ALMA status & Cycle 1 capacities

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Cycle1 tutorial 6 June 2012: Introduction

Main array: 50 x 12-m
150 m – 16 km

ACA: 12 x 7-m + 4 x 12-m

Presently: 39 antennas

Inauguration:
 March 2013

Atacama Compact Array - ACA
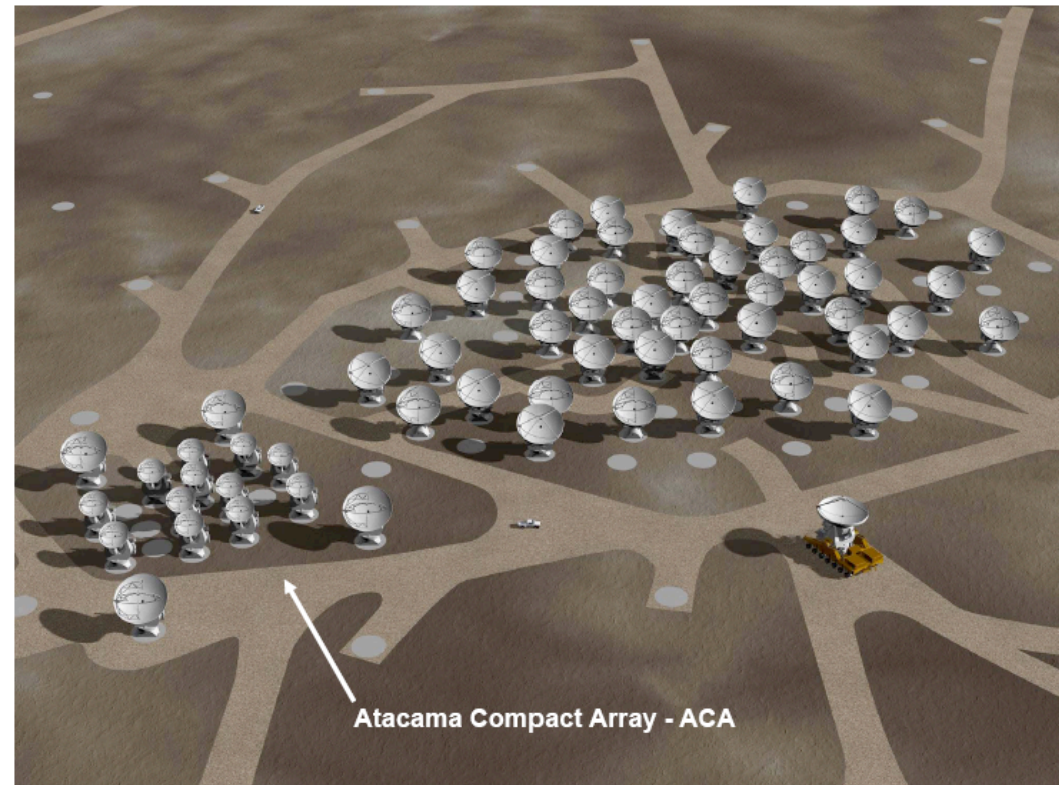
Early Science: to allow community to observe with incomplete, but already superior array, on best effort basis:

 Cycle 0: Sep. 2011 – Dec. 2012
 Cycle 1: Jan. 2013 – Oct. 2013

Time line   **CYCLE 1**

Call for Proposals: 31 May 2012
Deadline: 12 July 2012
  science & technical assessments
Phase 2: end Oct. – end Dec. 2012
Starts: 1 Jan. 2013
Duration: 10 months (➜ 31 Oct. 2013) [9 months for science ops.]
Science time: 800 hrs main array + up to 800 hrs ACA

Configuration

Antennas: 32 x 12-m in main array
         + 9 x 7-m + 2 x 12-m (TP) in ACA
Max. baselines: ca. 160 m to 1 km
Six distinct configurations; pseudo-continuous reconfiguration
Effective snapshot coverage

Full details in the Call for Proposals on the Science Portal

Frequencies   CYCLE 1

Bands 3, 6, 7, 9 (as for Cycle 0) 3, 1.3, 0.8, 0.45 mm

Correlator

Increased flexibility:
different modes and spectral resolution in different basebands
On-line time averaging spectral channels (less data!)

Observing modes

Single-field interferometry
Mosaics (max. 150 pointings per proposal)
Array + ACA + TP antennas (TP: spectral lines only)

Programs

Standard; ToO; DDT; time critical (> 3 wks. sched. fuzziness)

Angular resolution and max angular scale for the six 12m array configs.
In red: including ACA (NB: no ACA allowed for 2 most extended configs.)

Config. baselines (meter)	C32-1 15-166		C32-2 15-304		C32-3 21-443		C32-4 21-558		C32-5 26-820		C32-6 43-1091	
Band	Res "	Max "	Res "	Max "	Res "	Max "	Res "	Max "	Res "	Max "	Res "	Max "
Band 3 (100 GHz)	3.7	25 44	2.0	25 44	1.4	17 44	1.1	17 44	.75	14	.57	8.6
Band 6 (230 GHz)	1.6	11 19	.89	11 19	.61	7.6 19	.48	7.6 19	.33	6.2	.25	3.7
Band 7 (345 GHz)	1.1	7.1 13	.59	7.1 13	.40	5.0 13	.32	5.0 13	.22	4.1	.16	2.5
Band 9 (675 GHz)	.55	3.6 6.5	.30	3.6 6.5	.21	2.6 6.5	.16	2.6 6.5	.11	2.1	.08	1.3

ALMA Early Science

Continuum sensitivity

Band	Frequency (GHz)	Wavelength (mm)	FOV (arcsec)	Cont Sens (mJy/beam)
3	84 – 116	2.6 – 3.6	72 – 52	0.11
6	211 – 275	1.1 – 1.4	29 – 22	0.14
7	275 – 373	0.8 – 1.1	22 – 16	0.24
9	602 – 720	0.4 – 0.5	10 – 8.5	2.2

Source: A Primer for Early Science (Cycle 1)

Band	Freq (GHz)	Angular Resol (arcsec)	Max Scale (arcsec)	ΔT_{line} (K)
Most compact				
3	84 – 116	4.4 – 3.2	29 – 21	0.09
6	211 – 275	1.7 – 1.3	11 – 9	0.11
7	275 – 373	1.4 – 1.0	8.9 – 6.6	0.18
9	602 – 720	0.6 – 0.5	4.1 – 3.4	1.8
Most extended				
3	84 – 116	0.7 – 0.5	10 – 7	3.4
6	211 – 275	0.27 – 0.21	4.1 – 3.1	4.5
7	275 – 373	0.21 – 0.15	3.1 – 2.3	7.5
9	602 – 720	0.09 – 0.08	1.4 – 1.2	80

Limitations I

- Science Goal (SG) limitations regarding:
    number of sources per SG
    number of spectral setups per SG
    number of SG per proposal
  (details: Viviana's talk)

- Max. 150 pointings per proposal

- Expect ca. 200 highest priority projects, thus average 12-m
  array time per proposal ≈ 4 hrs (with large range)

- No Large Programs (max. 100 hrs. per proposal)

- No ACA, TP stand-alone observations. Only one ACA
  configuration: min / max baselines = 8.9 m / 32.1 m

Limitations II   CYCLE 1

- TP antennas only for spectral line observations

- Only 3 receivers available at any time (proposals requiring sequential observations in more than 3 bands are not allowed)

- Up to 4 basebands per spectral setup; only one spectral window per baseband

- No spectral sweeps offered
- No solar observations
- No full polarization

- δ_{max} = +40°. Significant shadowing at δ< -60° > +20° (ACA) and δ< -75° > +25° (most compact config. main array)

ES observations – general considerations

★ Cycle 1 proposals will be considered on their own merit
independent of Cycle 0 results

★No guarantee that data & data reduction quality meets standards
 expected when ALMA fully operational

★ No/limited reduction pipeline available. Experience in radio or
mm-interferometry will be advantage when working with
ES data products. Or visit ARC-node for help.

★ Estimated max fraction of time suitable for obs. in each band:
Band: 3 (100%)   6 (70%)   7 (40%)   9 (10%)

★ Proprietary period 12 months

★ No transfer of projects from Cycle 1 to Cycle 2

Full details in the ALMA Proposers Guide on the Science Portal

Science categories

◆ Cosmology and the high redshift universe

◆ Galaxies and galactic nuclei

◆ ISM, star formation and astrochemistry

◆ Circumstellar disks, exoplanets and solar system

◆ Stellar evolution and the Sun (nb: no Sun in Cycle1)

Cycle 0 stats for highest-priority proposals

Highest-priority proposals: Science category distribution

10.7%   18.8%   25.9%   44.6%

- Cosmology
- Galaxies
- ISM
- Stellar evolution
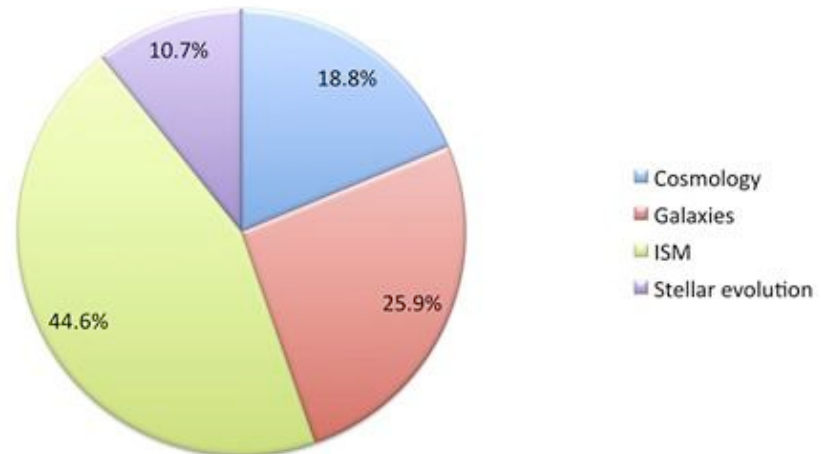
How to propose for ALMA observations

- Must use software package ALMA Observing Tool (OT)

- Log on to Science Portal for all necessary documentation:
   (http://almascience.org)

ALMA Proposers Guide
A Primer for Early Science
OT Phase I Quickstart Guide; OT User Manual
ALMA Technical Handbook
ALMA Sensitivity Calculator
CASA Simulator; ALMA Observation Support Tool (OST)

And: this tutorial!

Today's program

10:20 - 11:00 The ALMA Observing Tool (Casasola)

11:10 – 11:30 Practical examples (Mignano, Boissier)

11:40 – 12:00 ALMA Simulations (Paladino)

12:10 – 12:30 Discussion and Questions

Helpdesk: submit a ticket or consult the Knowledgebase/FAQ

Also to apply for face-to-face help at the Italian ARC node