



EUROPEAN ARC
ALMA Regional Centre || Italian



ALMA Cycle 9 Proposal Preparation Day



ALMA REGIONAL CENTRE ITALY
is Bologna

Italian ALMA Regional Centre

Bologna, 4/4/2022



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Outline of the day

- 1) Status of the array and of the ARC-Network
- 2) Offered capabilities and observing modes
- 3) ALMA simulations
- Break -
- 4) Proposal writing and reviewing (double anonymous)
- 5) Use of the ALMA Science Archive



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Part I

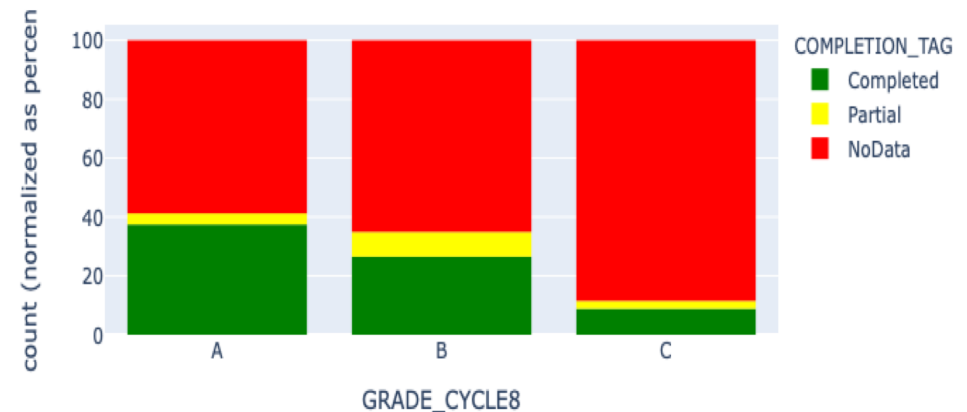
Status of ALMA and the ARC-Network



Photo credit C. Malin (ESO)

- After restart, **ramping up has been long, but successful.**
- Cycle 7 completed at 75%
- **Cycle 8 is progressing well**
- Under development: **Band 1, Band 2, a new Observing Tool, ACA spectrometer, ARI-L**
- A new **Guaranteed Time Observations (GTO) policy** for ALMA has been approved by ESO in exchange for ALMA development projects to be approved in future calls.

ALMA News



ALMA Science Portal

<https://almascience.eso.org>



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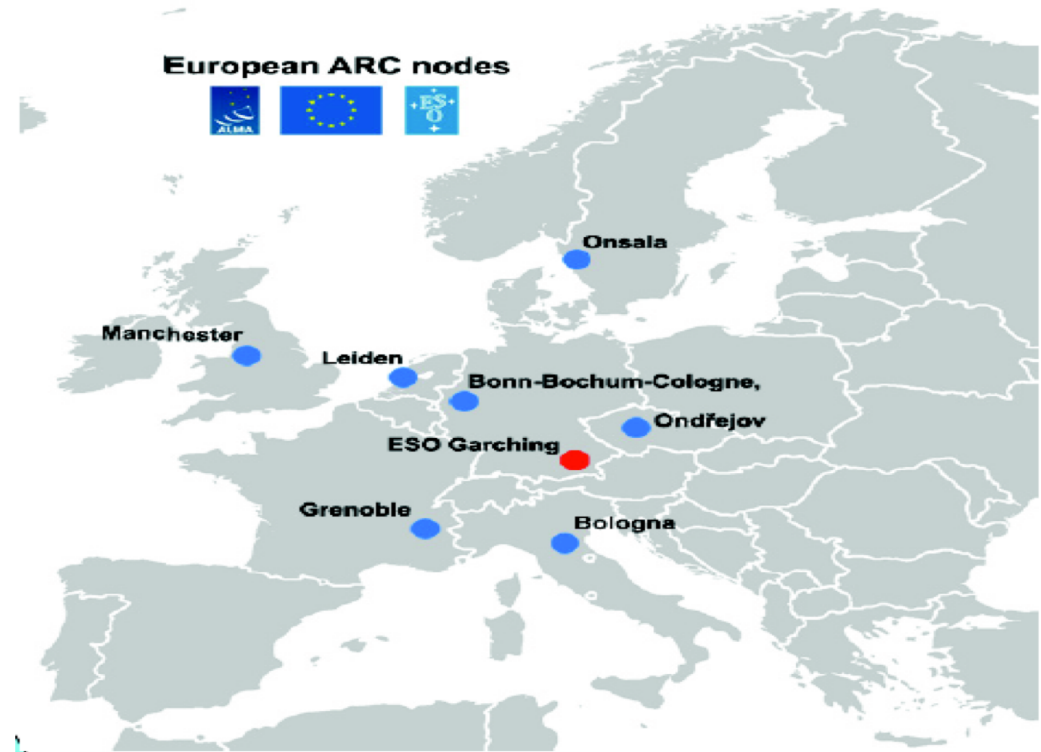
<http://www.alma.inaf.it/>



People:

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- E. Liuzzo
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Activities of the IT-ARC (other than user support):

- lead the ALMA development project for the archive ARI-L
- contribute to polarization calibration, VLBI (EHT)
- contribute to training network (MAYA, ITRAIN)
- supervise master and PhD students on ALMA-related projects



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Part II

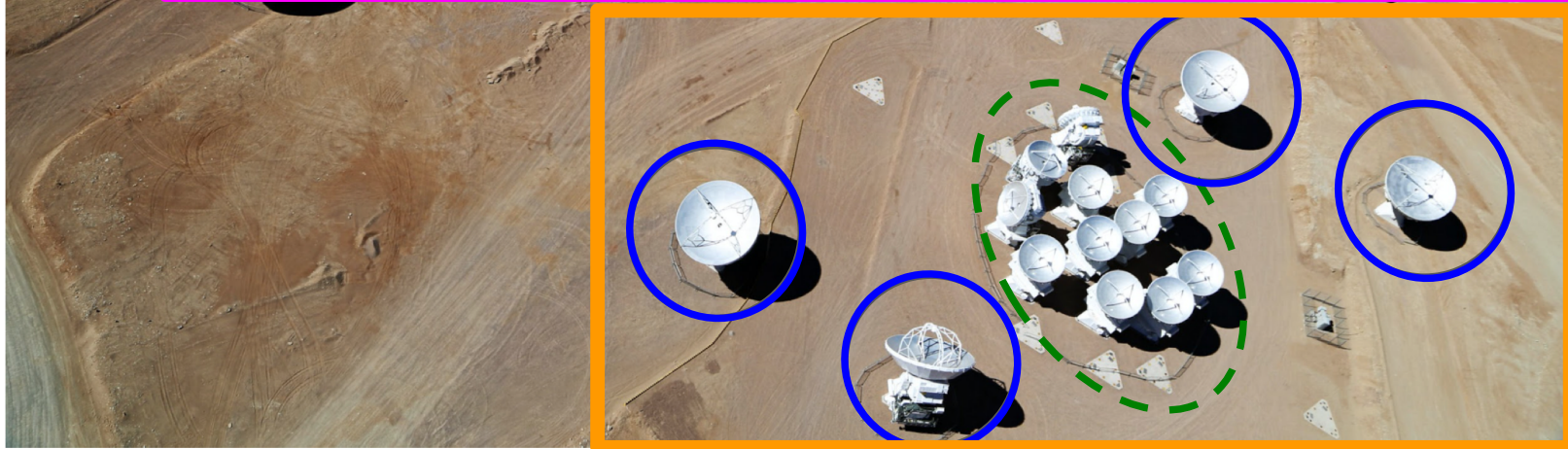
ALMA cycle 9 capabilities and observing modes



Photo credit C. Malin (ESO)

ALMA

50 12-m antennas → 12m main Array

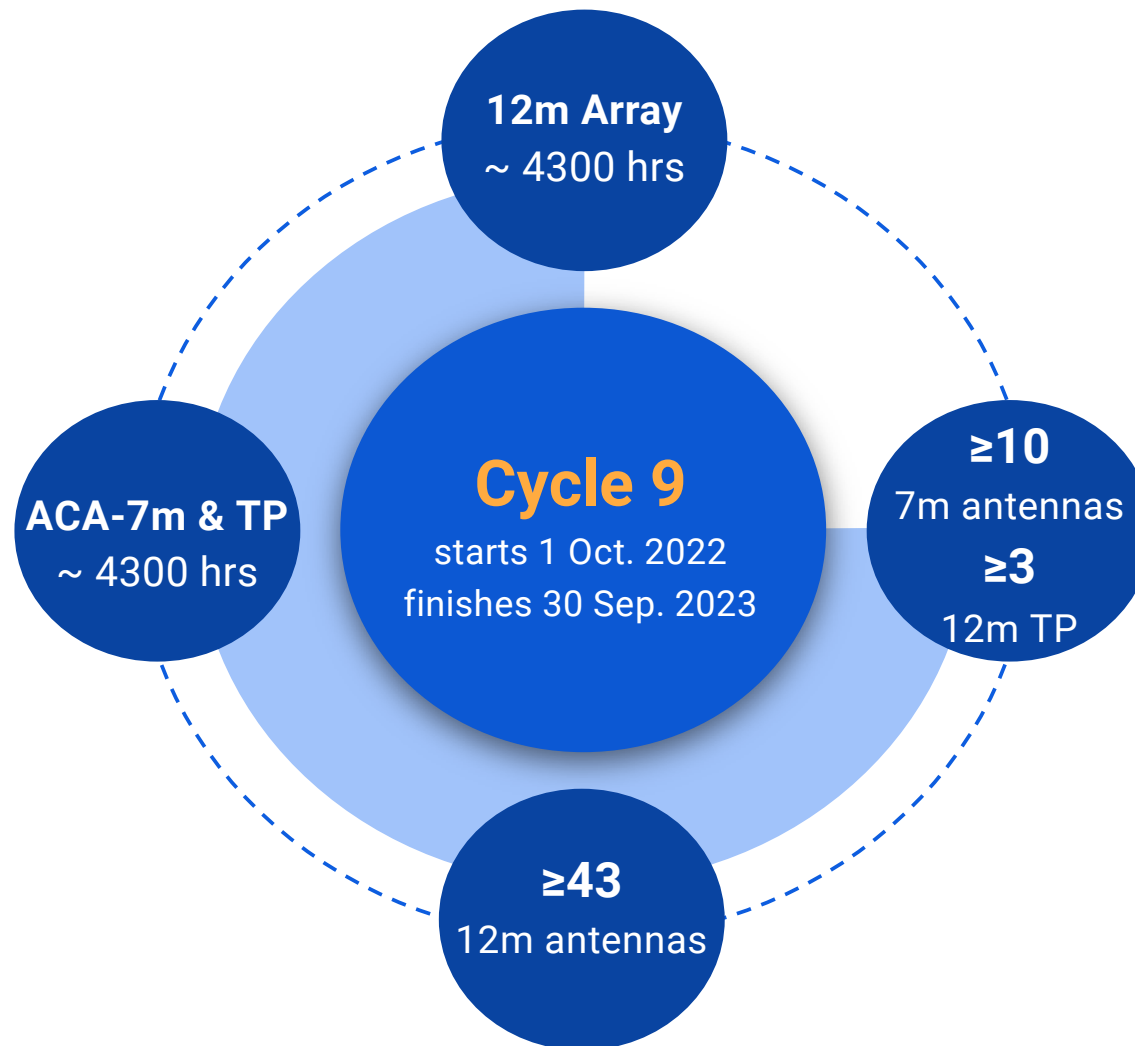


12 7-m antennas → 7-m array

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!!!**

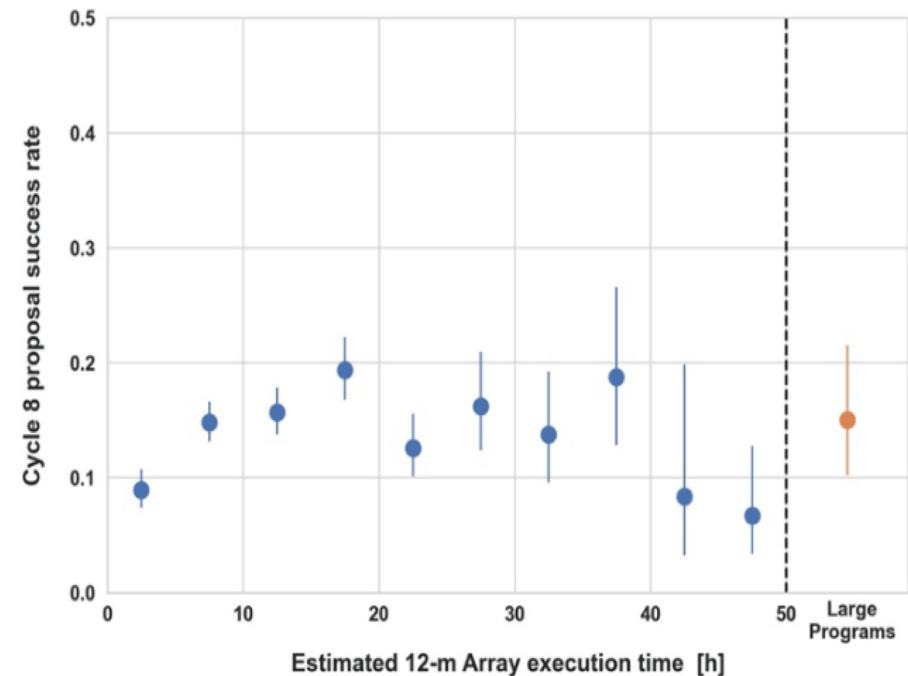
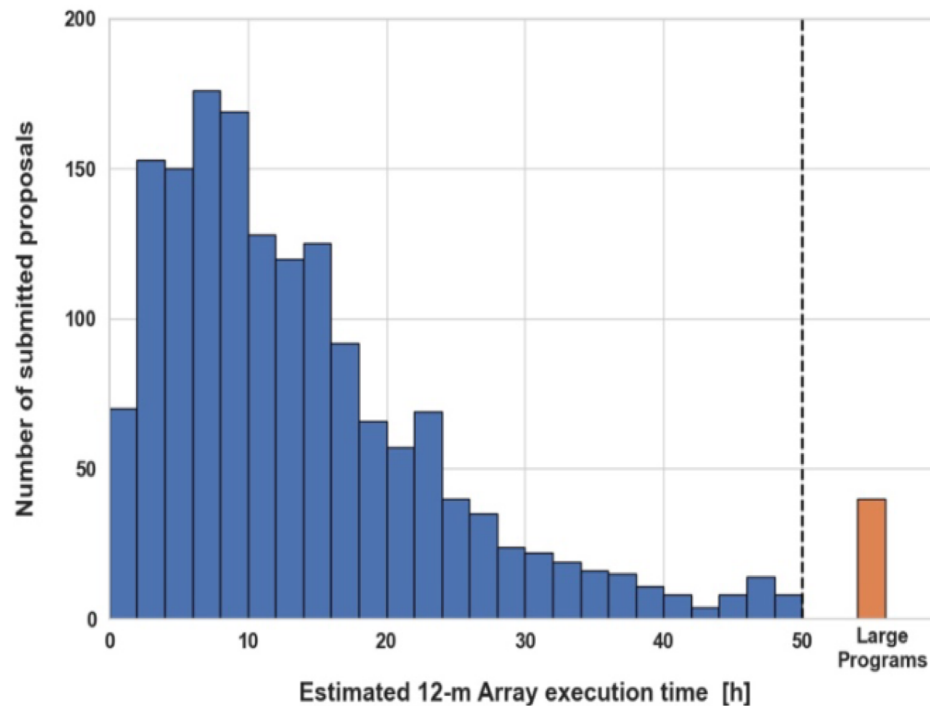
Proposal types I

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

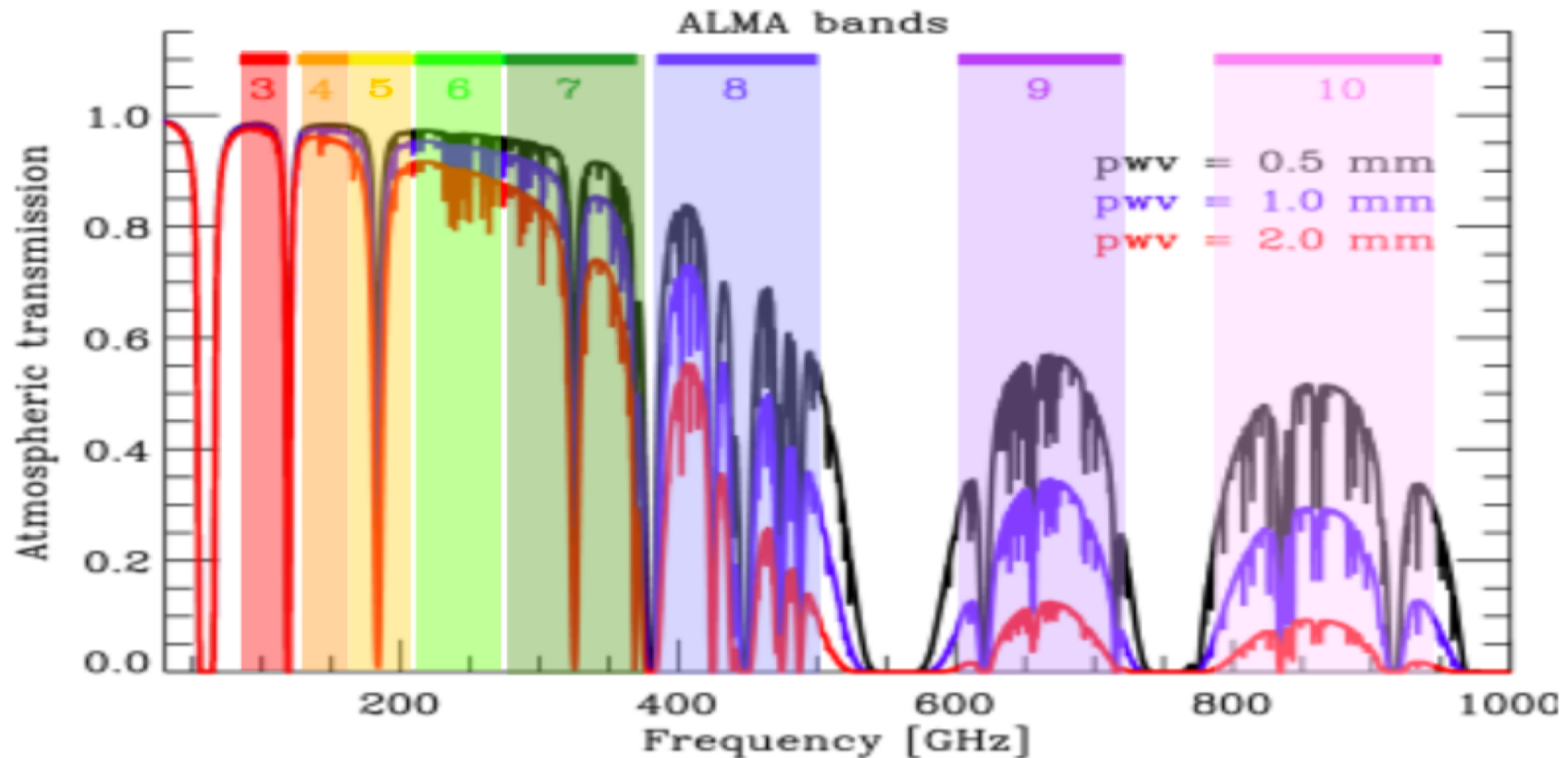
Target of Opportunity

- 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)

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

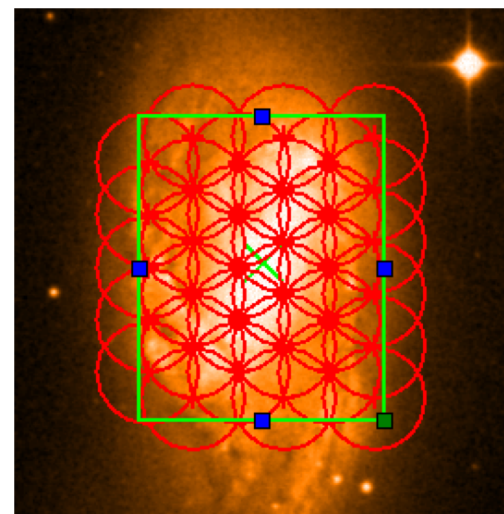
Mosaics

- 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)



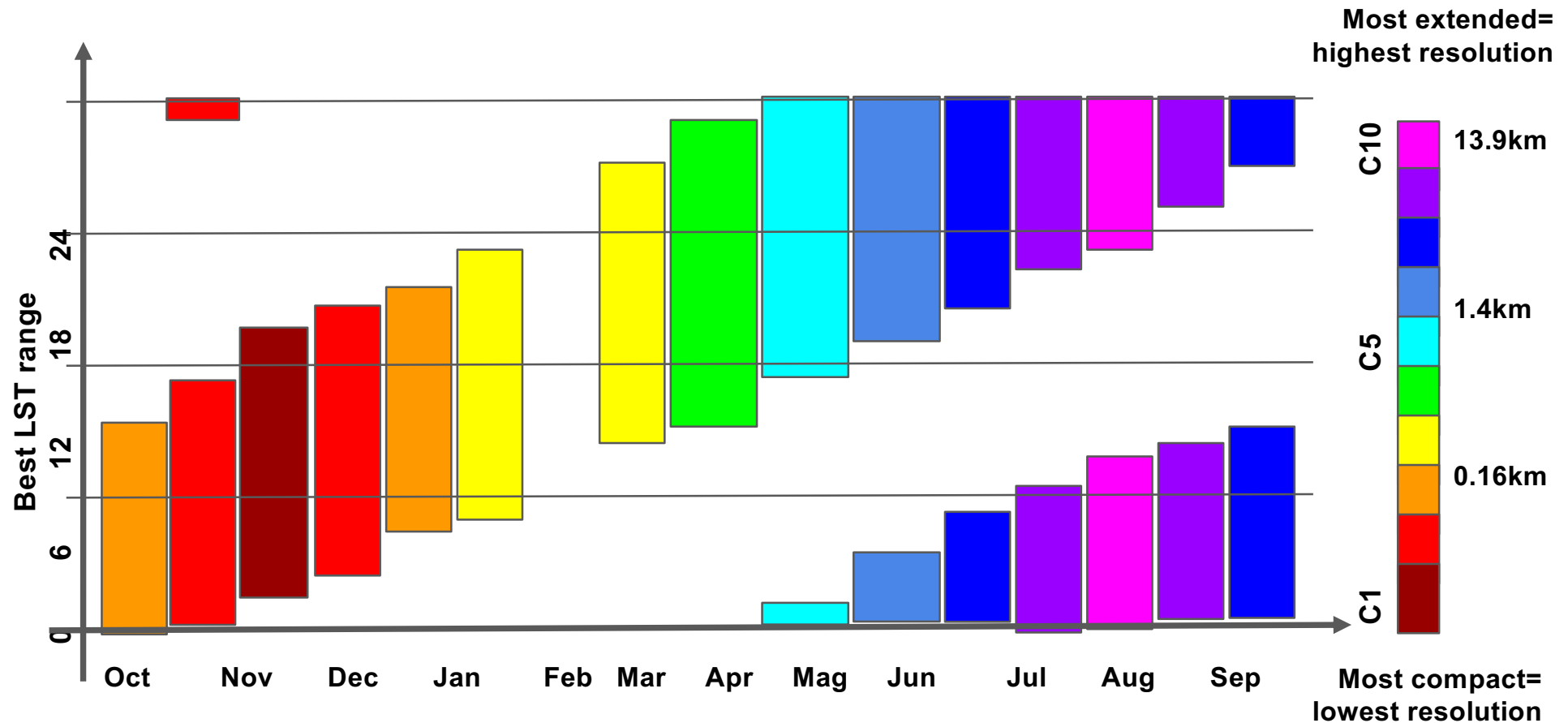
12m Configurations

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 if 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 $< \frac{1}{3}$ 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 $< \frac{1}{3}$ 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 μ s
- 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 <https://almascience.eso.org/proposing/observing-tool>
(recommended)

1) Run it

2) Open the interface

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

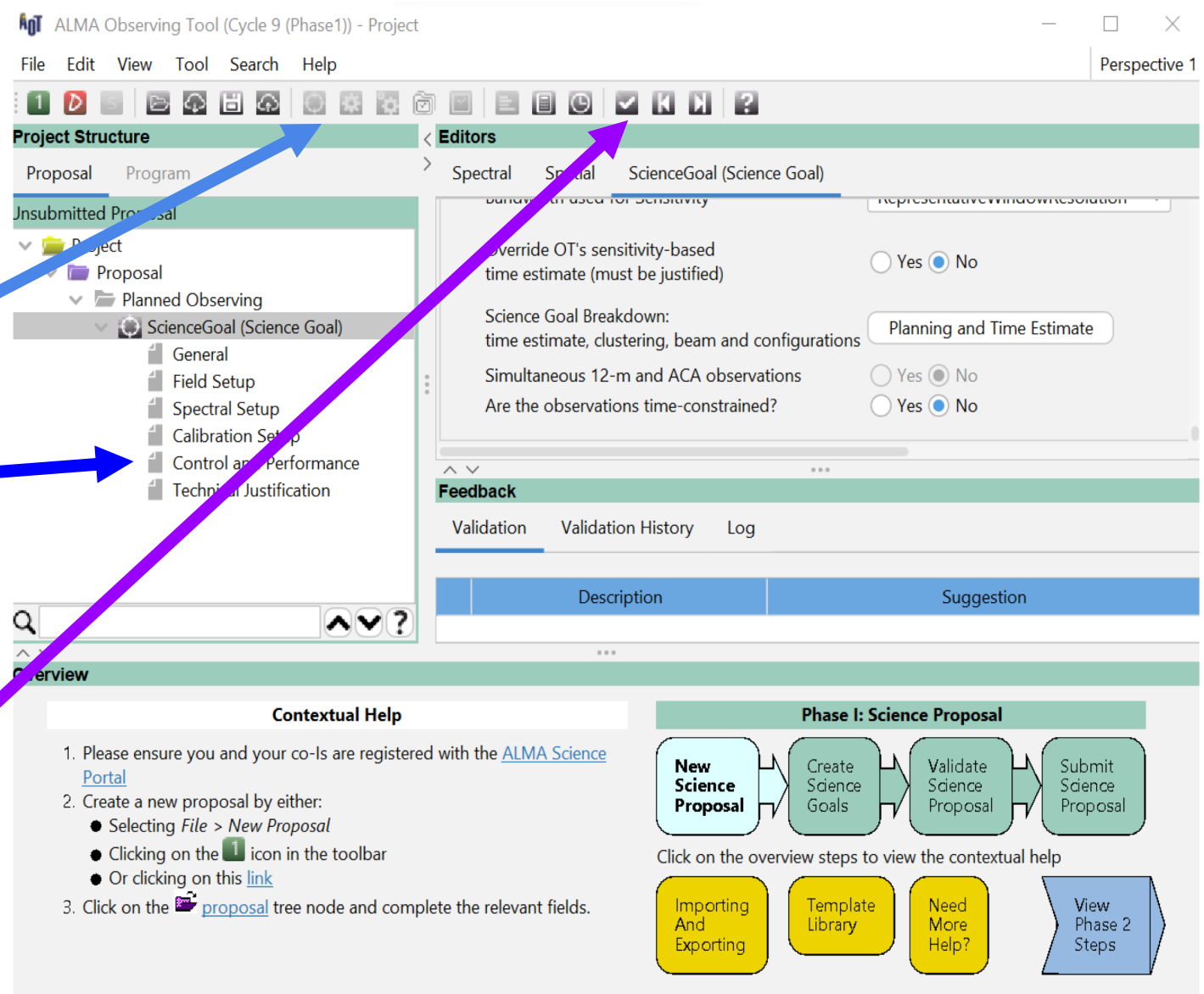
1) Add them in

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