



Cycle 2: Capabilities Policies

Paola Andreani





The Science Portal: entry point to ALMA operations and users support




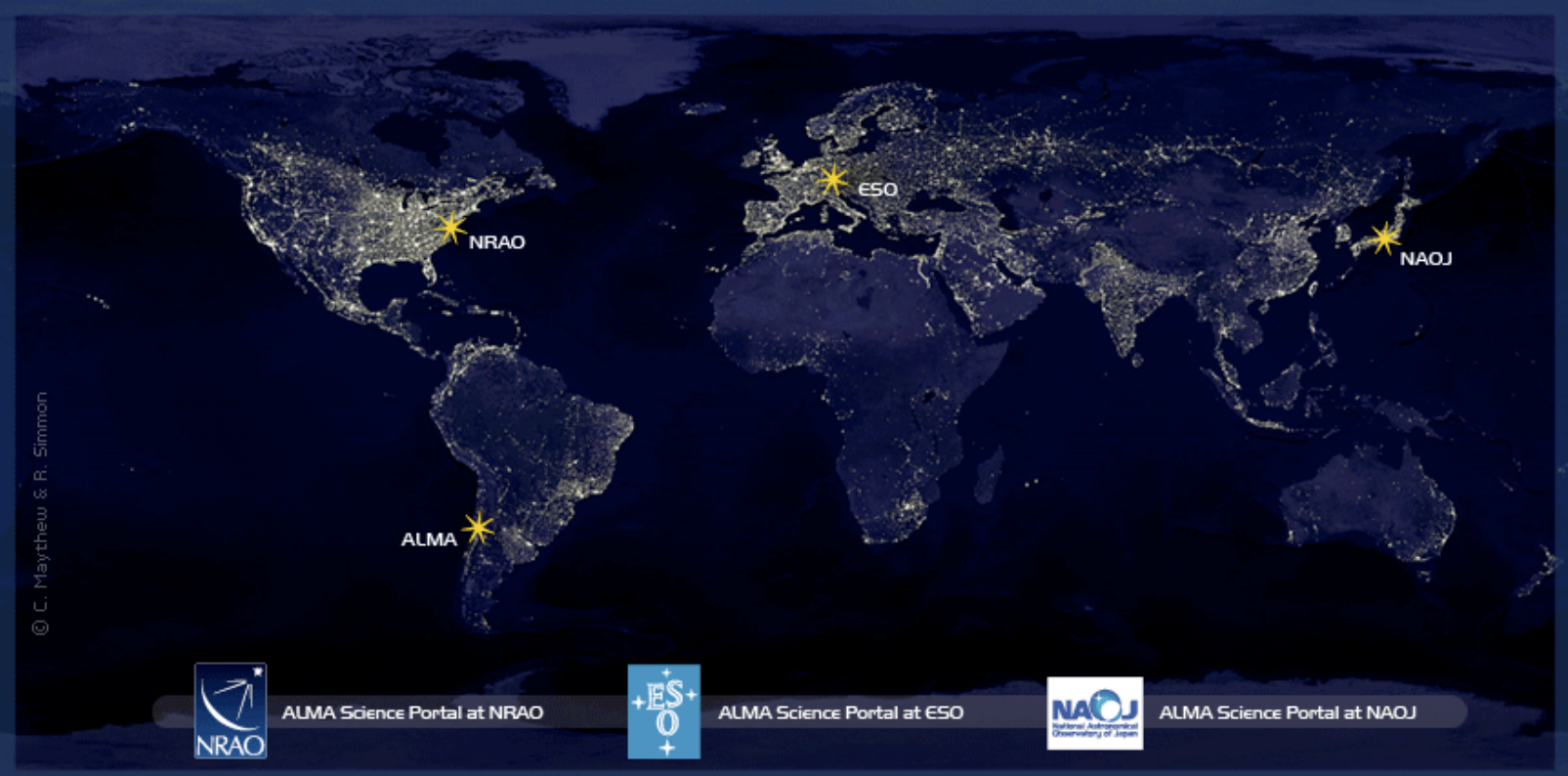
EUROPEAN ARC
ALMA Regional Centre






User automatically re-directed to regional SP

Atacama Large Millimeter/submillimeter Array
In search of our Cosmic Origins

Please select your preferred ALMA Regional Centre (ARC). Alternatively you will be redirected in 8 seconds to the closest ARC which in your case is at .



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User Services at ARCs

- Helpdesk
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Welcome to the Science Portal at ESO

Cycle-2 OT update to be released Monday 18 November. All users should install this update. Nov 15, 2013 03:40 PM

Atacama Large Millimeter/submillimeter Array

This is the website for **The ALMA Science Portal**, served from one of the **ALMA Regional Centers (ARCs)** of the ALMA partner organizations: ESO, NRAO or NAOJ. You may switch between the different instances of the portal through the links to the appropriate ALMA partner at the top banner. Through this portal you can find details about the technical capabilities of ALMA, how to propose for observing time, and how to access ALMA data. It includes links to all official ALMA documents and tools, including those for preparing and submitting proposals and processing ALMA data. In order to access some of the tools, users must register with the project and login to the portal via the links at the top banner.

Each of the three ARCs provides additional **User Services**, including a **Helpdesk** for all user queries. Each ARC maintains additional web pages with information on region-specific user services, such as visitor and student programs, schools, workshops, financial programs and public outreach activities. These are accessed via the links under the **User Services at the ARCs** area in the left menu.

General News

- ALMA Cycle 2 Call for Proposals is now open
Oct 24, 2013
- Cycle 1 Update and Transfer to Cycle 2
Oct 07, 2013
- ALMA Cycle 2 Pre-announcement
Sep 17, 2013
- ALMA Cycle 1 Status Update
Sep 10, 2013
- ALMA Cycle 0 final report
Jun 19, 2013

More...

Local News

- IRAM Cycle 2 proposal preparation
Oct 24, 2013
- Italian ALMA proposal preparation day
Oct 24, 2013
- Italian Cycle 2 talk tour
Oct 24, 2013

Link to the helpdesk



The SP contains all the information necessary to prepare and submit a proposal



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Call for Proposals for Cycle 2

The ALMA Director, on behalf of the Joint ALMA Observatory (JAO) and the partner organizations in East Asia, Europe, and North America, is pleased to announce the Early Science Cycle 2 Call for Proposals (CfP). Members of the astronomical community are invited to propose for scientific observations that will be scheduled from June 2014 to October 2015.

At full operational capability, the ALMA Observatory will include an array of fifty 12-m antennas for long baseline interferometric observations (the 12-m Array), and the Atacama Compact Array (ACA, aka Morita Array) composed of twelve 7-m antennas for short baseline interferometric observations (7-m Array) and four 12-m antennas for single-dish observations (Total Power or TP Array).

Cycle 2 observations provide an exciting opportunity for science from this unique world-class facility, though completion of the full 66-antenna array remains the highest ALMA priority.

Cycle 2 Capabilities

The ALMA Early Science [Cycle 2 capabilities](#) include:

- Thirty-four 12-m antennas in the 12-m Array, nine 7-m antennas in the 7-m Array, and two 12-m antennas in the TP Array
- Receiver bands 3, 4, 6, 7, 8 & 9 (wavelengths of about 3.1, 2.1, 1.3, 0.87, 0.74 and 0.44 mm)
- Both single field interferometry and mosaics
- Spectral-line observations with all Arrays (except Band 9 with the TP Array) and continuum observations with the 12-m Array and the 7-m Array
- Polarization (on-axis, continuum, selected frequencies in Band 3, 6 and 7, no ACA, no mosaics, no circular polarization)
- Mixed correlator modes (both high and low frequency resolution in the same observation)
- Baselines up to 1 km for Bands 8 & 9
- Baselines up to 1.5 km for Bands 3, 4, 6, & 7

About

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Cycle 2 Capabilities

Proposers Guide

Technical Handbook

Early Science Primer

Duplications

Proposal Template

Road Map

Sensitivity Calculator

DDT proposals

Observing Tool

Observing

Data

Documents & Tools

Knowledgebase/FAQ

ALMA Community days, Garching Nov 19-20 2013





The helpdesk is the entry point to the EU ARC (ESO+nodes)



Contacts with the users done through the helpdesk.
 i.e. need face-to-face support?
 Use the Helpdesk.

Every registered user has access to the helpdesk

ALMA Community days, Garching Nov 19-20 2013

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ALMA Proposal Road Map



- Proposal Planning
 - Help from documents in the Science Portal (Primer, Technical Handbook, Proposers' Guide, Guide to the European ARC (users' support), etc)
- Proposal Preparation (Phase I)
 - Use of the ALMA Observing Tool (AOT)
 - Submit your proposal with the AOT, multiple submissions are allowed, the last submitted version goes to the panel members.
- Proposal Review Process
 - Ranked according to scientific merit up to regional share
 - Only top 10% proposals (Grade A) will be carried over to cycle 3.
- Observing Preparation (Phase II)
 - Observing plan (SBs) prepared by ARCs according to PIs' wishes
- Observations
 - Schedule (according to weather/configurations/etc)
- Post-observing/Data Reduction
 - Quality assurance (JAO/ARCs)
 - CASA package (-> ARC nodes)



Cycle 2 Operations

- [Early Science through Cycle 2](#) (until construction and commissioning complete)
- [Best effort](#): priority is given to [completion of the array](#): the time is shared with Commissioning activity.
- Only top (a few %) Grade A Projects [carried over](#) from Cycle 2 to Cycle 3 (for only one cycle)
- [Phase 2](#): every approved project gets assigned an ALMA Contact Scientist at the associated ARC or ARC node. Contact Scientists contact the PI, establish a preparation timeline and act as the primary channel of communication between the project PI and the ALMA Observatory.
- [12-month proprietary rights](#) applicable to all ALMA data.
- Scheduling of SBs done by the [dynamic scheduler](#), used in manual mode
- [Data quality assurance](#) done on [best effort](#) basis and provided by the ARCs: the quality of the data and data reduction may not meet the standards expected when ALMA is in full scientific operations.
- [No guarantee](#) that the project will be completed



Cycle 2 Operations



- **Peer review by an unique international committee:**
 - Proposals assessed for their scientific merit and their potential contribution to the advancement of scientific knowledge, as well as the extent to which the planned observations demonstrate and exploit the ALMA Cycle 2 capabilities.
 - Projects with the potential to deliver compelling science from relatively short observations will be favorably considered.
- **ALMA share:**
 - 22.5% for East Asia (EA);
 - 33.75% for Europe (EU);
 - 33.75% for North America (NA);
 - 10% for Chile.
 - Up to 5% to Open Skies (non-ALMA members)
- **Proposals checked for duplication** against successful Cycle 1 (though not Cycle 0) projects
 - The Proposal Review Committee will make recommendations regarding potential duplications.



Cycle 2 timeline



- **Call for Proposal:** Science Archive opened on Oct 24 for proposal submission
- **Deadline:** 5 December 2013 Proposal submission deadline, 15:00 UT
- **Proposal Review Process (Dec-March)** outcome notification: April 2014
- **Start of ALMA Cycle 2 science observations:** June 1, 2014
- **Length of Cycle 2:**
 - Nominally 17 months (finishes at the end of October, 2015)
 - October 2015 End of ALMA Cycle 2 science observations
- **Scheduling and observations:**
 - Cycle 2 observations will be scheduled during blocks of about 10 days, with 16 hours daily of observing time, mainly during nighttime.
 - about 2000 hours of array time will be available for the highest priority projects, including those transferred from Cycle 1.
 - Up to 1/3 of the 12-m Array time will be available for observations that require both the 12-m Array and ACA



Cycle 2 Proposal types

- **Standard Programmes**
 - Time-critical
 - Multi-epoch observations
 - Monitoring
 - But time tolerance of ~2 weeks
 - Any special timing constraints (e.g. observations that once started need to be continued for a set amount of time or executed with a fixed cadence) must be fully justified.
- **ToO**
 - "Reaction time" ~2 weeks between trigger and observations
- **DDT**
 - Can be submitted any time during Cycle 2
 - Need *exceptionally strong* science case
 - Sudden and unexpected astronomical event
 - Same "reaction time" as for ToO
- **Large Programmes** will NOT be offered in Cycle 2



Cycle 2 capabilities



- **Array:**
 - 34 12-m antennas in the 12-m Array
 - 9 7-m antennas in the 7-m Array
 - 2 12-m antennas in the TP Array
- **Receiver bands:**
 - 3, 4, 6, 7, 8 & 9 (wavelengths of about 3.1, 2.1, 1.3, 0.87, 0.74 and 0.44 mm)
- **Observing modes:**
 - Both single field interferometry and mosaics
 - Spectral-line observations with all Arrays (except Band 9 with the TP Array) and continuum observations with the 12-m Array and the 7-m Array
 - Mixed correlator modes (both high and low frequency resolution in the same observation)
- **Polarization** (on-axis, continuum, selected frequencies in Band 3, 6 and 7, no ACA, no mosaics, no circular polarization)
- **Baselines:**
 - Baselines up to 1 km for Bands 8 & 9
 - Baselines up to 1.5 km for Bands 3, 4, 6, & 7
- **ACA:**
 - for short baseline interferometry and single-dish observations only offered to complement observations with the 12-m Array, and not as a stand-alone capability.



On the SP a road map to your proposal



What is ALMA?

ALMA Science Capability

Developing a Research Program with ALMA

Estimating sensitivity and integration time

Accessible spectral lines

Visualising your expected images

Configurations, resolution and Largest Angular Structure (LAS)

Do I need to use the Atacama Compact Array?

Proposal Preparation (Phase 1)

Scientific Justification

Science Goals

Field setup & source sizes

Doppler correction types

Spectral setup

Technical Feasibility





Key elements before developing a proposal:



- What rms sensitivity is required to achieve your science?
- What angular and spectral resolution do you need?
- What are the size scales of the sources of interest to you?
- *Depending on the configuration ALMA may resolve (or filter) out the larger angular scales of emission in extended sources*
- What is the total area you wish to map? Will you need a mosaic to achieve your goals?
- Do you need to observe the polarization structure of your source?
- What elevation will your sources have at the ALMA site?
- **Check for Duplication!**



Sources



- **Targets with declination $\leq +40^\circ$ (but the Sun!)**
 - maximum source elevation at Chajnantor of $\sim 25^\circ$, but shadowing by adjacent antennas becomes an increasing problem at low elevations
 - Shadowing depends on the antenna configuration. For ACA sources with declinations -60° or $> +20^\circ$ will be subject to significant shadowing. For the 12m array, shadowing becomes significant ($> 5\%$) in the most compact configuration for sources $< -75^\circ$ or higher than $+25^\circ$.
- **Mosaic:**
 - total number of pointings / science goal < 150
 - all within a 10 degree area on the sky
 - ACA and TP arrays available to recover LAS
- **Individual pointings: (per Science Goal)**
 - not separated by more than 10 degrees on the sky
 - one spectral setup (correlator)
 - no more than 5 separate frequency settings (same receiver band)
 - the sum over all sources, offsets, and frequency settings < 150
- There is not limits on the number of SGs
- Proposals must request less than 100h but small proposals favoured.

Receiver Bands

Band	Frequency (GHz)	IF range (GHz)	Type	Estimated fraction of suitable time
B3	84 – 116	4 – 8	2SB	100 %
B4	125 – 163	4 – 8	2SB	90 %
B6	211 – 275	5 – 10	2SB	70 %
B7	275 – 373	4 – 8	2SB	40 %
B8	385 – 500	4 – 8	2SB	20 %
B9	602 – 720	4 – 12	DSB	10 %



Configurations

Several configurations of the 12m-array will be used

From most compact: max baseline of ~160 m
 To most extended: max baseline of ~1.5 km in B3,4,6,7
 max baseline of ~ 1 km in B8 and 9

Frequency (GHz)	FOV (") (primary beam of 12m antenna)	Angular resolution (")		Max recoverable Scale (")	
		extended configuration	compact configuration	12m	ACA
100	62	0.41	3.9	26	42
150	41	0.27	2.6	17	28
230	27	0.18	1.7	11	18
345	18	0.12	1.1	7	12
460	13	0.12	0.8	5	9
650	9.5	0.09	0.6	4	6





Multi configuration observations

High-fidelity imaging may require several array configurations

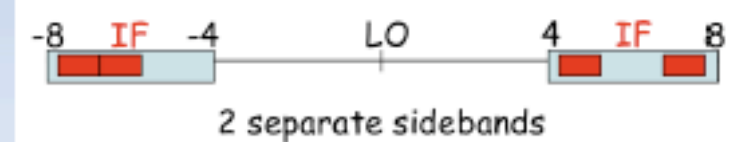
- OT does the check from
 - Requested angular resolution
 - Largest angular structure (non-point sources)
- The total observing time is the sum of observing time with the 12marray and the ACA (TP observations, if needed, are counted as ACA time)
- Total observing time should be < 100 hours
- Notes: No WVR corrections for ACA
- TP array is not offered for spectral line observations in B9

Spectral setup (correlator)

Four basebands (BB) to be placed within the two sidebands (SB)

Number of BB per SB=

0, 1, 2 or 4 for 2SB receivers
any up to 4 for DSB receivers (B9)



TDM (Time Division Mode) modest spectral resolution – small data sets – continuum observations

FDM (Frequency Division Mode) high spectral resolution - ! data rate

Each BB can have a set of spectral windows 4 SPW / BB
128 – 3840 channels / SPW

BB can have different correlator mode

All SPW in the same BB must have the same correlator setup

Possible channel averaging (correlator) by power of 2 limits data rate



Spectral Scan

A set of contiguous spectral windows:

- all targets within 10 degree area on the sky
- one representative frequency (angular resolution, sensitivity)
- no more than FIVE frequency tunings (same band) / science goal
- only one pointing per target (no mosaic/offset allowed)
- only 12m-array (no ACA)
- the sum for all targets of the number of separate tunings < 150 (e.g. 30 targets can be observed for 5 tunings)



Polarisation

Observing modes:

Dual polarization ("standard")

Single polarization (need larger number of channels against sensitivity)

Full polarization = All correlation products

- > offered in B 3, 6, 7
- > only for 12m-array observations
- > centered and compact source (single-field, source < 1/3 primary beam)
- > only specific frequency settings (TDM mode) (chosen for optimized performance)
- > sufficient parallactic angle coverage required (3h, possible to add more sources < 10 deg)



Cycle 2 timeline



- October 24: Call for proposal and opening of the archive
- Dec 5: Proposal submission deadline
- Dec – March 2014: science/technical assessments
- mid March: Meeting of the science panels
- April 9: PI notification and start of Phase II
- June 1st: start of cycle 1 observations
- End October 2015: end of cycle 2





Questions?

