

# ALMA Cycle 8 2021 Proposer's Guide

**ALMA Overview**

**What's new in Cycle 8 2021**

**Proposal types**

**Proposal planning**

**Proposal preparation and submission**

**Jihyun Kang, Mar 17 2021**

17 December 2020	Cycle 8 2021 pre-announcement
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21 April 2021	Proposal submission deadline
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# Atacama Large Millimeter/submillimeter Array

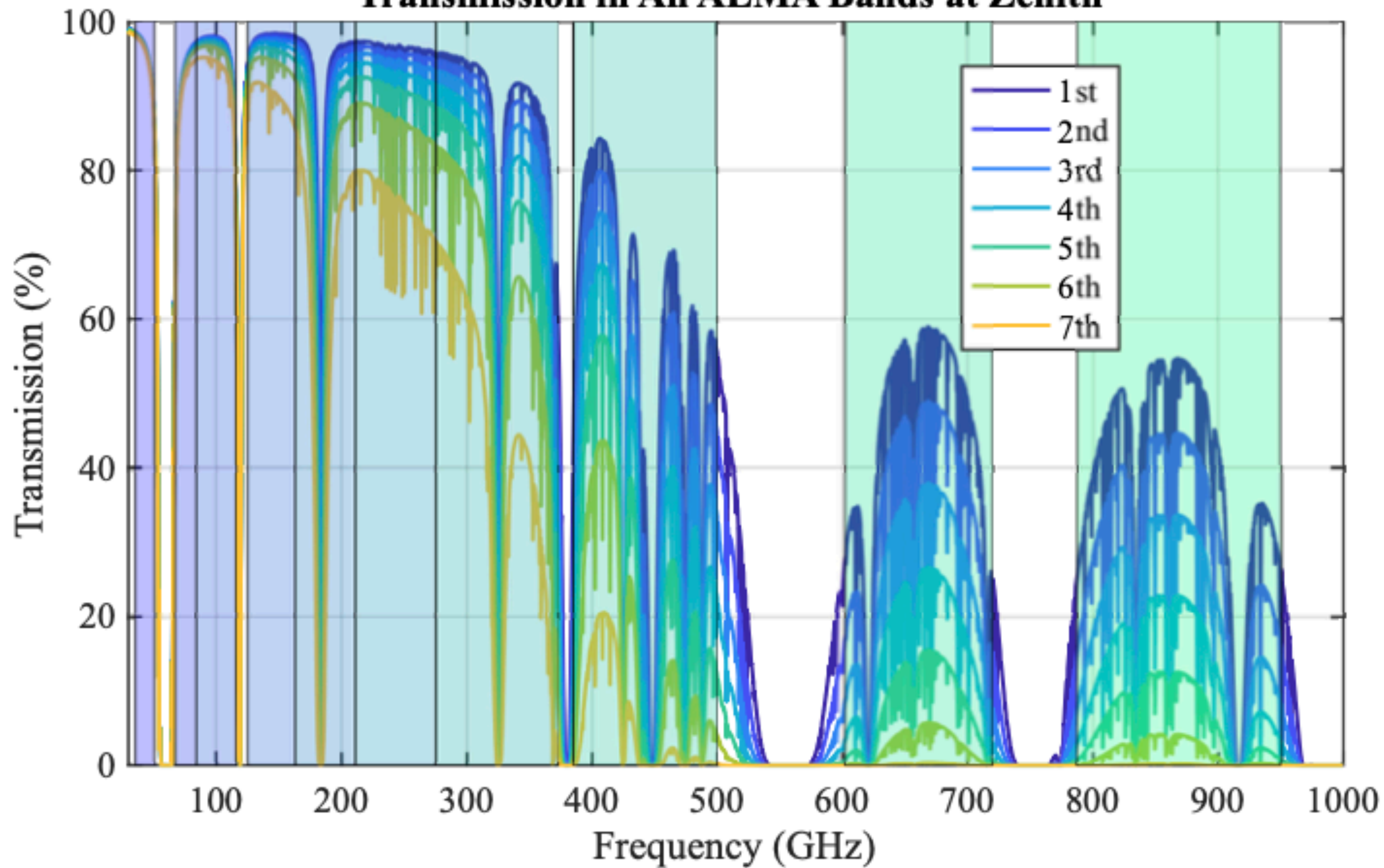
## ALMA Overview

- 50 x 12 m (the 12-m Array), 12 x 7 m (the 7-m Array), 4 x 12 m (the TP Array)
- Located at 5000 m in northern Chile
- Operates in submm/mm range (3.6 mm to 315  $\mu\text{m}$  : 84 - 950 GHz)
- Separate or combined proposals for 12-m and ACA





**Transmission in All ALMA Bands at Zenith**



# What's new in ALMA Cycle 8 2021

## 1. Technical and observing capabilities

- **Solar observations in Band 5 continuum at a mean frequency of 198 GHz are now offered in configurations C-1, C-2, and C-3.**
- **Observations in Bands 9 and 10 with the stand-alone 7-m Array.**
- **Spectral Scans with the 7-m Array.**
- **Mosaics for continuum linear polarization observations in Bands 3 to 7 with the 12-m Array.** Field setups can be defined using custom mosaics or rectangular areas. The mosaic is subject to a maximum of 150 pointings per scheduling block.
- **Stand-alone 7-m Array polarization observations.** Single-field interferometric linear polarization observations with the 7-m Array are available in Bands 3 to 7 with any frequency setup. The measurements are accurate for the central one third of the FWHM beam. Multiple pointings are permitted, however mosaics are not supported at this time. There will be a maximum of 75 hours offered for this mode.

# What's new in ALMA Cycle 8 2021

## 1. Technical and observing capabilities

- **VLBI observations of faint science targets.** Observations of targets with correlated flux densities  $<500$  mJy are now permitted by using the Passive Phasing mode, where it is recommended to have a bright calibrator within  $6^\circ$  or  $3^\circ$  of the science target in Band 3 or 6, respectively.
- **Observations of pulsars using the 12-m Array as a single dish.** For VLBI, ALMA uses special hardware that coherently sums the signals from each antenna, effectively allowing the 12-m Array to mimic a large single dish. It is now possible to observe in this Phased Array mode in a stand-alone (non-VLBI) capacity for pulsar science.



# What's new in ALMA Cycle 8 2021

## 2. Proposal format and composition / Observing Tool

### 1.2.1 Dual-anonymous review

To help reduce biases, ALMA will implement a dual-anonymous review process starting in Cycle 8 2021. In a dual-anonymous review, the proposal team does not know the identity of the reviewers and the reviewers do not know the identities of the proposal team. While proposers will still enter their names and affiliations in the ALMA OT, this information will not appear on the proposal cover sheet, nor in the tools used by the reviewers. It is the responsibility of the proposers to ensure anonymity is preserved when writing their proposals. More information can be found in Section 5.2.

### 1.2.2 Distributed peer review

ALMA is using a distributed peer review system for proposals requesting less than 25 hours on the 12-m Array and for ACA stand-alone proposals requesting less than 150 hours on the 7-m Array. For each proposal submitted, the PI or a designee from the list of investigators will review and rank 10 submitted proposals from this Call. Review assignments will be made based on the expertise of the designated reviewer as listed on their ALMA [user profile](#). **Users are strongly advised to update the specification of their expertise in the Science Portal by the proposal deadline.** See Section 5.6.1 for more information on distributed peer review.

# What's new in ALMA Cycle 8 2021

## 3. Prioritizing larger projects

Following recommendations from the ALMA Science Advisory Committee (ASAC) and the ALMA International Visiting Committee (IVC), ALMA is taking further steps to encourage large, more ambitious proposal submissions. First, ALMA has removed the cap on the total amount of time that can be allotted to Large Programs as of Cycle 8 2021. However, Large Programs will still be limited to filling no more than 50% of the time in a given LST and configuration so that smaller programs will be able to compete at each configuration and LST.

Second, proposals that request more than 25 hours on the 12-m Array (including Large Programs) will have priority when filling at least 10% of the available time for Grade A and B proposals. If the total amount of time for the Large Programs recommended by the APCR sum to less than 430 hours on the 12-m Array, then the highest ranked proposals requesting between 25 and 50 hours will be given next priority in building the queue.

# What's new in ALMA Cycle 8 2021

## 4 Stand-alone ACA supplemental Call for Proposals

- 7-m Array only or +TP
- Observation capabilities same as main call
- Will be given grade C : main call - A, B, or C

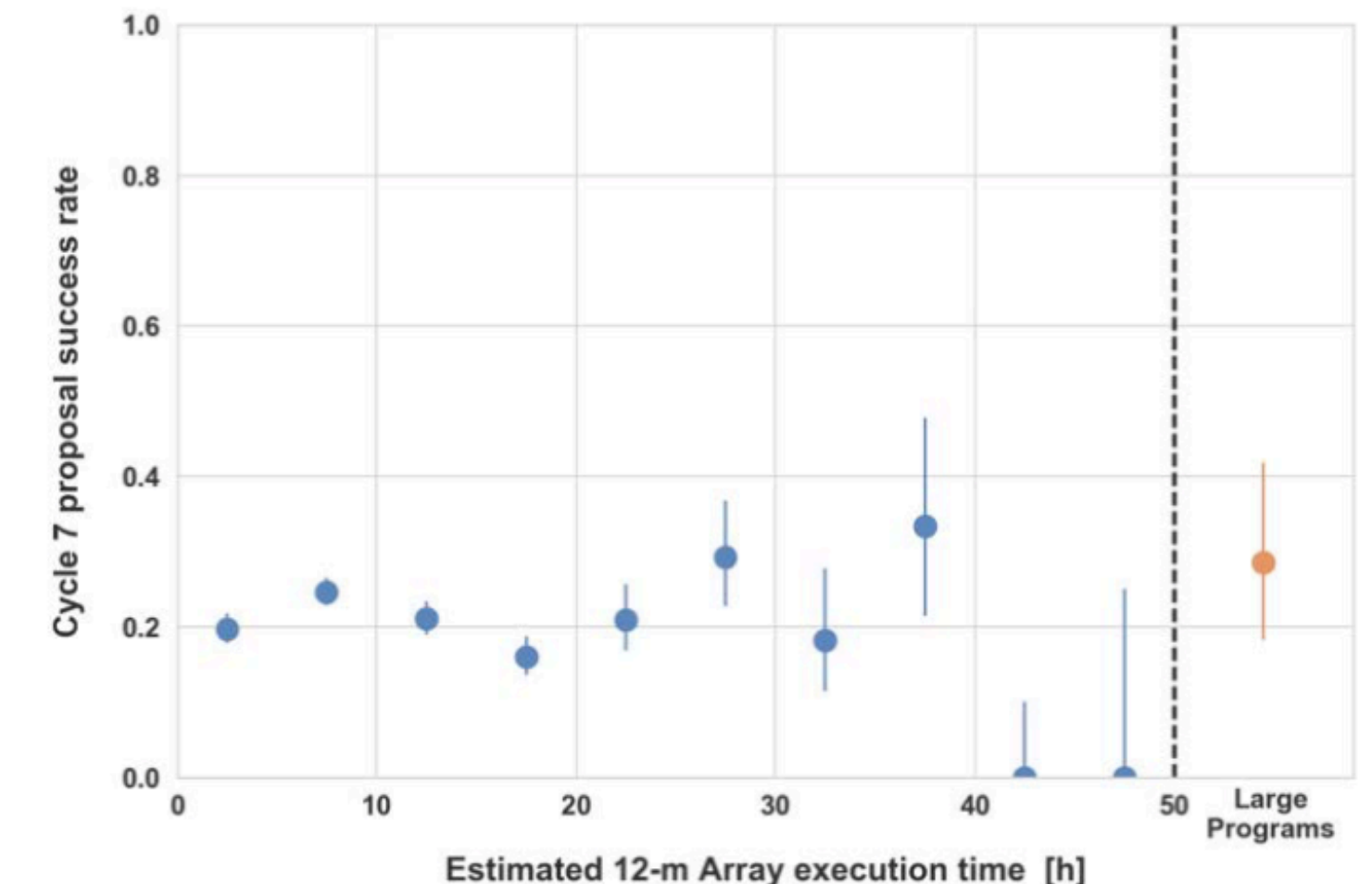
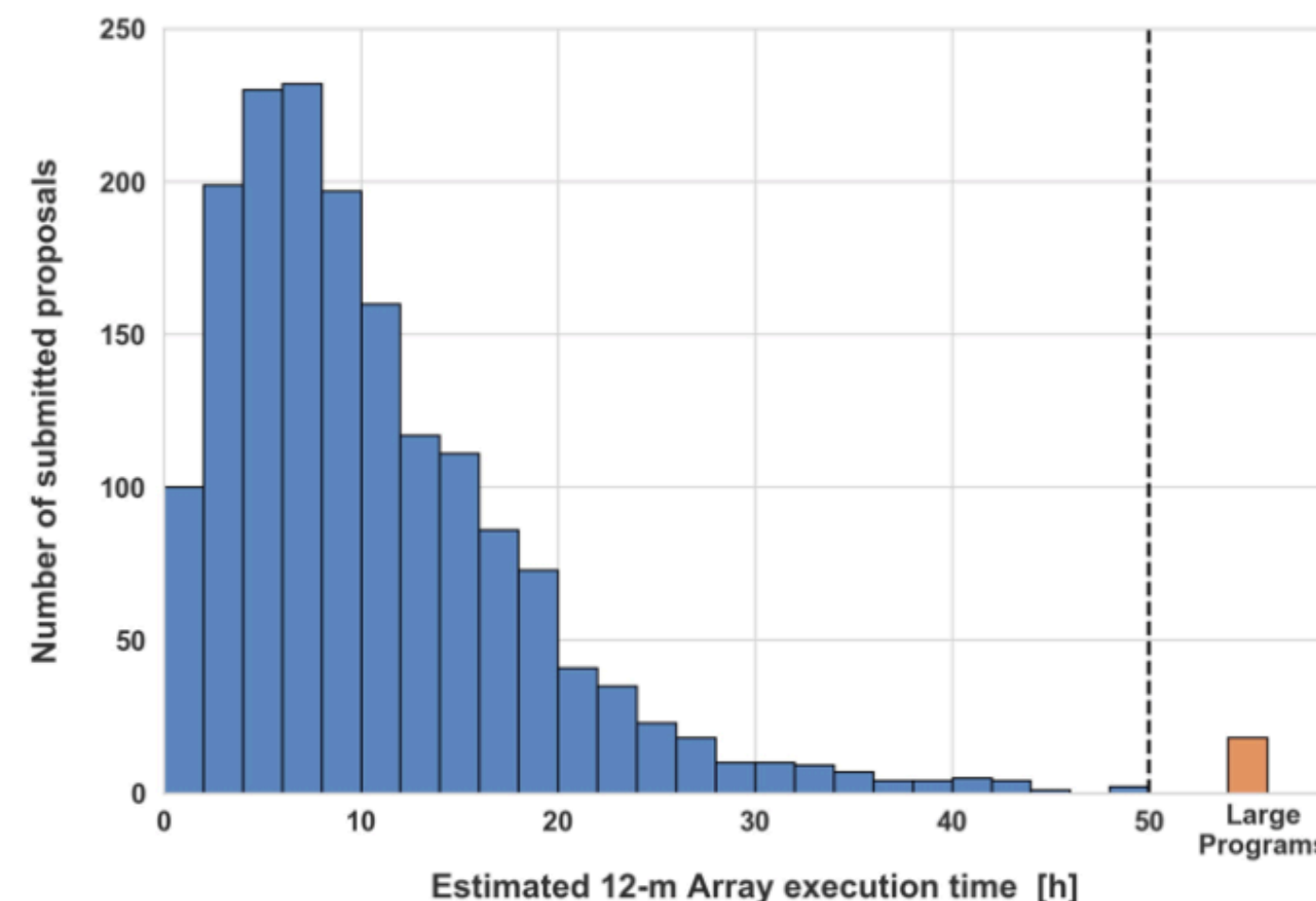
**Table 2: The anticipated stand-alone ACA Cycle 8 supplemental call timeline**

Date	Milestone
15 September 2020	Release of the Cycle 8 stand-alone ACA supplemental CfP, Observing Tool & supporting documents and opening of the Archive for proposal submission
08 October 2020	Supplemental Call proposal submission deadline
December 2020	Announcement of the outcome of the proposal review process and start of Phase 2 for accepted proposals
January 2021	Start of Science Observations
30 September 2021	End of ALMA Cycle 8



# Proposal types

- Regular Proposals :  $< 50$  hrs on 12-m Array or  $< 150$  hrs on 7-m Array in stand-alone mode. Time-critical, multiple-epoch, monitoring of a target over a fixed time interval.
- Target of Opportunity Proposals : when targets and/or time of observation are not known in advance. Priority will be given when trigger request submitted.
- Large Programs :  $> 50$  hrs on 12-m Array or  $> 150$  hrs on 7-m Array. No solar, time-critical, VLBI, Astrometric observation. Breakthrough / major advance in the field.  $>10\%$  &  $< 50\%$  per configuration
- mm-VLBI and Pulsar Proposals : GMVA (3mm, band3), EHT (1.3mm, band 6). March/April 2022.  $> 3$  hrs for polarization calibration. Stand-alone phased array for pulsar science in Band 3. Sudo-single-continuum spectral setup
- Director Discretionary Time Proposals : including VLBI or pulsar observation



# Proposal planning

- Time available in Cycle 8 2021
  - 4300 hrs of the 12-m Array, > 3000 hrs on 7-m & TP Arrays
  - LP (< 50%), VLBI or DDT (5% of the available time)



# Proposal planning

## Summary of capabilities offered in Cycle 8 2021

### Number of antennas

- At least forty-three antennas in the 12-m Array.
- At least ten 7-m antennas (for short baselines) and three 12-m antennas (for single-dish maps) in the ACA.

### Receiver bands

- Receiver Bands 3, 4, 5, 6, 7, 8, 9, and 10 (wavelengths of about 3.0, 2.0, 1.6, 1.3, 0.85, 0.65, 0.45, and 0.35 mm, respectively).

### 12-m Array Configurations

- Cycle 8 2021 includes configurations C-1 through C-8. Configurations C-9 and C-10 will next be available in Cycle 9.
- Maximum baselines between 0.16 km and 8.5 km depending on array configuration and subject to the following restrictions:
  - The maximum possible baseline for Bands 8, 9 and 10 is 3.6 km.
  - The maximum possible baseline for Bands 3, 4, 5, 6 and 7 is 8.5 km.

# Proposal planning

## Summary of capabilities offered in Cycle 8 2021

### Spectral-line, continuum, and mosaic observations

- Spectral-line and continuum observations with the 12-m Array and the 7-m Array in all bands.
- Single-field interferometry (all bands) and mosaics (Bands 3 to 9) with the 12-m Array and the 7-m Array.
- Single-dish spectral-line observations in Bands 3 to 8.

### Polarization

- Single-pointing, on-axis, full linear and circular polarization for both continuum and full spectral resolution observations in Bands 3 to 7 on the 12-m Array. The field of view of linear and circular polarization observations is limited to the inner one third and the inner one tenth of the primary beam, respectively.
- Single-pointing, on-axis linear polarization on the stand-alone 7-m Array in Bands 3 to 7. The field of view is limited to the inner one third of the primary beam. A maximum of 75 hours will be offered for this mode.
- Mosaics for continuum linear polarization observations for the 12-m Array in Bands 3 to 7. Such mosaics are subject to a maximum of 150 pointings.



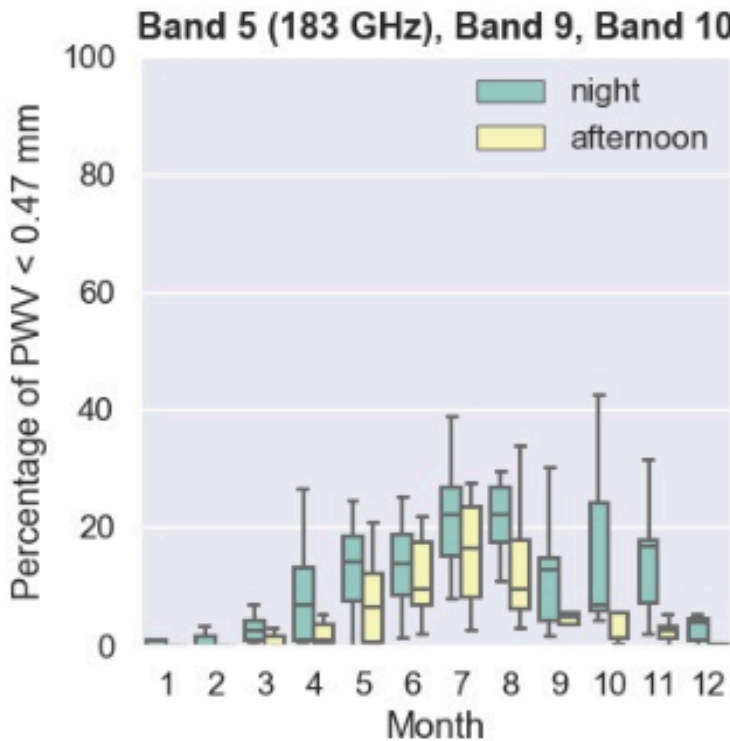
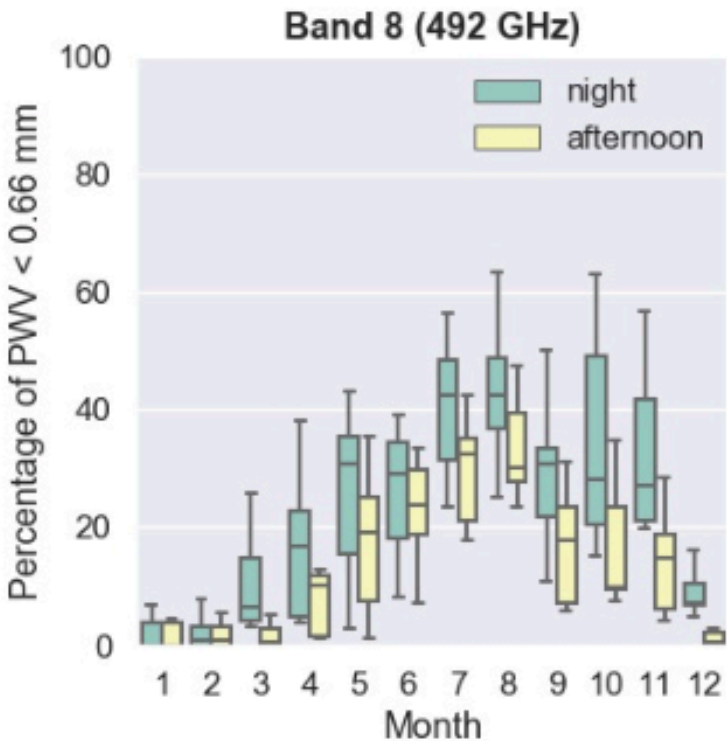
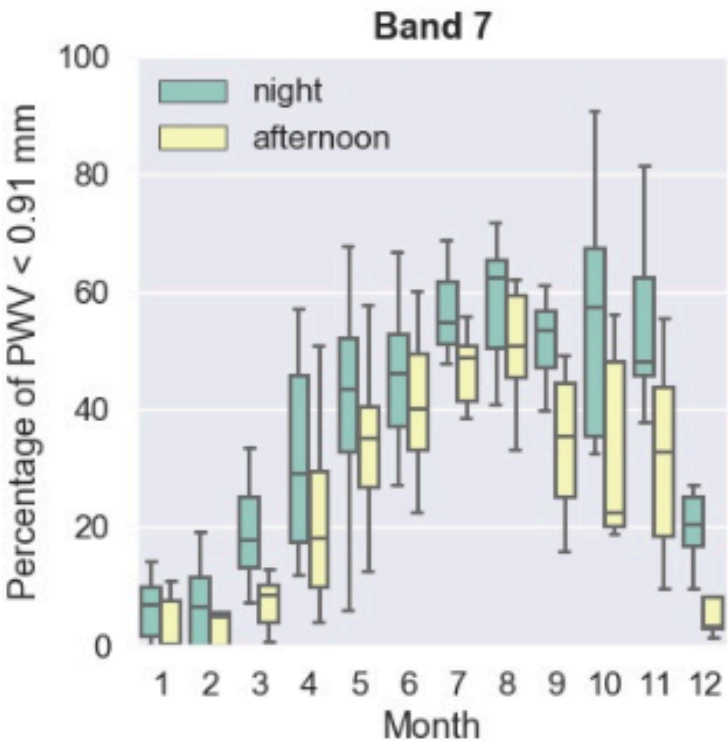
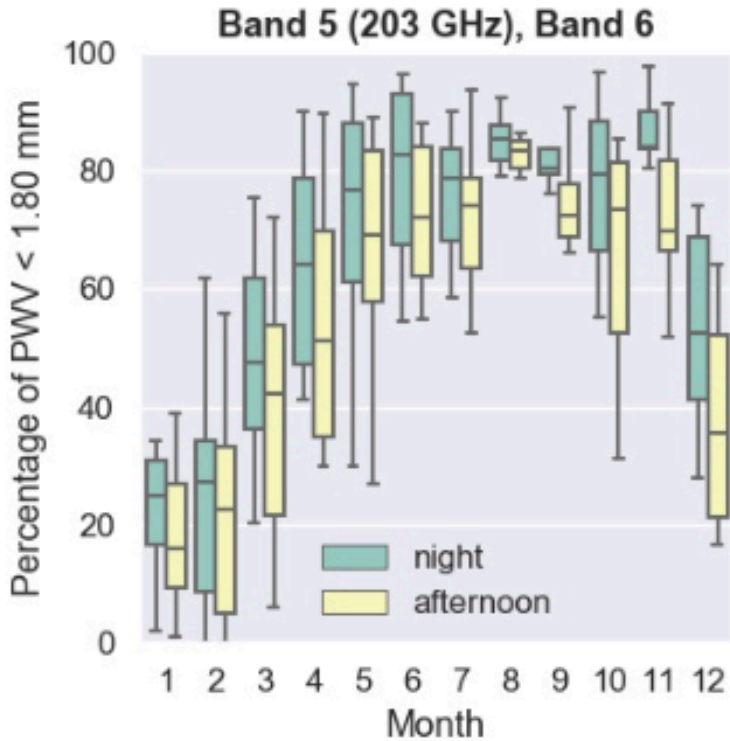
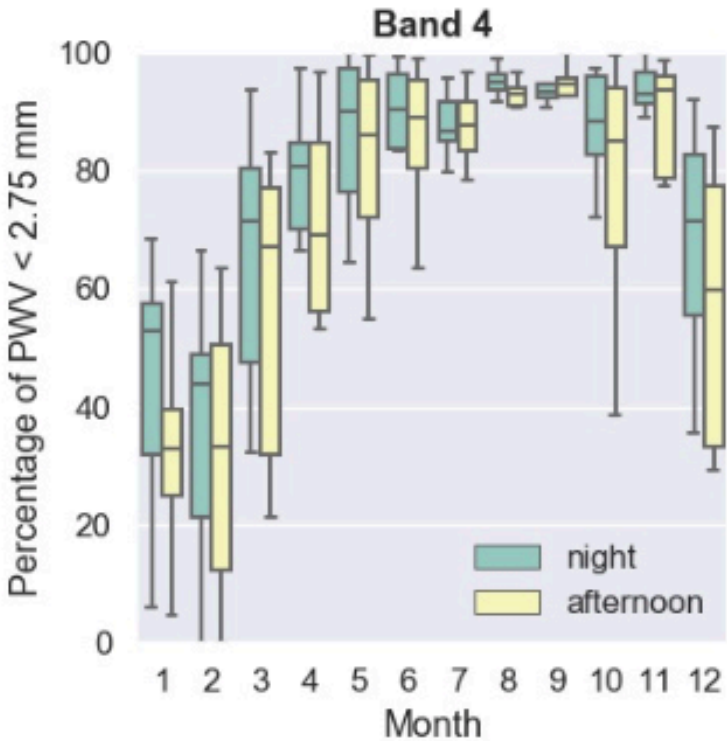
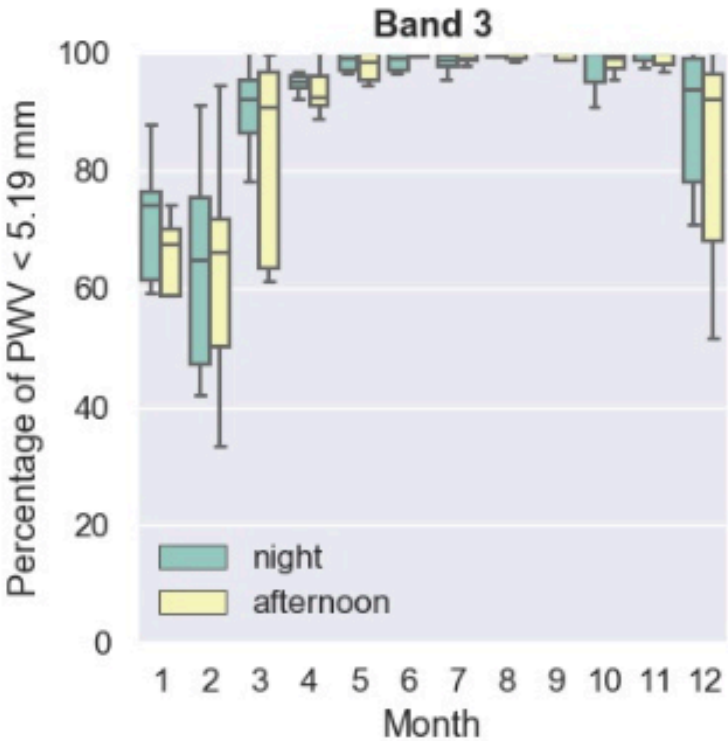
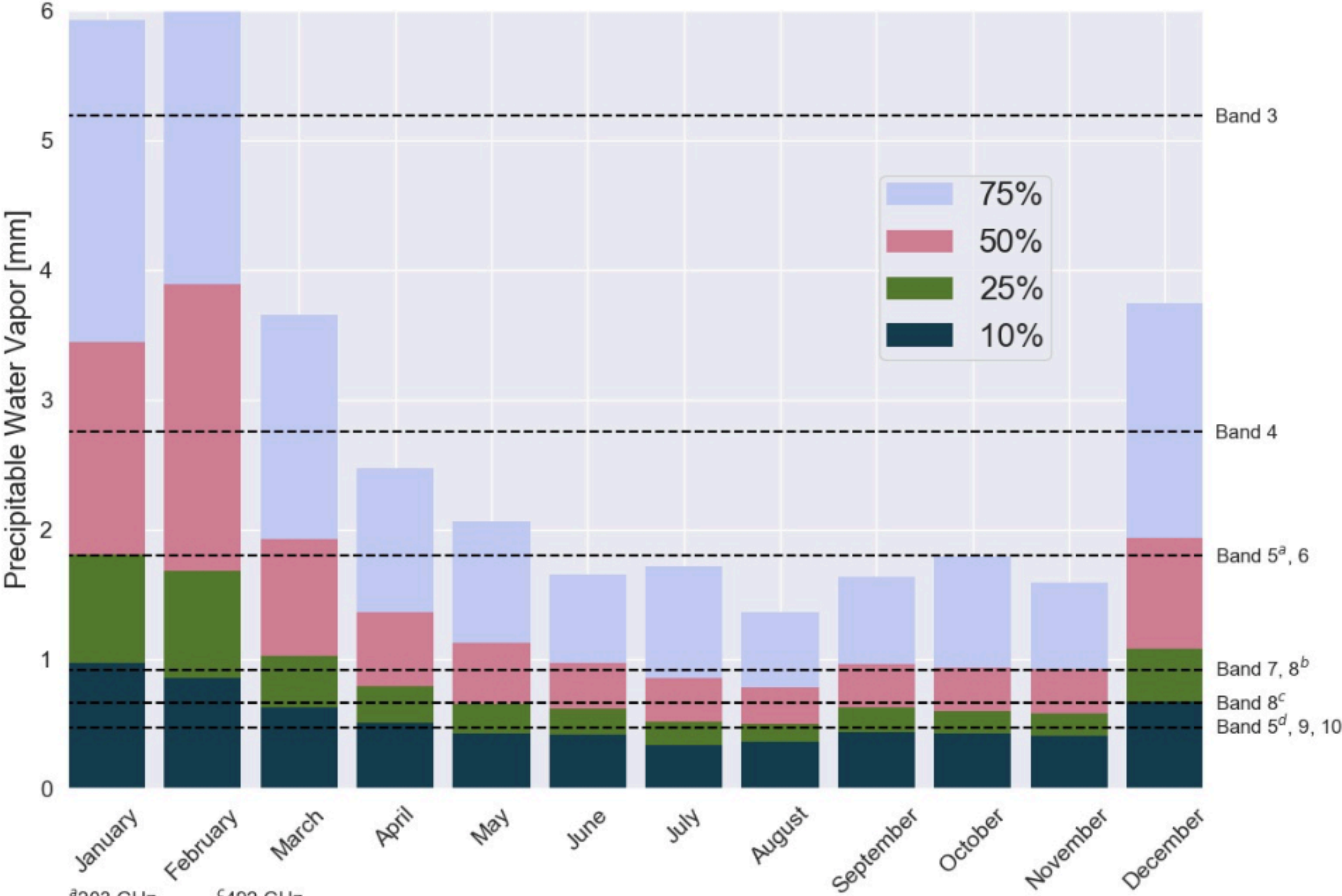
# Proposal planning

## Scheduling considerations

- Weather
- Angular resolution : encourages to enter a range spanning more than one configuration
- Configuration schedule for the 12-m Array : C-1 to C-8. (No C-9 and C-10), configuration change of once every 3 weeks. B7 to B10 sensitive to the best LST range.
- Observing pressure

# Weather

## Fraction of time that PWV falls below a given value



<sup>a</sup>203 GHz      <sup>c</sup>492 GHz  
<sup>b</sup>400 GHz      <sup>d</sup>183 GHz



**Table A-1: Angular Resolutions (AR) and Maximum Recoverable Scales (MRS) for the Cycle 8 configurations**

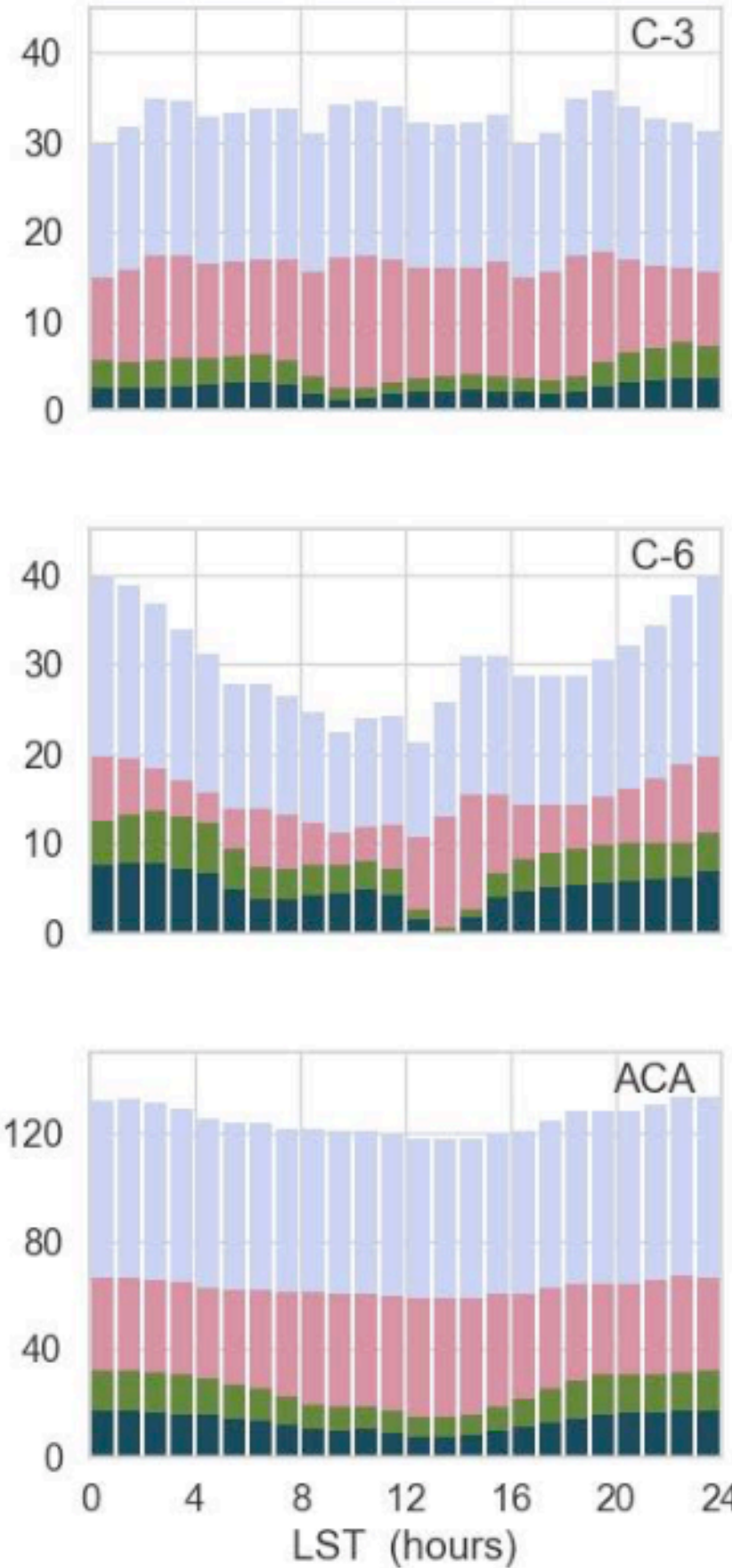
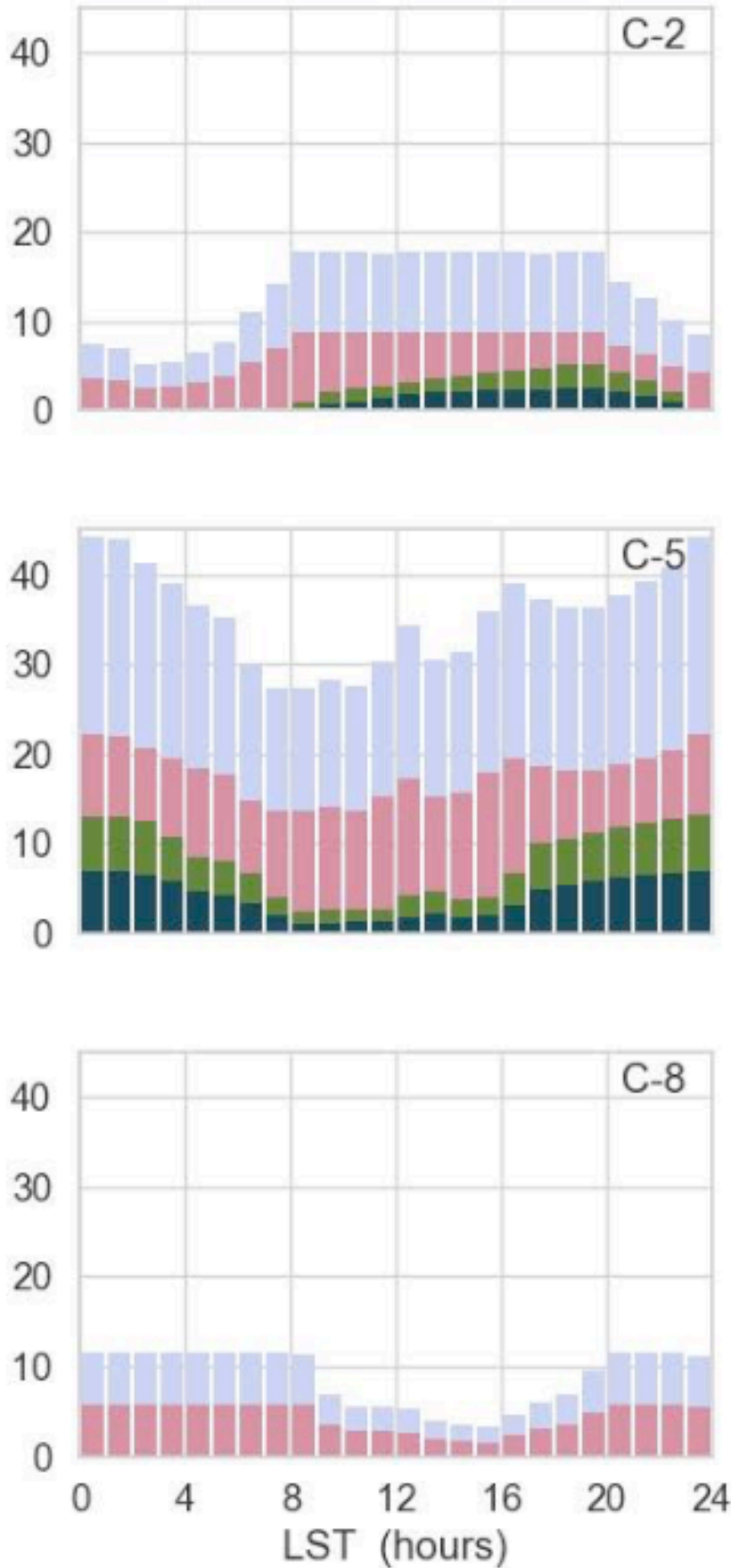
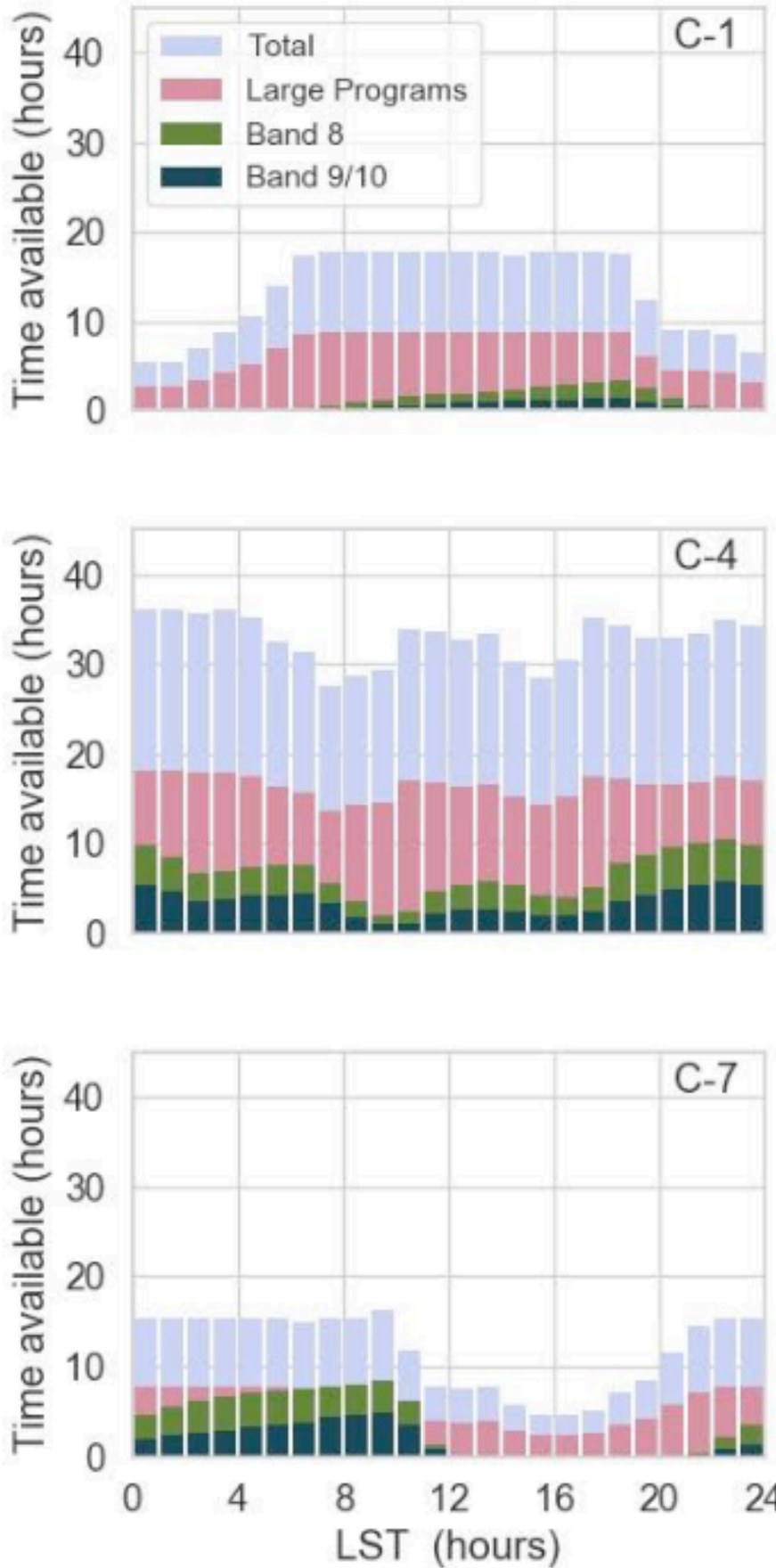
Config	Lmax		Band 3	Band 4	Band 5	Band 6	Band 7	Band 8	Band 9	Band 10
	Lmin		100 GHz	150 GHz	185 GHz	230 GHz	345 GHz	460 GHz	650 GHz	870 GHz
7-m	45 m	AR	12.5''	8.4''	6.8''	5.5''	3.6''	2.7''	1.9''	1.4''
	9 m	MRS	66.7''	44.5''	36.1''	29.0''	19.3''	14.5''	10.3''	7.7''
C-1	161 m	AR	3.4''	2.3''	1.8''	1.5''	1.0''	0.74''	0.52''	0.39''
	15 m	MRS	28.5''	19.0''	15.4''	12.4''	8.3''	6.2''	4.4''	3.3''
C-2	314 m	AR	2.3''	1.5''	1.2''	1.0''	0.67''	0.50''	0.35''	0.26''
	15 m	MRS	22.6''	15.0''	12.2''	9.8''	6.5''	4.9''	3.5''	2.6''
C-3	500 m	AR	1.4''	0.94''	0.77''	0.62''	0.41''	0.31''	0.22''	0.16''
	15 m	MRS	16.2''	10.8''	8.7''	7.0''	4.7''	3.5''	2.5''	1.9''
C-4	784 m	AR	0.92''	0.61''	0.50''	0.40''	0.27''	0.20''	0.14''	0.11''
	15 m	MRS	11.2''	7.5''	6.1''	4.9''	3.3''	2.4''	1.7''	1.3''
C-5	1.4 km	AR	0.54''	0.36''	0.30''	0.24''	0.16''	0.12''	0.084''	0.063''
	15 m	MRS	6.7''	4.5''	3.6''	2.9''	1.9''	1.5''	1.0''	0.77''
C-6	2.5 km	AR	0.31''	0.20''	0.17''	0.13''	0.089''	0.067''	0.047''	0.035''
	15 m	MRS	4.1''	2.7''	2.2''	1.8''	1.2''	0.89''	0.63''	0.47''
C-7	3.6 km	AR	0.21''	0.14''	0.11''	0.092''	0.061''	0.046''	0.033''	0.024''
	64 m	MRS	2.6''	1.7''	1.4''	1.1''	0.75''	0.56''	0.40''	0.30''
C-8	8.5 km	AR	0.096''	0.064''	0.052''	0.042''	0.028''	N/A	N/A	N/A
	110 m	MRS	1.4''	0.95''	0.77''	0.62''	0.41''			

c.f., JCMT 14''@850um  
Polarization unto B7



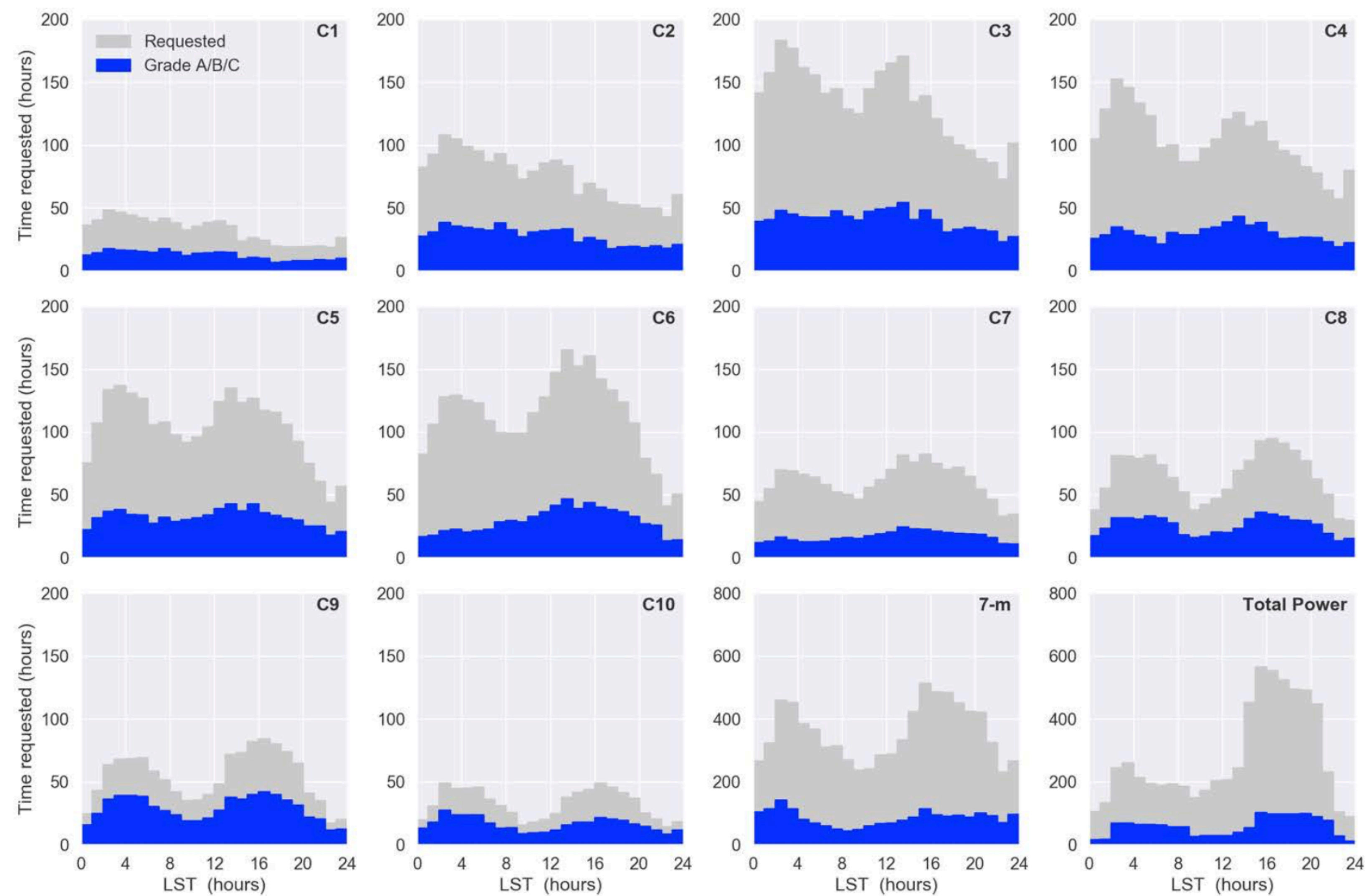
# 12-m Array Configuration Schedule / Effective observing time available per configuration

Start date	Configuration	Longest baseline	LST for best observing conditions
2021 October 1	C-8	8.5 km	~ 22—10 h
2021 October 20	C-7	3.6 km	~ 23—11 h
2021 November 10	C-6	2.5 km	~ 1—13 h
2021 December 1	C-5	1.4 km	~ 2—14 h
2021 December 20	C-4	0.78 km	~ 4—15 h
2022 January 10	C-3	0.50 km	~ 5—17 h
2022 February 1	No observations due to maintenance		
2022 March 1	C-1	0.16 km	~ 8—21 h
2022 March 26	C-2	0.31 km	~ 9—23 h
2022 April 20	C-3	0.50 km	~ 11—0 h
2022 May 10	C-4	0.78 km	~ 12—2 h
2022 May 31	C-5	1.4 km	~ 13—4 h
2022 June 23	C-6	2.5 km	~15—6 h
2022 July 28	C-5	1.4 km	~17—7 h
2022 August 18	C-4	0.78 km	~19—8 h
2022 September 10	C-3	0.50 km	~20—9 h





# Observing pressure



# Notice

- All documents named as ALMA Cycle 8 “2021”, Not just cycle 8
- Register your expertise in the Science Portal.
- More documents in the Science Portal
- Help for Korean ARC node

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**Table A-3: Properties of ALMA Cycle 8 2021 Receiver Bands**

<b>Band</b>	<b>Frequency range<sup>1</sup> (GHz)</b>	<b>Wavelength range (mm)</b>	<b>IF range (GHz)</b>	<b>Type</b>
3	84 – 116	3.6 – 2.6	4 – 8	2SB
4	125 – 163	2.4 – 1.8	4 – 8	2SB
5	158 – 211	1.9 – 1.4	4 – 8	2SB
6	211 – 275	1.4 – 1.1	4.5 – 10	2SB
7	275 – 373	1.1 – 0.8	4 – 8	2SB
8	385 – 500	0.78 – 0.60	4 – 8	2SB
9	602 – 720	0.50 – 0.42	4 – 12	DSB
10	787 – 950	0.38 – 0.32	4 – 12	DSB

**Table A-4: Properties of ALMA Cycle 8 2021 Correlator Modes, dual-polarization operation <sup>1,2</sup>**

<b>Bandwidth (MHz)</b>	<b>Channel spacing<sup>(3)</sup> (MHz)</b>	<b>Spectral resolution (MHz)</b>	<b>Number of channels</b>	<b>Correlator mode<sup>(4)</sup></b>
1875	15.6	31.2	120	TDM
1875	0.488	0.976	3840	FDM
938	0.244	0.488	3840	FDM
469	0.122	0.244	3840	FDM
234	0.061	0.122	3840	FDM
117	0.0305	0.061	3840	FDM
58.6	0.0153	0.0305	3840	FDM