EUROPEAN ARC
ALMA Regional Centre || Italian

Part II

ALMA cycle 9 capabilities and observing modes

Photo credit C. Malin (ESO)

ALMA

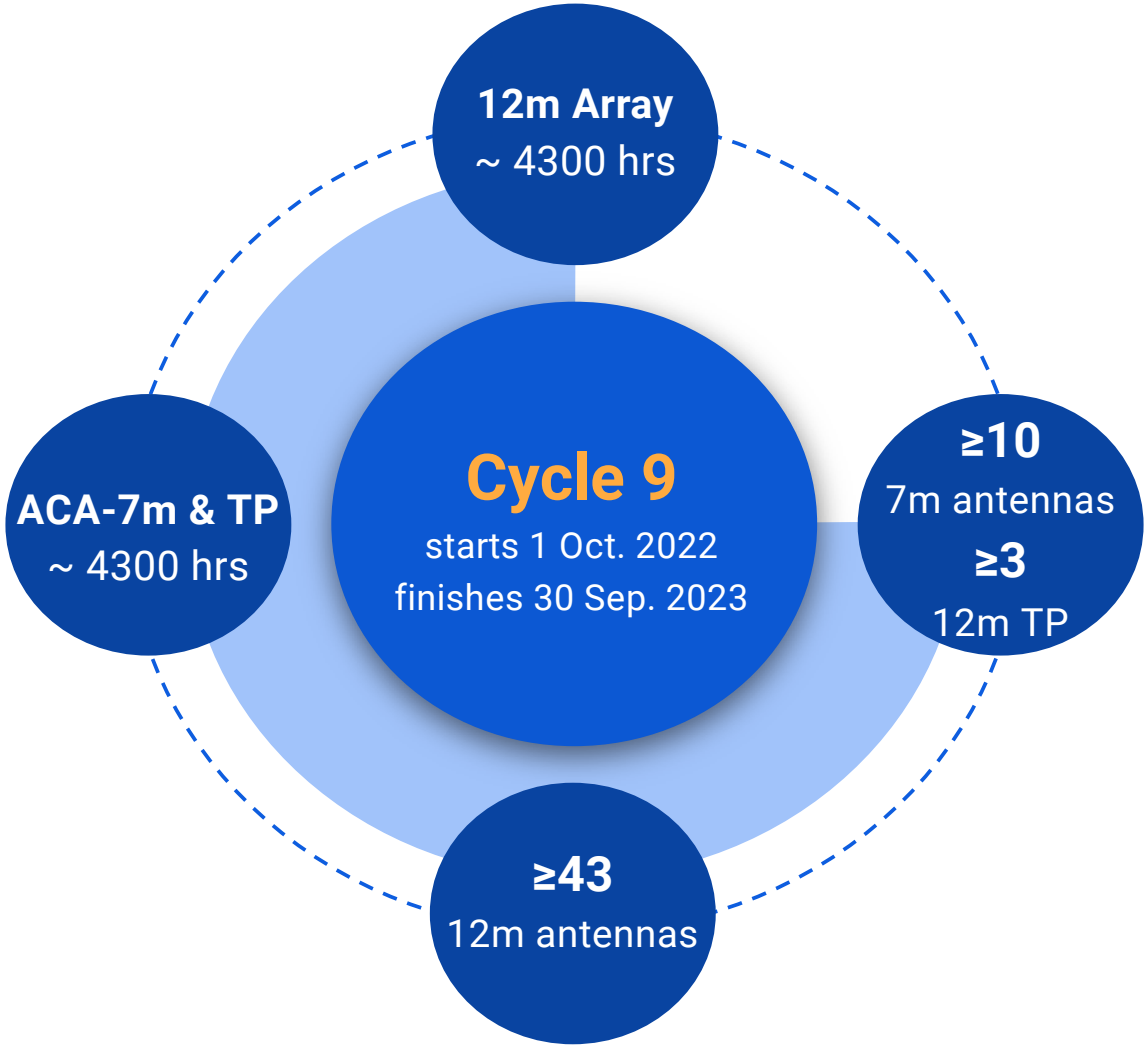
50 12-m antennas → 12m main Array

12 7-m antennas → 7-m array

4 12-m antennas → TP array

Atacama Compact Array

Cycle 9



There will NOT be a supplemental CfP for stand-alone ACA so submit all your proposals by the 21st April deadline!!!

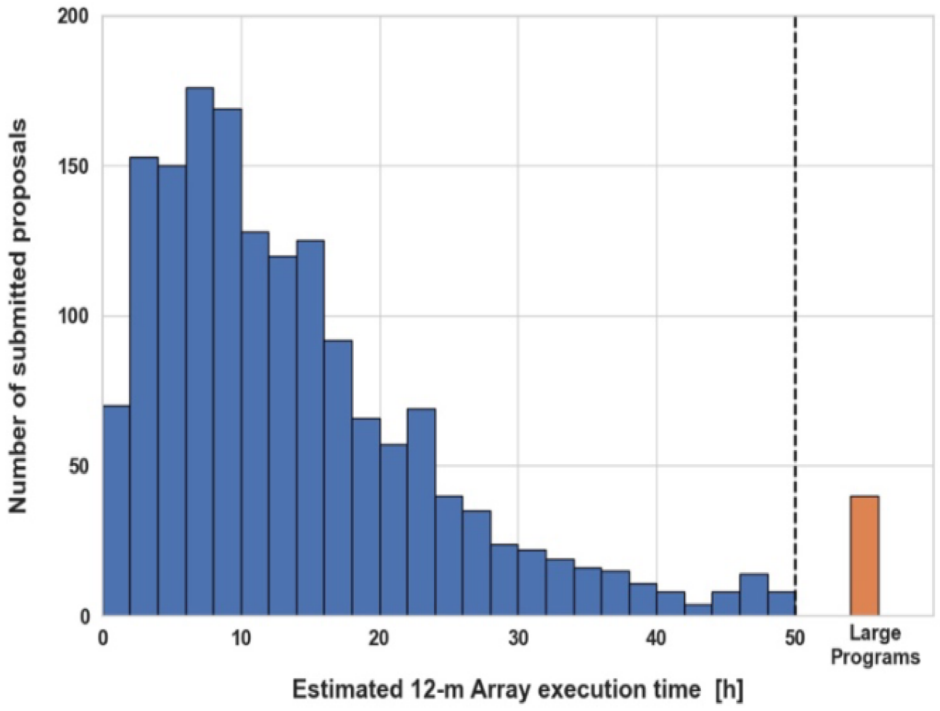
Proposal types I

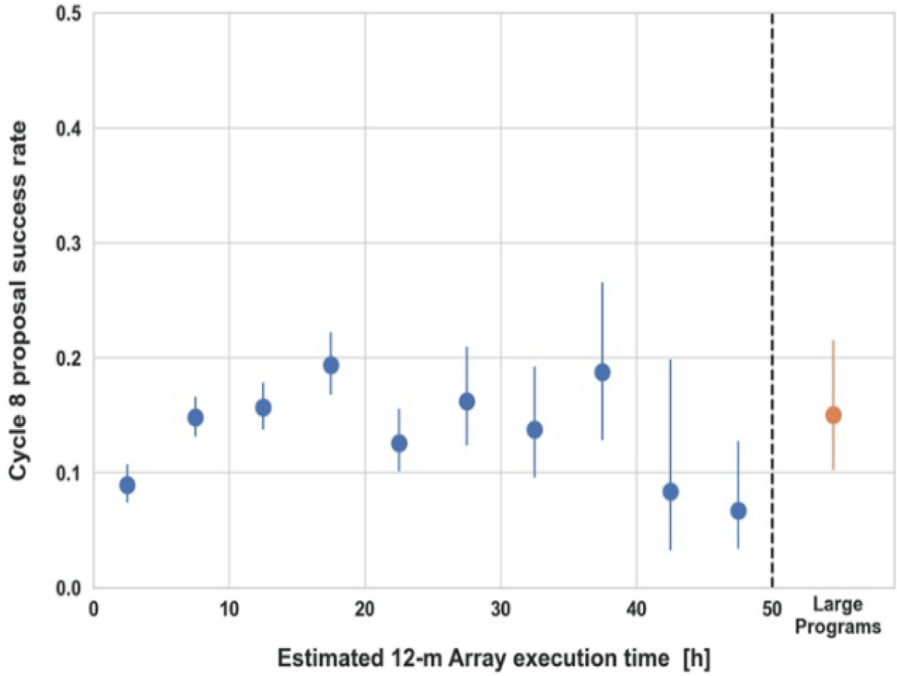
Regular proposals

- **<50h for 12m <150h for ACA**
- include time critical

Large proposals

- **>50h for 12m >150h for ACA**
- coherent **project that cannot be split** in smaller regular projects
- up to 33% of available time per LST range

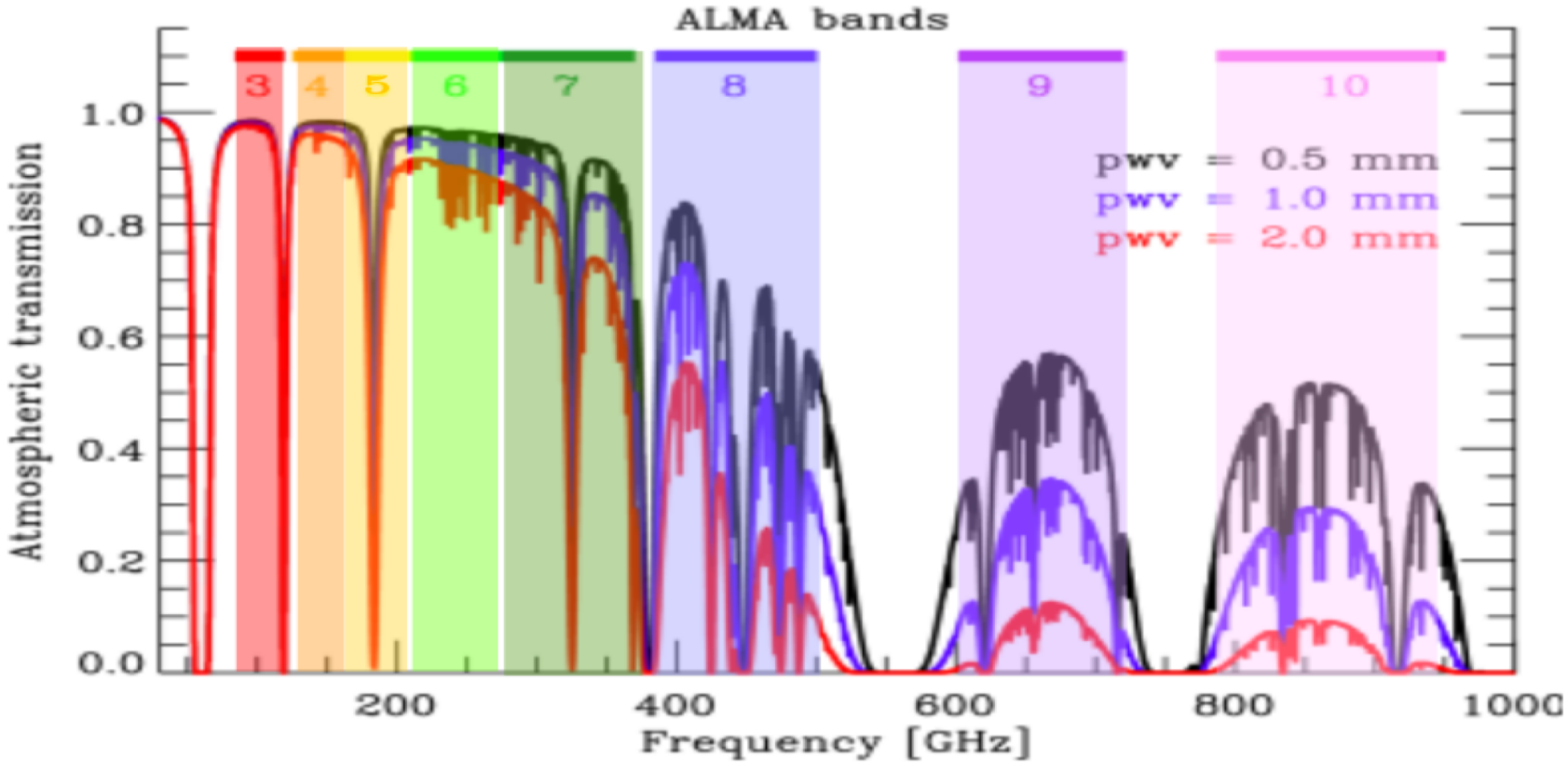




Proposal types II

VLBI	• Band 3 VLBI in conjunction with **GMVA** requires a proposal submitted in february • Band 7 VLBI is in conjunction to **EHT**
Phased Array	• **50h in the cycle** available for phased array
Target of Opportunity	• observing modes submitted at proposal deadline • target list submitted at triggering time
Director's Discretionary Time	• **Submit at any time during the Cycle,** according to Cycle capabilities

Bands



Different bands are better suited according to different weather conditions (i.e. highest frequencies require best weather and hence have different probability to be observed in different periods of the year)

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High frequency (Bands 7-10) will be prioritized if weather is suitable.

Total Intensity single fields and mosaics

Single field

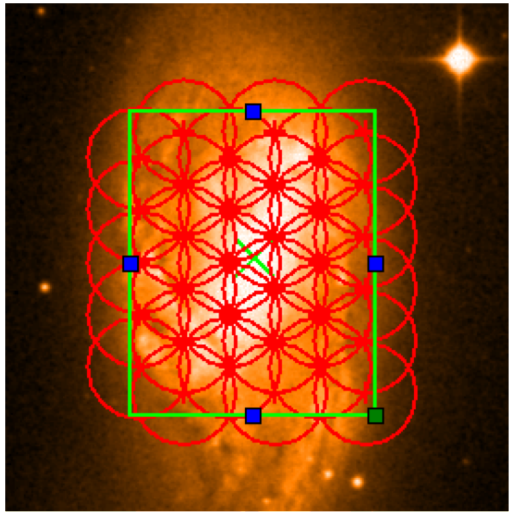
- Continuum & spectral lines & spectral scan
- Bands 3 to 10
- 12-m and 7-m arrays

Mosaics

- Continuum & spectral lines
- **Bands 3 to 9**
- 12-m and 7-m arrays
- maximum **150 pointings**

Nyquist spacing is recommended
a sparser sampling must be justified and may be rejected on technical grounds.

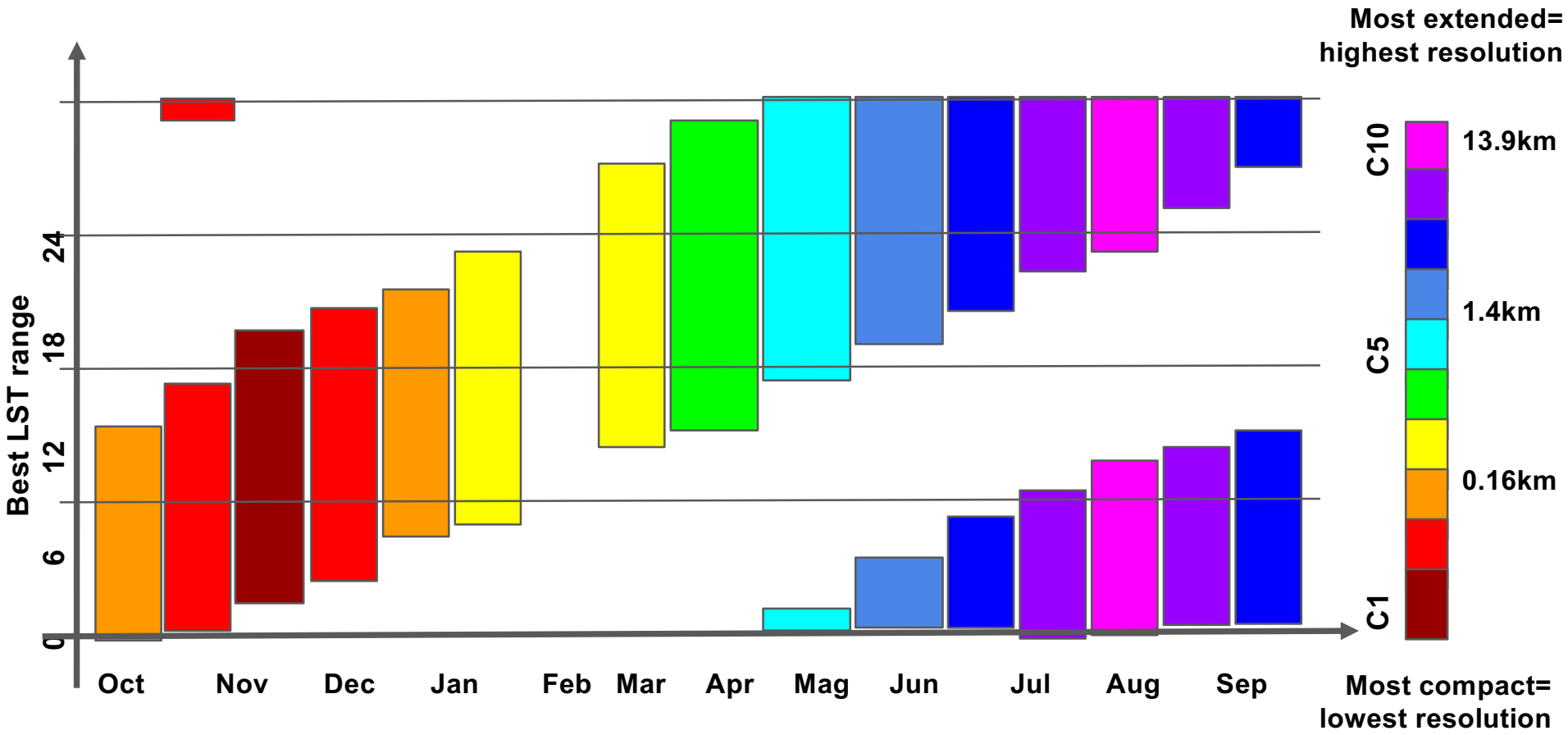
Up to 5 spectral tunings per each of the 4 baseband can be requested for pointings within 10 degrees (this can be enclosed in a single Science Goal)



12m Configurations

Band 3-8 with baselines up to 16.2km
Band 9 with baselines up to 8.5km
Band 10 with baselines up to 3.6km

Config.	Band 8	Band 9	Band 10
C-8	0.021"	0.015"	**0.011"**
C-9	0.012"	**0.0088"**	---
C-10	**0.0091"**	---	---



Note on high frequencies on extended configurations

Bands 7-10 in configurations C8-10 require closer phase calibrators.
It is possible to exploit band-2-band calibration to find bright close phase calibrators.
The OT will automatically check for suitable calibrators and validation will not be possible is they are not automatically found.

Table A-6: Maximum separation angle between phase calibrator and science target

	C-8	C-9	C-10
Band 7	5 degrees	5 degrees	5 degrees
Band 8	5 degrees	5 degrees	4 degrees
Band 9	4 degrees	4 degrees	
Band 10	3 degrees		

ACA Configurations and TP

7-m array	• **Can be stand-alone** • **NO supplemental call this Cycle** • All the bands
Single dish (TP) observations	• Cannot be stand-alone: **always with ACA data** (even already existing from previous cycles) • Bands 3 through 8

The TP can be allocated only if large LAS are needed and cannot be reached with the ACA.

The OT manages the combination of the arrays necessary for requested angular scales ranges (and relative observing time)

12m Polarization

Time required > 3 hrs to allow for calibration

12-m array single field on-axis	• Full, dual and single • Continuum & spectral lines • Bands 3 to 7 • Linear and circular pol • **For linear pol sources size must be < ⅓ of FWHM of FOV** • **For circular pol sources size must be < 1/10 of FWHM of FOV**
12-m array mosaicking	• Full, dual and single • **Continuum only** • **Only linear** • Only default spectral setup • TDM or FDM allowed • **Up to 150 pointings** • Non-Nyquist must be justified

7m Polarization

Time required > 3 hrs to allow for calibration

7-m array
single field on-axis

- Full, dual and single
- Continuum & spectral lines
- Bands 3 to 7
- **Only linear**
- **For linear pol sources size must be < ⅓ of FWHM of FOV**

No mosaic is allowed in polarization for 7m observations

Calibration in polarization can be affected by the calibrator properties

Time constrained observations

✓ Time constrained

- Only one 12m array configuration
- ACA stand-alone allowed
- 7+12m allowed only if simultaneous
- No limits on time window
- **>2hr of continuous monitoring might not be feasible for weather**

Solar observing mode

Solar observations

- Only combining 7 and 12m arrays
- TP not stand-alone
- Only in short specific configuration per each band 3-7
- Only continuum TDM
- **Either full sun or fast-region-mapping (FRM) on one target**
- Calibration is on a quiet sun zone within the FOV
- Time cadence depends on band and FOV

Table A-7: Time cadence of images obtained with FRM

FOV Diameter	Band 3	Band 5 and Band 6	Band 7
100 arcsec	n/a[1]	11 sec	14 sec
200 arcsec	13 sec	21 sec	27 sec
300 arcsec	19 sec	32 sec	40 sec

VLBI (campaign mode)

mm VLBI

- **Band 3 with GMVA (proposal submitted by 1st February)**
- **Band 6-7 with EHT (21st April)**
- **Fixed spectral setup**
- Full polarization

Table A-9: Observing Frequencies for Cycle 9 VLBI Observations

Band	spw1 (GHz)	spw2 (GHz)	LO1 (GHz)	spw3 (GHz)	spw4 (GHz)
3	86.268	88.268	93.268	98.328	100.268
6	213.1	215.1	222.1	227.1	229.1
7	335.6	337.5414	342.6	347.6	349.6

✓ Passive phasing mode

- Targets with flux < 0.5 Jy
- Need a closeby phase calibrator brighter than 0.5 Jy
- Only bands 3 and 6

Get in touch with the GMVA and EHT consortia before planning VLBI observations with ALMA

Phased array (campaign mode - Mar-Apr 2023)

Phased array (only for pulsars)

- During GMVA campaign but does not require involvement of the GMVA consortium
- **Band 3 continuum only**
- Same spectral configuration as VLBI
- Minimum time resolution 8 μs
- Caveat on proper motion coordinate corrections

Passive phasing mode

- Targets with flux < 0.5 Jy
- **A closeby phase calibrator brighter than 0.5 Jy has to be chosen and justified**

Contact your ARC_node for support on this mode:
the OT does not compute time and sensitivity that must be provided by the PI

ALMA Observing Tool

1) **Download the installer** (recommended)

https://almascience.eso.org/proposing/observing-tool

1) **Run it**
2) **Open the interface**

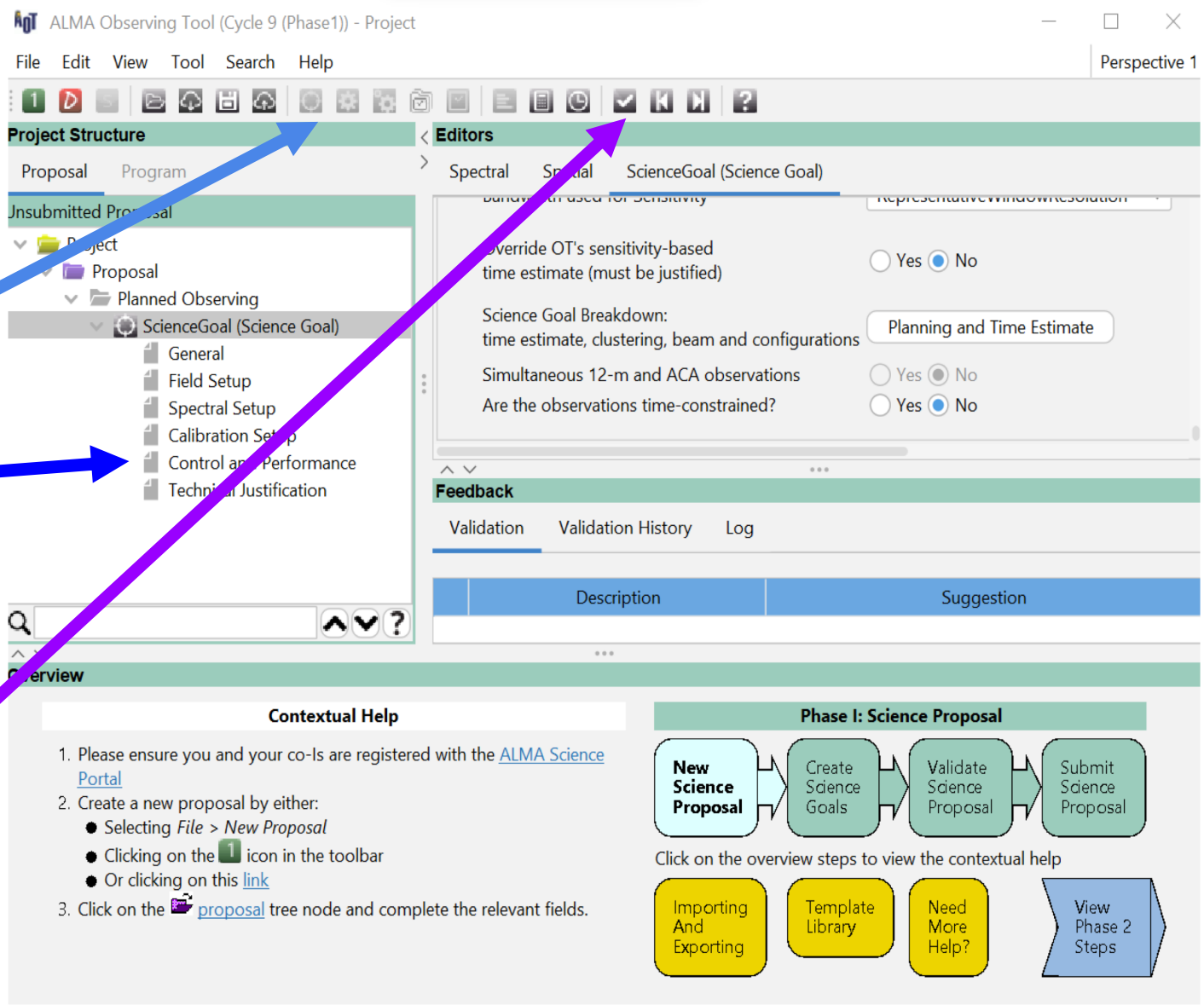
1) Divide your project into **science goals** (depending on bands, hour angle,...)
1) **Add them in**

1) **Add the requested capabilities** (coords, frequency ranges, polarization, sensitivity, resolution…) in the various panels

1) **Validate your project and submit it**

For any request/support check the help online and/or **contact your ARC node**

help-desk@alma.inaf.it



Important dates	Event
24 March 2022 15:00 UT	Proposal submission opens + Release of Docs & Tools
21 April 2022 15:00 UT	**Proposal submission deadline**
1 June 2022 15:00 UT	Review submission deadline
August 2022	Results of proposal review sent to proposers
October 2022	**Begin Cycle 9 observations**
September 2023	End of Cycle 9 2021 observations

There will NOT be a supplemental CfP for stand-alone ACA