $v = 1(2 - 1)$ line with a rest frequency of 86.243370 GHz. None of the parameters of this spectral window can be edited by the user. It is also necessary to enter a date for the observation in the time-constraint interface (*Control and Performance*) in order for the OT to check that the line will be observable.



It was previously the case that solar observing with the Total Power (TP) array would only produce maps of the full solar disc. It is now, however, possible to also obtain TP imaging of the area of interest on the Sun's surface, i.e., that imaged by the interferometric array. The TP regional mapping area will be centred on the interferometric mapping position.



Observations using Band 8 can be proposed with all configurations. Observations in Band 9 are now also allowed in configurations C-8 and C-9 and Band 10 observations in configuration C-8.



Proposal editor...



Proposal review for proposals that are neither Large Programs or ToOs, will now be done using distributed peer review i.e. the reviewing will be done by the PIs submitting such proposals. Unless Large Program is selected, the OT will require that one of the investigators be selected as a proposal reviewer. If this person is the PI and does not have a PhD, a mentor can be named who would assist the PI with the reviewing.

The screenshot shows the 'Proposal editor' interface. On the left is the 'Project Structure' tree with 'Unsubmitted Proposal' expanded to show 'Planned Observing' and 'ScienceGoal (Science Goal)'. The main area is divided into 'Editors' (Spectral, Spatial, Proposal) and 'Reviewers' (Investigators, Reviewer Information, Science Case). The 'Investigators' table has a 'Reviewer' checkbox checked for the PI. The 'Reviewer Information' section includes instructions and a 'Select Mentor' button. The 'Science Case' section has an 'Attach' button.

Type	Full name	Email	Affiliation	ALMA ID	Executive	Reviewer
PI	Jorge Zavala	jorge.zavala@nao.ac.jp	ALMA Project Office, Nation...	zavala	East Asia	<input checked="" type="checkbox"/>

Reviewer Information

Please designate a reviewer who will participate in the distributed review process. The reviewer may be the PI of the proposal or one of the other investigators. A student (without a PhD) may serve as the reviewer only if they are the PI of the proposal and a mentor (with a PhD) is identified. The mentor does not need to be an investigator on the proposal.

Reviewers are requested to update their user profiles with combinations of scientific categories and keywords which describe their area(s) of expertise using the new 'Expertise' tab in <https://asa.alma.cl/UserRegistration/secure/updateAccount.jsp>. Available expertise information will be used in the distribution of proposal assignments.

Reviewer has a PhD? No Yes

Select Mentor

Mentor name: Misato Fukagawa

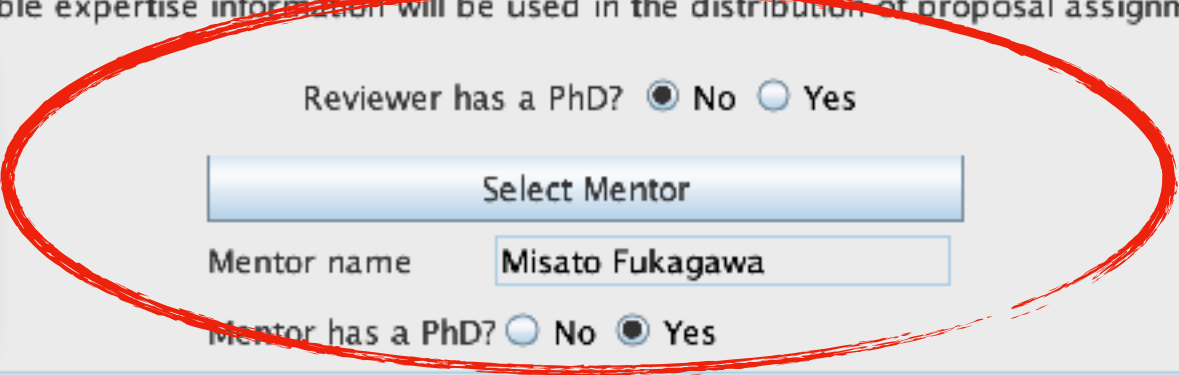
Mentor has a PhD? No Yes

Science Case

Please ensure that your science case is properly anonymized following instructions on the Science Portal

Science Case (Mandatory, PDF, 4 pages max.) [] [Attach] [Detach] [View]

The fonts used in the PDFs must have a minimum size of 12 points. The OT will issue an error if >15 per cent of the text is smaller than 12 points. Be aware that an image cropped from another PDF may contain text that lay outside of the cropped area, even though this is not displayed.

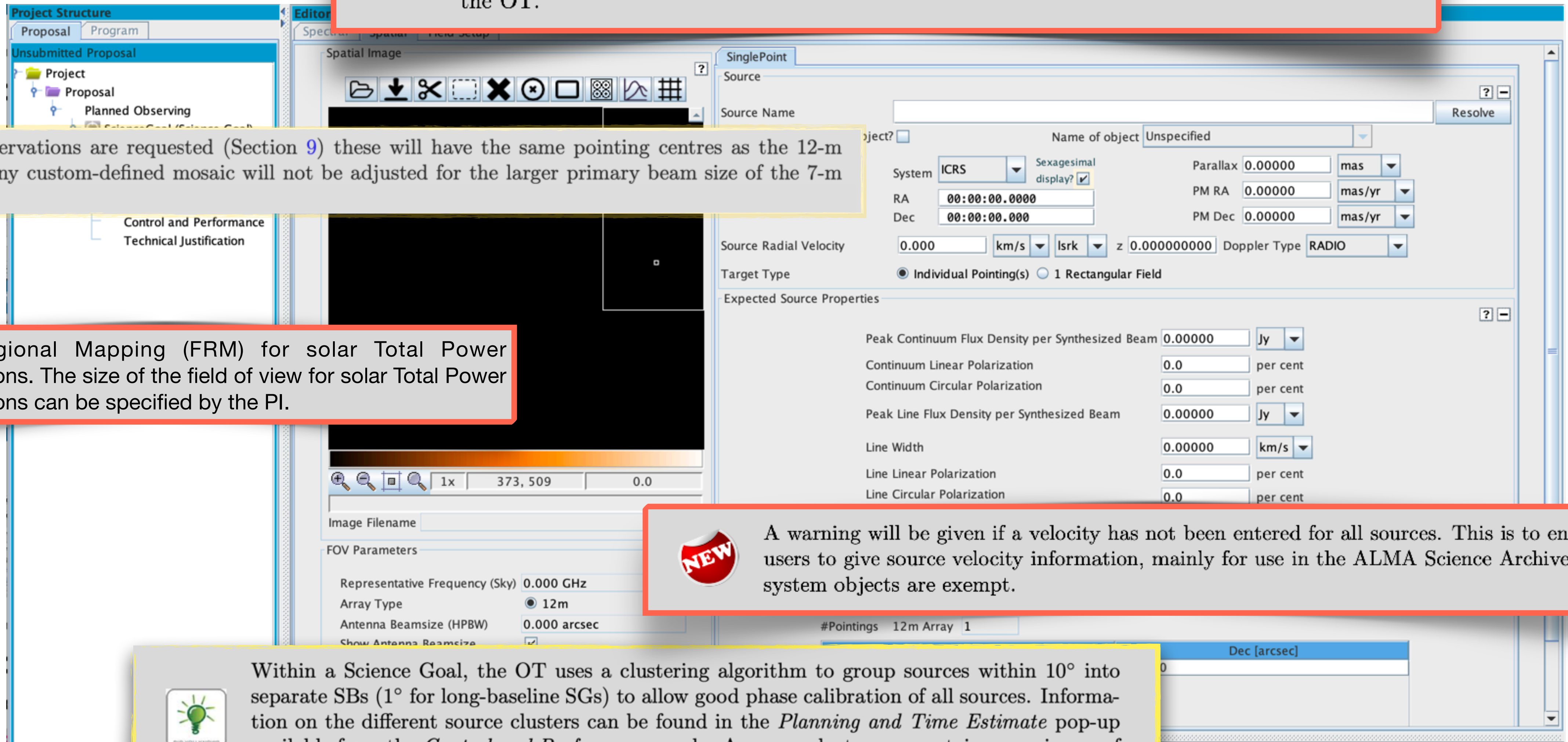


Field setup...

Mosaics



The algorithm for tiling a rectangular area with mosaic pointings has been updated such that it is now possible to have an even number of pointings along a single row. In general, it is likely that there will be small differences in the number pointings compared to previous versions of the OT.



If ACA 7-m observations are requested (Section 9) these will have the same pointing centres as the 12-m pointings defined; any custom-defined mosaic will not be adjusted for the larger primary beam size of the 7-m antennas.

NEW Fast Regional Mapping (FRM) for solar Total Power observations. The size of the field of view for solar Total Power observations can be specified by the PI.



A warning will be given if a velocity has not been entered for all sources. This is to encourage users to give source velocity information, mainly for use in the ALMA Science Archive. Solar-system objects are exempt.



Within a Science Goal, the OT uses a clustering algorithm to group sources within 10° into separate SBs (1° for long-baseline SGs) to allow good phase calibration of all sources. Information on the different source clusters can be found in the *Planning and Time Estimate* pop-up available from the *Control and Performance* node. A source cluster can contain a maximum of 150 pointings.

Spectral setup...

If you cannot find the transition you want in the Spectral Line Selector tool, try the *Search Online* button: you will then be able to search online from a more extensive database.

1 Spectral Line

2 Single continuum

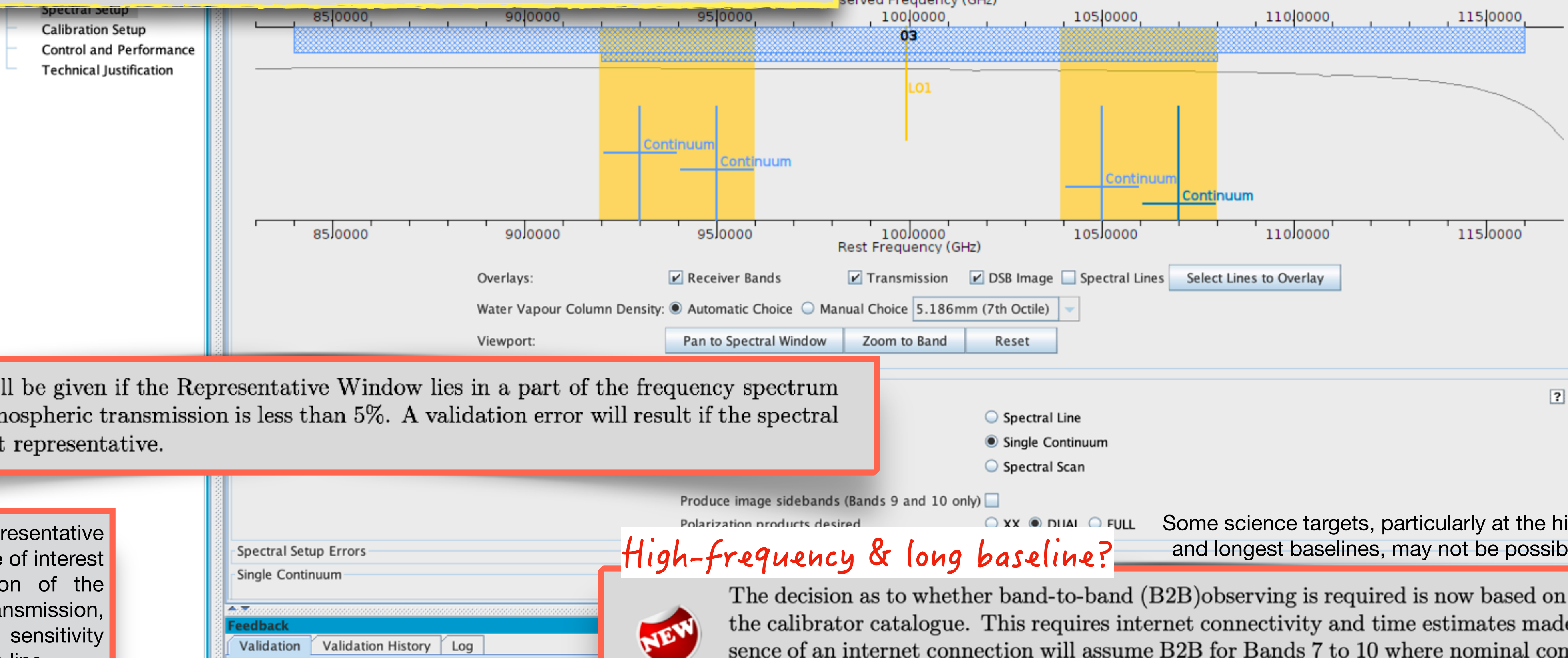
3 Spectral scan

Spectral scans



Despite the recent increases in observing efficiency, spectral scans can still have very high time estimates. This will happen mostly for observations with relatively long on-source times and many frequency tunings. It may be more efficient to set up such spectral scans using separate Science Goals for each frequency tuning.

as the total Fraction per baseband is no more than 1. have a different bandwidth and resolution. with one in the other.



A warning will be given if the Representative Window lies in a part of the frequency spectrum where the atmospheric transmission is less than 5%. A validation error will result if the spectral window is not representative.

It is important that the representative frequency is set to the line of interest that falls into the region of the poorest atmospheric transmission, otherwise the requested sensitivity will not be reached for this line.

High-frequency & long baseline?



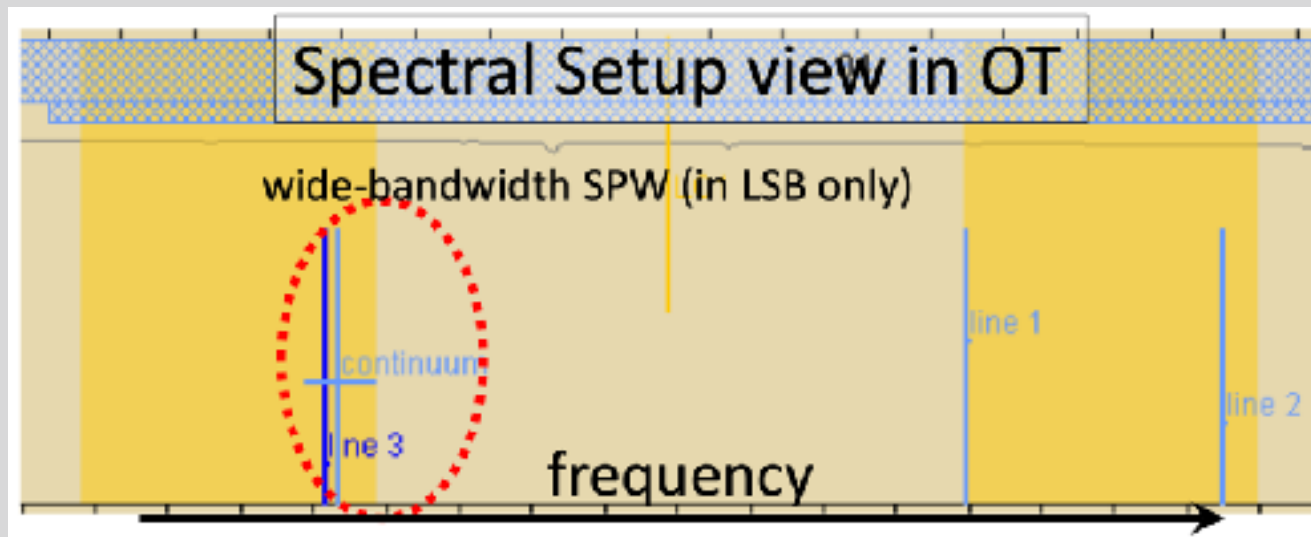
The decision as to whether band-to-band (B2B) observing is required is now based on a search of the calibrator catalogue. This requires internet connectivity and time estimates made in the absence of an internet connection will assume B2B for Bands 7 to 10 where nominal configurations C-8 and larger are required.

Some science targets, particularly at the highest frequencies and longest baselines, may not be possible even with B2B

Spectral setup...

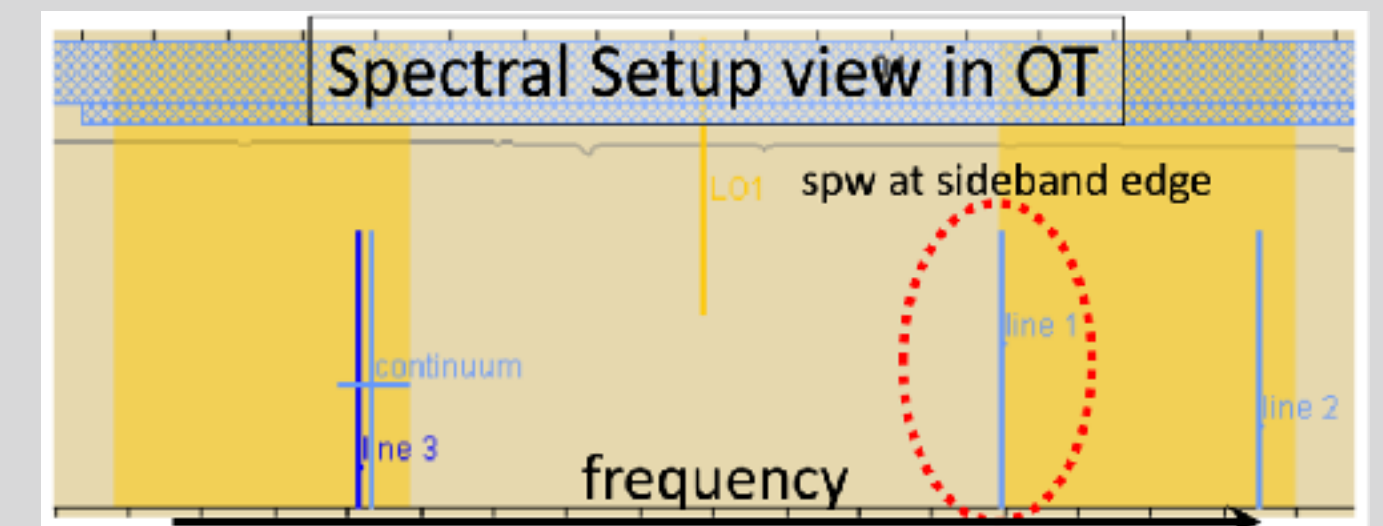
The screenshot shows the 'Spectral Setup' window in the OT software. The main plot displays 'Observed Frequency (GHz)' on the x-axis (95,000 to 115,000) and 'Rest Frequency (GHz)' on the bottom x-axis (90,000 to 105,000). A yellow shaded region represents the 'Continuum' observation, and a blue shaded region represents the 'SPW at sideband edge'. A vertical line labeled 'LO1' is positioned at 100,000 GHz. The interface includes a 'Project Structure' tree on the left, a 'Visualisation' text box with instructions, and a control panel with 'Overlays' (Receiver Bands, Transmission, DSB Image, Spectra), 'Water Vapour Column Density' (Automatic Choice, Manual Choice: 5.186mm (7th Octile)), and 'Viewport' (Pan to Spectral Window, Zoom to Band, Reset) buttons. At the bottom, there are radio buttons for 'Spectral Type' (Spectral Line, Single Continuum, Spectral Scan) and 'Polarization products desired' (XX, DUAL, FL).

Narrow BW observations



Narrow-bandwidth (BW) spectral windows (SPWs) may bring difficulties at gain calibration (low S/N), adding one or more wide-BW SPW(s) for continuum is encouraged.

SPW at sideband edge



spectral windows placed at the very edge of a sideband likely suffer excess noise due to high system temperature and/or low system gain. This will cause relatively low sensitivity and/or excess gain/flux error.

Control and performance...



Users do not directly select whether ACA 7-m and/or Total Power observations should be added to their 12-m observations or not. Instead, the ACA is imposed by the OT if required to achieve the LAS requested. Whether or not ACA observations will be scheduled can be easily seen in the *Planning and Time Estimate* pop-up (see Fig. 11) or the Proposal Time Summary dialogue ("clock" icon on the menu bar).

These parameters are used to control various aspects of the observations, including the required antenna configurations and integration times.

Configuration Information

Antenna Beamsize ($1.13 * \lambda / D$) 12m 21.408 arcsec 7m 36.699 arcsec

Number of Antennas 12m 43 7m 10 TP 3

ACA 7m configuration Most compact 12m configuration Most extended 12m configuration

Longest baseline 0.049 km 0.161 km 16.197 km

Synthesized beamsize 4.862 arcsec 1.295 arcsec 0.017 arcsec

Shortest baseline 0.009 km 0.015 km 0.256 km

Maximum recoverable scale 25.233 arcsec 11.035 arcsec 0.186 arcsec

Desired Performance

Desired Angular Resolution (Synthesized Beam) Single Range Any Standalone ACA

0.7 arcsec to 1.2 arcsec

953 mK @ 1.20 "

7455 K @ 0.700 "

Frequency Width 117.187500 MHz

000 h

Simultaneous 12-m and ACA observations Yes No

Are the observations time-constrained? Yes No

Note: The time in brackets is that required to reach the sensitivity. Operational requirements often mean that the actual observed time is longer, especially for mosaics. Please see the User Manual for more details.

Input Parameters

Requested sensitivity 0.2000 mJy

Bandwidth used for sensitivity 117.188 MHz

Representative frequency (sky, first source) 271.801 GHz

Estimated Total time for Science Goal 3.01 h

Source Name	RA	Dec	Velocity
test	09:55:52.4299	-69:40:46.930	218.769 km/s

12-m (1)	12-m (2)	7-m	TP	Nominal Beam(")	Max expected axial ratio
C-7	None	No	No	0.082 x 0.103	1.5



Observations requesting very small angular resolutions (i.e. those making use of long baselines) are inefficient because they need to be frequently calibrated to correct for atmospheric phase fluctuations. Since the array configuration is determined based on the AR defined in the OT, it is possible to inadvertently trigger long baseline observations by entering an AR just slightly smaller than that actually required. You can see if the observations defined make use of long baselines in the *Planning and Time Estimate* pop-up – the first 12-m configuration will be labelled C-7 to C-10 and the number of phase calibrator observations per SB execution will be larger than usual. Long baselines should be avoided if they are not necessary to achieve a Science Goal.

Technical justification...

Submit!

Validate

The screenshot shows the NAOJ proposal software interface. The top menu bar includes File, Edit, View, Tool, Search, and Help. Below the menu is a toolbar with various icons. Two icons in the toolbar are circled in red: a checkmark icon and a document icon. Arrows point from these icons to the text 'Submit!' and 'Validate' respectively. The main window is divided into two panes. The left pane, titled 'Project Structure', shows a tree view with 'Unsubmitted Proposal' expanded to 'Project', then 'Proposal', 'Planned Observing', and 'ScienceGoal (Science Goal)'. Under 'ScienceGoal', several sub-items are listed, with 'Technical Justification' selected and highlighted in blue. The right pane, titled 'Editors', has three tabs: 'Spectral', 'Spatial', and 'Technical Justification'. The 'Technical Justification' tab is active. It contains a text area with the following text: 'Enter a Technical Justification for this Science Goal, paying special attention to the parameters reproduced below.' Below this are three sections: 'Sensitivity', 'Imaging', and 'Correlator configuration'. Each section has a text area for justification and a question mark icon in the top right corner. The 'Sensitivity' section shows 'Requested RMS over 117.188 MHz is 200.00 uJy' and 'Achieved RMS over the total 117.188 MHz bandwidth is 148.07 uJy, 339.18 mK-382.90 mK For a continuum flux density of 0.00 Jy, 0.00 mK-0.00 mK , the achieved S/N is 0.0'. A note below states: '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.' The 'Imaging' section shows 'Requested angular resolution 85.00 mas - 80.00 mas' and 'Requested Largest Angular Scale 100.00 mas'. The 'Correlator configuration' section is partially visible at the bottom.

Documentation...

QUESTIONS?

Atacama Large Millimeter/submillimeter Array
In search of our Cosmic Origins

ALMA

About Science **Proposing** Observing Data Processing Tools Documentation Help

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[Installer](#)

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Doc. 9.10, Ver. 1.0 | March 2022

ALMA Observing Tool Quickstart Guide

ALMA

ESO
National Astronomical Observatory of Japan
NRAO

www.almascience.org

ALMA, an international astronomy facility, is a partnership of ESO (representing its member states), NSF (USA) and NINS (Japan), together with NRC (Canada), MOST and ASIAA (Taiwan), and KASI (Republic of Korea), in cooperation with the Republic of Chile. The Joint ALMA Observatory is operated by ESO, AUI/NRAO and NAOJ.



