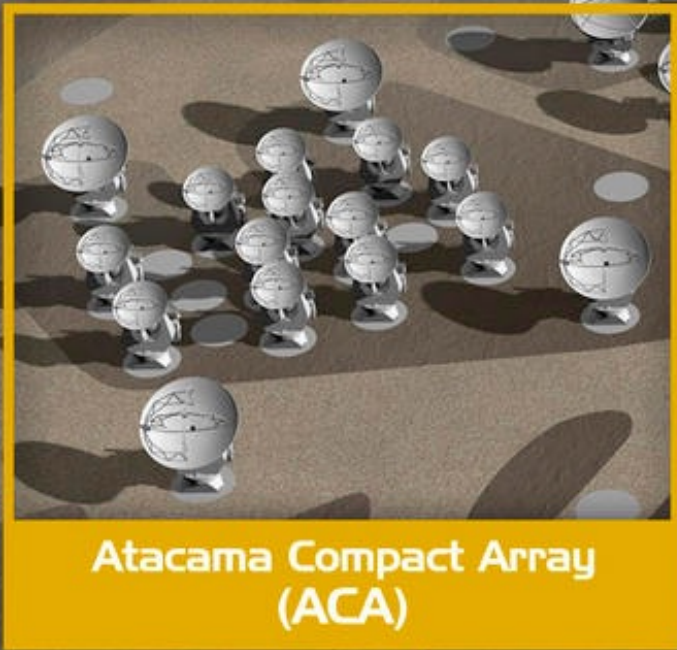


ACA Stand-alone Mode



(“Cycle 0”) for
ACA Stand-alone Mode



**Atacama Compact Array
(ACA)**

ACA (a.k.a. Morita Array)

- ALMA-EA contribution (including ACA correlator)
- Aimed for recovering zero- and short-spacing, particularly in the case of large field mosaicking observations
 - In the Design Reference Science Plan (2003) : Short-spacing (single dish) data are requested for about 25% of the proposals; supporting ACA data for a similar fraction of proposals
- Stand-alone mode was also envisioned
 - e.g. matching resolution between ACA @ 900 GHz and 12-m Array @ 230 GHz
 - future Band 11?
- Cycle 4 : ACA stand-alone up to 1800 hrs (c.p. 3000 hrs of 12-m Array) [No TP-only]



	SMA		ALMA	
Latitude	19:45:32.4 N		23:01:22.4 S	
Altitude (m)	4205		5017	
# of Ant.	8		12 (10)	4 (3)
Diameter (m)	6		7	12
Freq. (GHz)	230/345/400 (194-420)		B3/B4//B6/B7/B8/B9/B10	
Θ_{primary} (")	55/36/31		46/30/26	27/18/12
BW _{max} (GHz)	8 * 2SB/ 2 * SB		8 * 2SB * 2 Pol	
Polarization	single/full		dual	
Aperture Efficiency	0.75/0.67/0.67		0.69/0.66/0.64	0..68/0.63/0.6
Configuration	CMP	VEX	fixed	-
B _{min} (m)	8	68	9	-
B _{max} (m)	70	509	45	-
Θ_{MRS} (")	27/17/15	2.4/1.6/1.4	29/19.3/14.5	-
$\Theta_{\text{synthesis}}$ (")	3.5/2.5/2.2	0.41/0.29/0.25	5.4/3.6/2.7	-
Single-Field sensitivity (ND ²)	288		490	432
effective	202		323	
Mosaic sensitivity (ND)	48		70	
effective	33.6		46.2	
image fidelity (N ³)	512		1000	-
On-Source T _{int} (mins) (for 1mJy/beam in cont.)	29/245/331		2.4/7.6/20.3	

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BW_{max} (GHz)	8 * 2SB/ 2 * SB		8 * 2SB * 2 Pol	
Polarization	single/full		dual	
Aperture Efficiency	0.75/0.67/0.67		0.69/0.66/0.64	0.68/0.63/0.6
Configuration	CMP	VEX	fixed	-
B_{min} (m)	0	60	0	-
B_{max} (m)	$\sigma_S = \frac{w_r 2 k T_{\text{sys}}}{\eta_q \eta_c A_{\text{eff}} (1 - f_s) \sqrt{N(N-1)} n_p \Delta\nu t_{\text{int}}}$			
Θ_{MRS}				
Θ_{synthsi}				
Single-Field sensitivity (ND ²)				
effective	202	323		
Mosaic sensitivity (ND)	48	70		
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B _{max} (m)	70	509	45	-
Θ_{MRS} (")	27/17/15	2.4/1.6/1.4	29/19.3/14.5	-
$\Theta_{\text{synthesis}}$ (")	3.5/2.5/2.2	0.41/0.29/0.25	5.4/3.6/2.7	-
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image fidelity (N ³)	512		1000	-
On-Source T _{int} (mins) (for 1mJy/beam in cont.)	29/245/331		2.4/7.6/20.3	

Table A-1: Angular Resolutions (AR) and Maximum Recoverable Scales (MRS) for the Cycle 4 Array configuration

Config	Lmax	Band	Band 3	Band 4	Band 6	Band 7	Band 8	Band 9	Band 10
	Lmin	Freq	100 GHz	150 GHz	230 GHz	345 GHz	460 GHz	650 GHz	870 GHz
7-m Array	45 m	AR	12.5"	8.4"	5.4"	3.6"	2.7"	1.9"	1.4"
	9 m	MRS	66.7"	44.5"	29.0"	19.3"	14.5"	10.3"	7.7"
C40-1	155 m	AR	3.7"	2.5"	1.6"	1.1"	0.80"	0.57"	0.42"
	15 m	MRS	29.0"	19.4"	12.6"	8.4"	6.3"	4.5"	3.3"
C40-2	273 m	AR	2.4"	1.6"	1.0"	0.69"	0.52"	0.37"	0.27"
	15 m	MRS	22.1"	14.8"	9.6"	6.4"	4.8"	3.4"	2.5"
C40-3	460 m	AR	1.5"	0.97"	0.63"	0.42"	0.32"	0.22"	0.17"
	15 m	MRS	13.7"	9.1"	5.9"	4.0"	3.0"	2.1"	1.6"
C40-4	704 m	AR	0.93"	0.62"	0.40"	0.27"	0.20"	0.14"	0.11"
	15 m	MRS	8.9"	5.9"	3.9"	2.6"	1.9"	1.4"	1.0"
C40-5	1.1 km	AR	0.54"	0.36"	0.23"	0.16"	0.12"	0.083"	0.062"
	17 m	MRS	6.0"	4.0"	2.6"	1.7"	1.3"	0.93"	0.69"
C40-6	1.8 km	AR	0.35"	0.23"	0.15"	0.10"	0.076"	0.054"	0.040"
	15 m	MRS	3.1"	2.1"	1.3"	0.90"	0.67"	0.48"	0.36"
C40-7	3.7 km	AR	0.21"	0.14"	0.090"	0.060"	0.045"	0.032"	0.024"
	81 m	MRS	1.8"	1.2"	0.77"	0.52"	0.39"	0.27"	0.20"
C40-8	6.8 km	AR	0.12"	0.079"	0.052"	0.034"	N/A	N/A	N/A
	168 m	MRS	1.3"	0.87"	0.57"	0.38"			
C40-9	12.6 km	AR	0.066"	0.044"	0.029"	N/A	N/A	N/A	N/A
	271 m	MRS	0.78"	0.52"	0.34"				

Science case of ACA by ASAC (2001)

Table 1. Examples of ALMA programs with potential ACA candidates indicated

Distance	Object	Linear Size	Angular Size (")	Sample ALMA projects	ACA?
$z \approx 5$	Proto galaxies	10 kpc	3	Blind survey of dust, CO, ...	–
$z \approx 0.5-??$	SZ effect	1 Mpc	200	Imaging of SZ effect to determine H_0	+
$z \approx 0.1-??$	Ultraluminous IR galaxies	10 kpc	6	Imaging structures, line ratios	–
$z \approx 0.01$	Galaxies at $z = 0.01$	10 kpc	50	Imaging structures, line ratios	+
10 Mpc	AGN tori	1 pc	0.02	Imaging of obscuring torus	–
10 Mpc	AGN, starburst centers	1 kpc	20	Structure and kinematics	+
10 Mpc	Nearby spirals	10 kpc	200	Imaging arm/interarm, line ratios	+
100 kpc	GMC in LMC/SMC	50 pc	100	Line ratios (CI/CO), structure	+
8 kpc	Galactic Center	5 pc	100	Mini spiral continuum, line	+
5 kpc	Hot cores, UC HII	0.05 pc	2	Line surveys, continuum	–
1 kpc	SNRs	0.05 pc	10	Continuum profile, line ratios	–
1 kpc	Late-type stars	0.02 pc	4	Line surveys, radial profile	–
0.1-1 kpc	Cluster-forming cloud cores	0.01-0.1 pc	2–100	Radial profile, polarimetry	+
0.1-1 kpc	Molecular outflows	0.01-0.5 pc	2–1000	Kinematics, cavities, line ratios	+
0.1 kpc	Infalling protostar envelope	5000 AU	50	Radial profile, line ratios	+
0.1 kpc	Protoplanetary disks	400 AU	4	Dust + molecules, gaps, line ratios	–
10 pc	Debris disks main-seq. stars	400 AU	40	Structure, gaps	+
	Planets		50	Structure atmosphere, e.g., Jupiter, Mars	+
	Comets		5	Jets, distributed molecules in coma	–
	Sun		1800	Limb brightening, solar activity	+

Science case of ACA by ASAC (2001)

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$z \approx 0.01$	Galaxies at $z = 0.01$	10 kpc	50	Imaging structures, line ratios	+
10 Mpc	AGN tori	1 pc	0.02	Imaging of obscuring torus	–
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10 Mpc	Nearby spirals	10 kpc	200	Imaging arm/interarm, line ratios	+
100 kpc	GMC in LMC/SMC	50 pc	100	Line ratios (CI/CO), structure	+
8 kpc	Galactic Center	5 pc	100	Mini spiral continuum, line	+
5 kpc	Hot cores, UC HII	0.05 pc	2	Line surveys, continuum	–
1 kpc	SNRs	0.05 pc	10	Continuum profile, line ratios	–
1 kpc	Late-type stars	0.02 pc	4	Line surveys, radial profile	–
0.1-1 kpc	Cluster-forming cloud cores	0.01-0.1 pc	2–100	Radial profile, polarimetry	+
0.1-1 kpc	Molecular outflows	0.01-0.5 pc	2–1000	Kinematics, cavities, line ratios	+
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10 pc	Debris disks main-seq. stars	400 AU	40	Structure, gaps	+
	Planets		50	Structure atmosphere, e.g., Jupiter, Mars	+
	Comets		5	Jets, distributed molecules in coma	–
	Sun		1800	Limb brightening, solar activity	+

ACA Stand-alone Mode

- Cycle 4 : ACA stand-alone available up to 1800 hrs
 - c.p. 3000 hrs of 12-m Array)
 - or ~ 18000 hrs (~ 2250 tracks) of SMA?!
- (new) path to high resolution study with the 12-m Array;
think about xploratory projects at low resolution
- consideration of sensitivity, uv-coverage/shadowing,
overhead should be paid

