Cycle 9 and Future Capabilities

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General Information

- **ALMA Cycle 9 will start in October 2022 and span 12 months.**
- **The JAO anticipates having 4300 hours for approved science observations on the 12-m Array and 4300 hours on both 7-m and Total Power arrays.**
- **The JAO strongly encourages projects with observations in Bands 8, 9, and 10.**
- **The JAO will only issue a Supplemental Call for the ACA in stand-alone mode if needed for scheduling purposes. Therefore, proposers are encouraged to submit ACA stand-alone proposals for the Main Call.**
  - **In particular, proposers are encouraged to submit ACA stand-alone observations for targets that can be observed in the LST range of 20h to 10h.**
- **PIs of Band-3 (3mm) VLBI must also submit a proposal to GMVA by February 1st, 2022.**

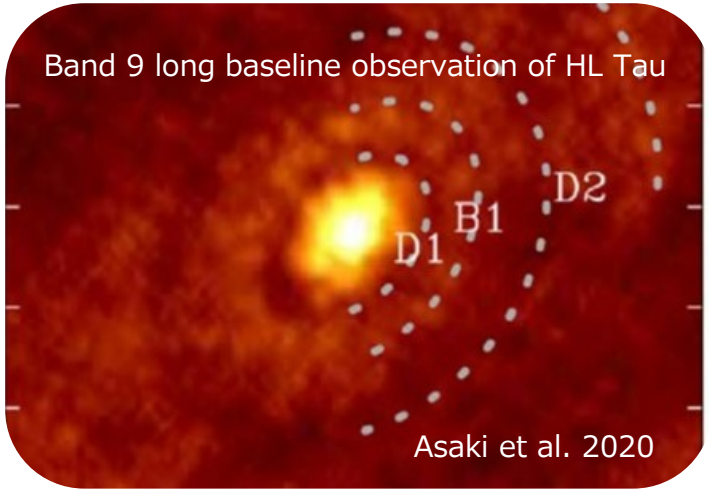
All the capabilities from previous cycle will be kept

- **Number of antennas**
  - **>43 antennas in the 12-m Array.**
  - **>10 7-m antennas (for short baselines) and 3 12-m antennas (for single dish) in the ACA.**
- **Receiver bands**
  - **Bands 3, 4, 5, 6, 7, 8, 9, and 10.**
- **Regular**
  - **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**
- **VLBI/pulsar in phase-up mode**
- **Target of Opportunity**
- **Large program (>50 hrs for 12m array, >150 hrs for 7m array)**
- **Polarization (Bands 3-7)**
  - **12m: Single pointing and mosaicking for linear polarization, only single pointing within 1/10 of PB for circular polarization**
  - **7m: single pointing, linear polarization only.**

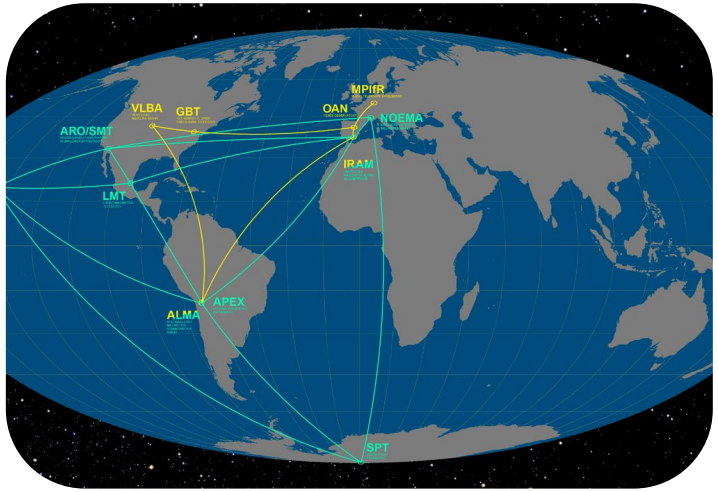
What’s new in Cycle 9?

TEST DATA

Solar TP regional mapping



Long baseline at B8/9/10



B7 continuum VLBI, B3 spectral line VLBI

Solar TP Regional Mapping

- **Fast-scan solar regional mapping to observe transient solar activity with high cadence.**
- **Mapping speed has increased by a factor of ~10.**
  - **~10s second for arcmin-scale mapping.**

Expected time cadence (Preliminary)

Diameter of FoV	Band3	Band5 & Band6	Band7
100 arcsec	-	11 sec	14 sec
200 arcsec	13 sec	21 sec	27 sec
300 arcsec	19 sec	32 sec	40 sec

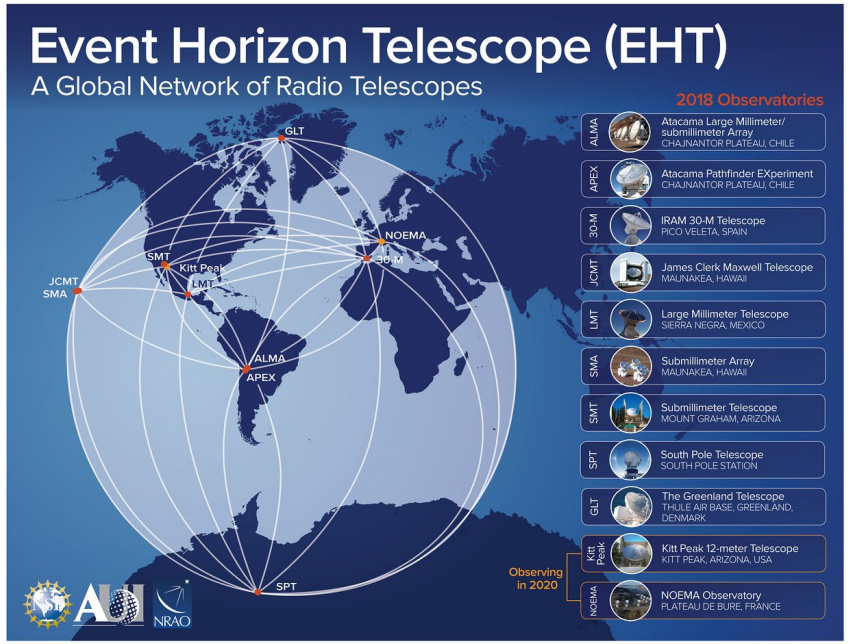
- **Flux calibration will be done on a quiet region of solar disk.**

High Frequency Long Baseline

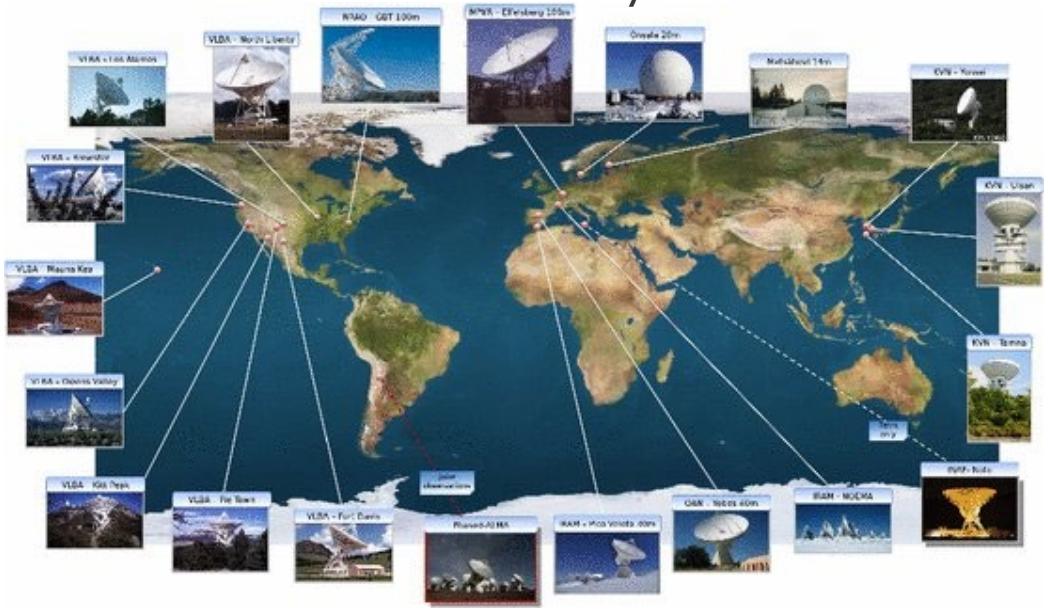
- **Following combinations of band and array configuration will be offered.**
  - **Band 8 up to Configuration 10 (16 km baseline)**
  - **Band 9 up to Configuration 9 (14 km baseline)**
  - **Band 10 up to Configuration 8 (8.5 km baseline)**
- **Maximum achievable angular resolution is about 10 mas for these three bands.**
  - **10 mas = 80 pc at z=1, 0.5 pc at D=10 Mpc, ~4.5 AU at Orion**
- **If a suitable phase calibrator is not found within a given separation angle, the project will be carried out with the Band-to-Band (B2B) phase transfer method.**
- **The data with the B2B calibration will be reduced by manual. Because of high workload for the data quality assurance, the total time available for the projects that require the B2B calibration is expected to be capped at approximately 45 hours.**

Band 7 Continuum & Band 3 Spectral Line VLBI

- **Band 7 continuum VLBI using phased-ALMA and EHT**
  - **8 EHT partner stations available including ALMA**
- **Band 3 Spectral Line VLBI using phased-ALMA and GMVA**
  - **All GMVA stations available**
  - **Tuning is fixed at continuum VLBI setup. Experiments will be limited to the SiO (v=1, J=2-1) masers for galactic sources.**
  - **Frequency resolution: TBD (No constraint in theory).**



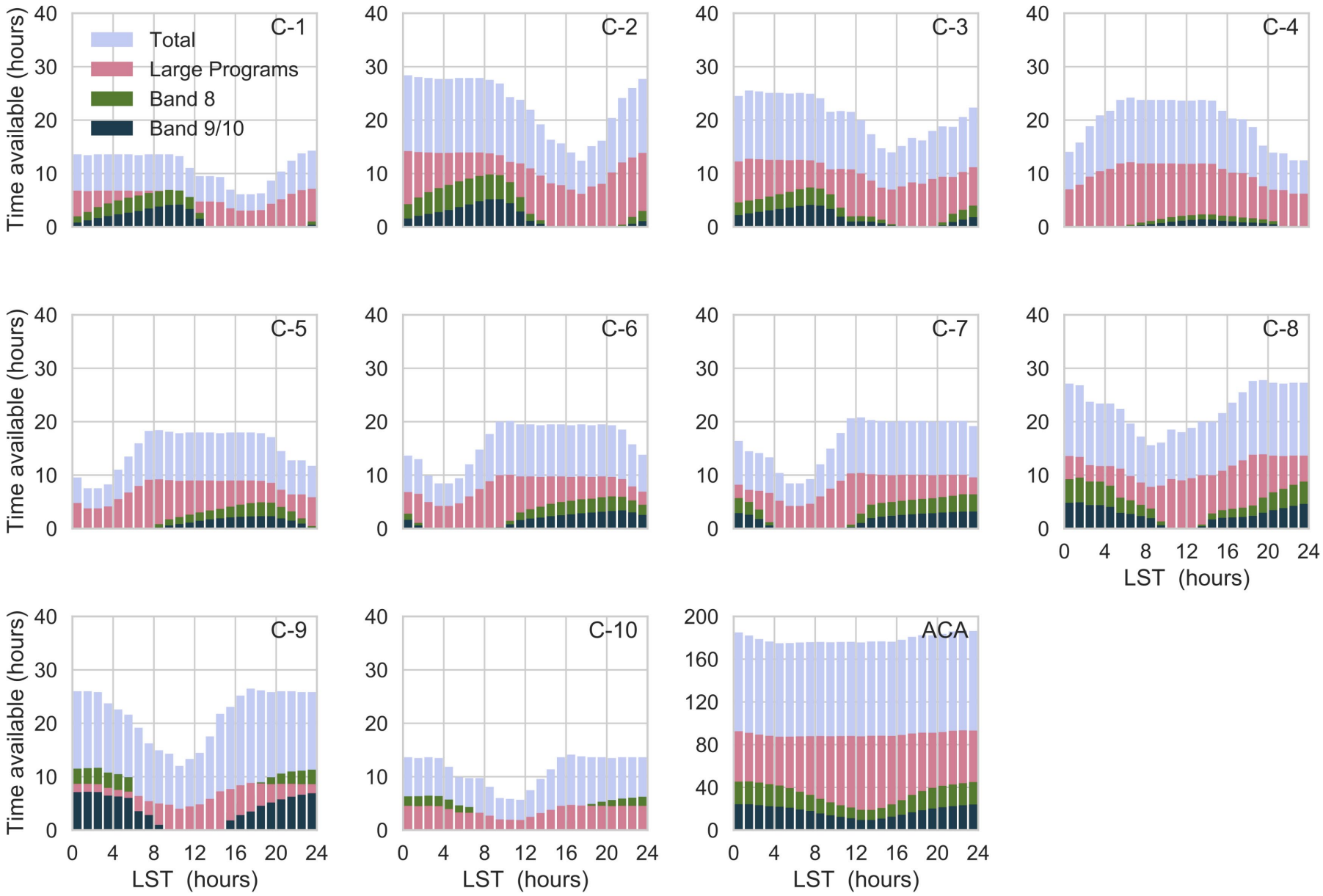
Global Millimeter VLBI Array



Configuration Schedule

Start date	Config	Longest baseline	LST: Best conditions
1-Oct-22	C-3	0.5	22-10
20-Oct-22	C-2	0.31	23-11
10-Nov-22	C-1	0.16	1-13
30-Nov-22	C-2	0.31	2-14
20-Dec-22	C-3	0.5	4-15
10-Jan-23	C-4	0.78	5-17
1-Feb-23	No observations due to maintenance		
1-Mar-23	C-4	0.78	8-21
20-Mar-23	C-5	1.4	9-23
20-Apr-23	C-6	2.5	11-1
20-May-23	C-7	3.6	13-3
20-Jun-23	C-8	8.5	14-5
11-Jul-23	C-9	13.9	16-6
30-Jul-23	C-10	16.2	17-7
20-Aug-23	C-9	13.9	19-8
10-Sep-23	C-8	8.5	20-9

Estimated observing time available (based on PWV)



Beyond Cycle 9

- **TP spectral scan**
- **TP high frequency (Bands 9 and 10)**
- **ACA polarization mosaicking**
- **Improving circular polarization accuracy**
- **Spectral line polarization mosaicking**
- **Band 1**
- **ACA spectrometer**
- **Solar polarization**
- **Astrometry**