

ALMA Cycle 2 Capabilities & proposal preparation



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EUROPEAN ARC

ALMA Regional Centre || Italian

with the contribution of the Italian ARC staff:
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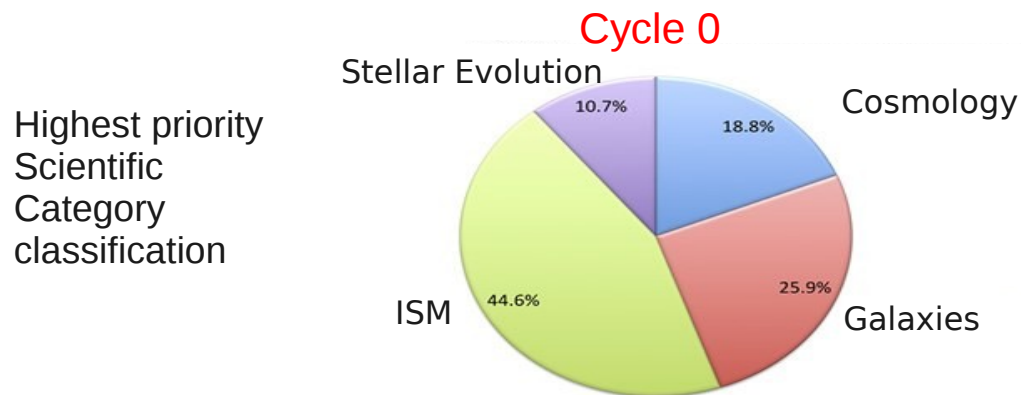
Early Science Cycles

Early Science observations will be conducted on a best effort basis, with priority given to the completion of the full ALMA capabilities

	Cycle 0 Sep. 2011 – Jan. 2013	Cycle 1 Jan. 2013 – May. 2014	Cycle 2 Jun. 2014 – Oct. 2015
Telescope			
Hours dedicated to Science	800	800	2000 (incl. some Cycle 1)
Antennas	> 12x12-m no ACA	> 32x12-m+9x7m+2TP	> 34x12-m+9x7m+2TP
Receiver bands	3, 6, 7, 9	3, 6, 7, 9	+4, 8
Wavelengths [mm]	3, 1.3, 0.8, 0.45	3, 1.3, 0.8 0.45	+2, 0.7
Baselines	up to 400 m	up to 1000 m	up to 1500
Polarisation	single-dual	single dual	+full (with limitations)

Proposal outcome

Submitted	919	1133
Highest priority	111	197
Filler	51	92
Success rate	12% (18%)	17% (25%)



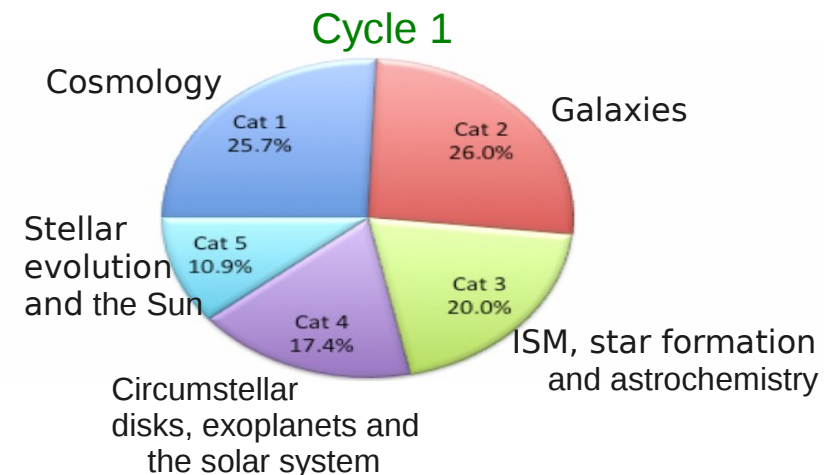
Cycle 0 results

98% Highest-priority PIs received some data

69% Highest-priority fully completed

> 50 ALMA observations related papers in the last 2 months!!!

(see some of the results on <http://almascience.eso.org/alma-science>)



ES Cycle 1 status

Cycle 1 observing was originally planned to start in January 2013 and to span 10 months. At the beginning, Several months were spent giving priority to commissioning and improvements to infrastructure and overall system stability & softwares.

Hence Cycle 1 was extended from the end of October 2013 to the end of May 2014 with observations that should have begun in June 2013.

In June & July weather & power related issues led to site closures and the subsequent warming of receivers. The Cycle 1 software for 12m Array observations was finally accepted on July 24.

August brought further power issues and a workers strike resolved on September 8

PI science observing for 12m Array observations resumed in early October.

No further extension is expected for Cycle 1.

However, the overall completion likelihood for Highest Priority proposals is 56%, 43% for Filler science goals, but this is a strong function of configuration, band and LST.

Finally, about 300 hrs of Cycle 1 Highest Priority science goals are expected to remain unobserved.

Cycle 1 PI were requested to accept to be moved to Cycle 2.

A check during cycle 2 proposal acceptance will be done against duplication wrt Cycle 1 observed highest ranked projects.

Cycle 2 capabilities: arrays & resolution

Band	Frequency range (GHz)	Wavelength Range (mm)	Maximum Recoverable Scale ^{2,3,4} with no ACA (<u>arcsec</u>)	Coarsest allowed angular resolution (<u>arcsec</u>)	Finest achievable angular resolution (<u>arcsec</u>)	ACA Maximum Recoverable Scale (<u>arcsec</u>)
3	84 - 116	3.6 - 2.6	25	7.5	0.41	42
4	125 - 163	2.4 - 1.8	17	5.0	0.27	28
6	211 - 275	1.4 - 1.1	11	3.3	0.18	18
7	275 - 373	1.1 - 0.80	7.2	2.2	0.12	12
8	385 - 500	0.78 - 0.60	5.4	1.6	0.12	9.1
9	602 - 720	0.50 - 0.42	3.8	1.2	0.09	6.4

Antennas: **34 main array 9 ACA 2 Total Power (TP)**
ACA only to complement main array observations
TP only for spectral line observations
in limited frequency (e.g. no continuum & no B9)

Configurations: **smooth transitions between allowed baseline ranges**
B3-7 160-1500m
B8-9 160-1000m
(no need to choose the configuration,
only indicate the angular scales & resolution needed)

Main array and ACA (& TP) observations will be conducted and calibrated independently and combined during data reduction.

ACA is not equipped with WVR in Cycle 2, hence calibration will be limited for ACA in B9.

Cycle 2 capabilities: receivers and spectral setup

Cycle 2 Receiver Bands					Most Compact			Most Extended		
Band	Frequency (GHz)	Wavelength (mm)	Primary Beam (FOV; ")	Continuum Sensitivity (mJy/beam)	Angular Resolution (")	Approx. Max. Scale (") (see P.14)	Spectral Sens. ΔT_{line} (K)	Angular Resolution	Approx. Max. Scale (") (see P.14)	Spectral Sens. ΔT_{line} (K)
3	84-116	2.6-3.6	73-53	0.097	4.4-3.2	31-22	0.08	0.48-0.35	11-8	6.1
4	125-163	1.8-2.4	49-38	0.11	3.0-2.3	21-16	0.08	0.32-0.24	7.3-5.6	7.0
6	211-275	1.1-1.4	29-22	0.13	1.8-1.4	12-9	0.10	0.19-0.14	4.3-3.3	8.6
7	275-373	0.8-1.1	22-16	0.22	1.4-1.0	9.5-7	0.17	0.14-0.11	3.3-2.4	14
8	385-500	0.6-0.8	16-12	0.41	0.97-0.75	6.8-5.2	0.32	0.15-0.12	2.4-1.8	14
9	602-720	0.4-0.5	10-8.5	1.69	0.6-0.5	4.3-3.6	1.25	0.15-0.08	1.4-1.3	54

Main array and ACA use separate correlators that offer the same setups.

Time Division Mode (high sensitivity low spectral resolution) and Frequency Division Mode (Low sensitivity high spectral resolution) are available.

For each receiver 2 sidebands separated by 8-10 GHz and up to 4 basebands per sideband are allowed.

Different correlator modes can be specified for each baseband

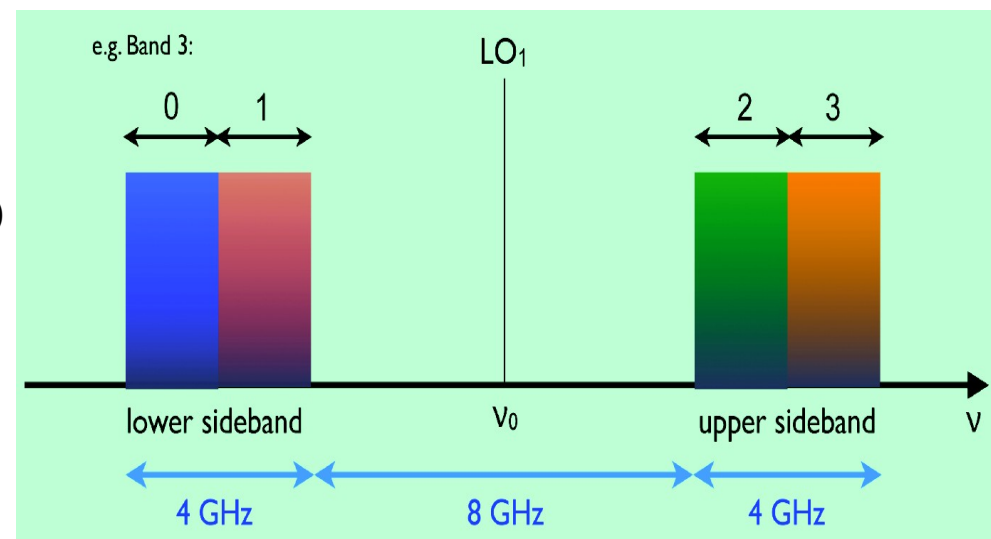
Up to 4 independent spectral windows (with up to 3840 channels) per baseband are allowed.

All spws within a given baseband must use the same correlator mode

Many channels observed at the same time imply high data rate.

Maximum data rate allowed is 60MB/s, but data rate above 6 MB/s must be technically justified.

Data can be binned to reduce data rate at correlator stage.



(see Viviana's talk)

Cycle 2: Observing modes

Science Goal (SG): Minimum proposed observational unit including targets in the same sky region that roughly share the same calibration and spectral setup

Continuum: main Array and ACA (i.e. no TP)

Spectral line: all Arrays (except for Band 9 with TP)

Spectral scan: **Spectral survey or redshift searches** available on main array

Polarization: Single + Dual in all Bands

Full Stokes:

**only main Array, continuum, B3, B6, B7,
at fixed frequencies (see table, each 1875MHz-wide TDM BB)
no ACA, no mosaics**

Sources must have angular scale $< 1/3$ primary beam_{main array}

min 3hr/SG observations for calibration issues

Band	SPW1 (GHz)	SPW2 (GHz)	LO1 (GHz)	SPW3 (GHz)	SPW4 (GHz)
3	90.5	92.5	97.5	102.5	104.5
6	224.0	226.0	233.0	240.0	242.0
7	336.5	338.5	343.5	348.5	350.5

Cycle 2: Proposal Types

- **Standard** (including also time-critical, multiple-epoch observations, and continuous monitoring of a target over a fixed time interval within Cycle 2).
- **Target of Opportunity (ToO)**: to observe targets that can be anticipated but not specified in detail. Cycle 2 proposal deadline.
For ToO and time-constrained projects tolerance of 2 weeks
- **Director's Discretionary Time (DDT)** proposals may be submitted at any time during Cycle 2
 - Proposals requiring the immediate (within 2 weeks) observation of an unexpected astronomical event
 - Proposals requesting observations on a highly competitive scientific topic
 - Follow-up observations of a program recently conducted with ALMA or any other observing facility, where a quick implementation is expected to provide breakthrough results

Cycle 2: Limitations & time available

Pointing: ≤ 150 pointings in the same Science Goal (single pointings or mosaic pointings).
Individual pointings separated $<10^\circ$ and with the same spectral setup

Observing Time: **≤ 100 hrs per proposal** as estimated by Observing Tool

Declination: Shadowing Problem:
Main Array: NO Dec < -75 deg, Dec $> +25$ deg (in compact config.)
ACA: NO Dec < -60 deg, Dec $> +20$ deg

Moving Targets allowed
No solar observations

Observatory staff will perform data quality assurance and will provide reduced data products via the ALMA Regional Centers (ARCs).

2000 hrs for Cycle 2 and highest priority Cycle 1 projects transferred to Cycle 2

The relative ranking of projects in Cycle 2 will proceed as follows:

- a. **Cycle 2 “A” proposals**
(If it is not completed by the end of Cycle 2, its execution will continue in Cycle 3.)
- b. Cycle 1 transfers
- c. Cycle 2 “B” proposals
- d. Cycle 2 “C” proposals

During scheduling, the project with the highest scientific rank is observed whenever all other factors taken into account like weather, configuration or target elevation are equal.

A proposal checklist

Have a good idea!

Estimate required configuration (CASA, Splatalogue, OST, OT)
Write the science case in pdf docs (max 4 page)

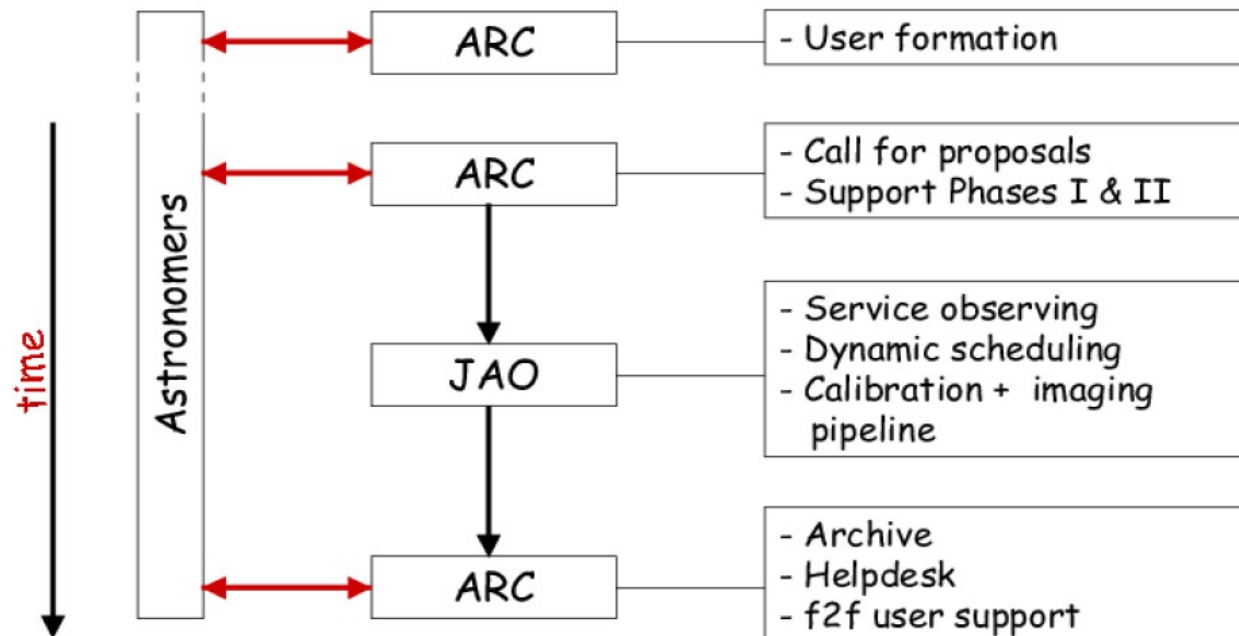
Register to the Science Portal (SP)

PHASE I – Proposal submission (OT, SP, Helpdesk)
TAC evaluation

PHASE II – Observing program submission for accepted proposals (OT, SP, Helpdesk)

Observations

Data reduction and analysis (CASA)



The science case

Science categories used to distribute the proposals for review to the most qualified assessors:

- Cosmology and high z universe
- Galaxies and galactic nuclei
- ISM, star formation and astrochemistry
- Circumstellar disks exoplanet and Solar system
- Stellar evolution and the Sun

Science case is limited to 4 pdf pages (A4, font size no smaller than 11 points) including:

- science case (recommended 2 pages)
- figures and tables
- potential for publicity

Proposals must be self-contained.

The proposal review panels will be encouraged to consider favorably proposals that best demonstrate and exploit the advertised ALMA Early Science Cycle2 capabilities, producing scientifically worthwhile results from relatively short observations (averaging a few hours), the science case should address this aspect.

Proposers are requested to consider the potential media appeal of proposed observations, with regard to scientific content and/or the quality of the visuals that could be produced and **add a statement for potential for publicity to the proposal.**

This information will not be used in the assessment of the proposal, which will be based solely on scientific merit and technical feasibility.

The technical justification

The Technical Justification for each SG is entered in a free-format text box in a dedicated OT panel and should fully justify the technical aspects of the requested observations, with particular attention paid to those parameters that most directly affect the Science Goal time estimate.

The text is limited to 4000 characters per Science Goal and should address the following aspects:

- **sensitivity**
- **imaging**
- **correlator setup**
- **calibration**
- **bandpass accuracy**
- **scheduling/time constraints:**
- **data rate**
- **special constraints on standard observing mode**
- **any non-standard choices**

Submissions & timelines

A Standard or ToO proposal can be submitted and resubmitted until the submission deadline.

Modifications of submitted proposals will not be permitted after the deadline.

If successfully submitted, a proposal receives a unique code.

For later re-submission, users must save a copy of the submitted proposal to their local disk, complete with the proposal submission code.

Do not update a previously submitted proposal using the local copy without a code as this will result in a new (duplicate) submission that will be assigned a new code.

To create a new proposal based on a previous one as a template take as starting point a local copy without a code, so as to avoid overwriting your original proposal in the Archive

Date	Milestone
24 October 2013	Release of Cycle 2 Call for Proposals, Observing Tool & supporting documents
24 October 2013	Opening of the Archive for proposal submission
5 December 2013 (15:00 UT)	Proposal submission deadline
April 2014	Announcement of the outcome of the Proposal Review Process
1 June 2014	Start of ALMA Cycle 2 Science Observations
31 October 2015	End of ALMA Cycle 2

Enter the ALMA world through the ALMA Science Portal

<http://almascience.eso.org/>

The screenshot shows the ALMA Science Portal homepage. The header features the ALMA logo and the text "Atacama Large Millimeter/submillimeter Array" and "In search of our Cosmic Origins". A navigation bar includes links for ESO, NRAO, and NAOJ, along with a search bar and a login/register section. The main content area is titled "Welcome to the Science Portal at JAO" and features a large image of the ALMA observatory. Red annotations highlight several key elements: the "Proposing" link in the left sidebar, the "Documents & Tools" link, the "Helpdesk" link under "User Services at ARCs", the "Current call Tools and info" text, the "All the documents and tools Cycle 2 primer, Proposer Guide, OT Guide" text, the "Log in | Register | Reset Password | Forgot Account" links, and the "All PI and CoI must be registered" text.

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

ALMA

ESO NRAO NAOJ

All PI and CoI must be registered

Search Site

Log in | Register | Reset Password | Forgot Account

About
Science
Proposing
Observing
Data
Documents & Tools
Knowledgebase/FAQ

User Services at ARCs
■ **Helpdesk**

You are here: Home

Welcome to the Science Portal at JAO

Current call Tools and info

**All the documents and tools
Cycle 2 primer, Proposer
Guide, OT Guide**

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

General News

ALMA Cycle 2 Call for Proposals is now open
Oct 19, 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

Access to Helpdesk for any request (FAQ, problems, F2F...)

Make your ALMA simulations (Observation Support Tool)

<http://almaost.jb.man.ac.uk/>



Submit a request for a full simulation of ALMA capabilities for your target
Receive the results via e-mail

Array	Instrument	ALMA	Queue Status • Help
Sky Setup	Source model	OST Library: Central point source	Choose a library source model or
	Upload a FITS file	<input type="text"/> Browse...	You may upload your own model
	Declination	-35d00m00.0s	Ensure correct formatting of this s
	Image peak / point flux in mJy	0.0	Set to 0.0 for no rescaling of source
Observation Setup	Central frequency in GHz	90	The value entered must be within
	Bandwidth in MHz	32	Use broad for continuum, narrow for
	Required resolution in arcseconds	1.0	OST will choose config if instrument
	Pointing strategy	Single	Selecting single will apply primary
	Start hour angle	0.0	Deviation of start of observation from
	On-source time in hours	3	Maximum duration is 24 hours
	Number of visits	1	How many times the observation is
	Number of polarizations	2	This affects the noise in the final n
Corruption	Atmospheric conditions	Good (PWV = 0.5 mm)	Determines level of noise due to w
Imaging	Imaging weights	Natural	This allows a resolution / sensitiv
	Perform deconvolution?	No (Return dirty image)	Apply the CLEAN algorithm to deconv

Job ID: 20110330175645 / Submitted by: casasola@ira.inaf.it

Overview

Click thumbnails to view full-size images. Left: linear colour scale, right: with histogram equalization.

Array configuration	Early Science ALMA (Compact Cycle 0, 125 m baseline)
Source model	All we ever see of stars are their old photographs

Maximum elevation	77.88 degrees
Central frequency	90 GHz = Band 3
Bandwidth	0.032 GHz
Track length	3 hours x 1.0 visits
System temperature	Tsys = Trec + Tsky = 37.0 + 4.42 = 44.15 K
PWV	0.5 mm
Theoretical RMS noise	0.000103323597098 Jy (in naturally-weighted map)
Restoring beam (resolution)	Major axis = 6.229 arcsec, minor axis = 5.176 arcsec, PA = 55.607 deg

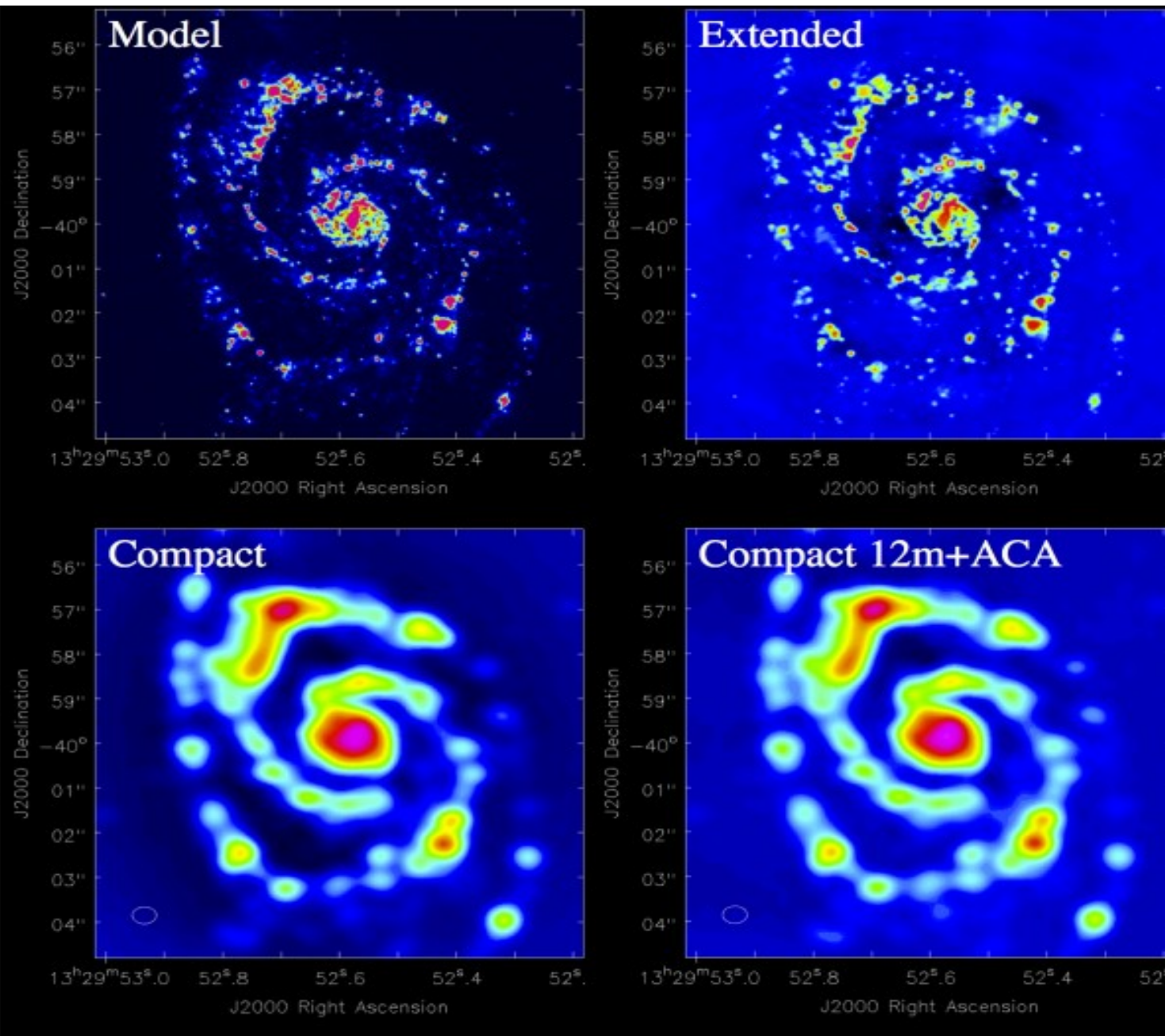
Data products

Your simulated image

Download FITS file

(see Rosita's talk)

Make your ALMA simulations (CASA simalma, simobserve, and simanalyze)



The task **simobserve** generates a data set with simulated visibilities based on an input model image.

The task **simanalyze** produces a cleaned image based on the simulated visibilities, and it generates some diagnostic images.

CASA also provides the task **simalma** that simplifies the steps needed to simulate ALMA observations that combine data from multiple arrays or multiple configurations.

Who needs CASA for simulations today and wants to access to our cluster can ask for an account

(see Rosita's talk)

The Science Goal: Sensitivity Calculator

<http://almascience.eso.org/call-for-proposals/sensitivity-calculator>

Common Parameters			
Dec	00:00:00.000		
Polarization	Dual		
Observing Frequency	345.00000	GHz	
Bandwidth per Polarization	0.00000	GHz	
Water Vapour Column Density	<input checked="" type="radio"/> Automatic Choice <input type="radio"/> Manual Choice		
tau/Tsky	0.913mm (3rd Octile)		
Tsys	tau0=0.158, Tsky=39.538		
	157.027 K		

Individual Parameters						
	12m Array		7m Array		Total Power Array	
Number of Antennas	34		9		2	
Resolution	0.00000	arcsec	5.974554 arcsec		17.923662 arcsec	
Sensitivity(rms)	0.00000	Jy	0.00000	Jy	0.00000	Jy
(equivalent to)	Infinity	K	0.00000	K	0.00000	K
Integration Time	0.00000	s	0.00000	s	0.00000	s

Integration Time Unit Option Automatic

Calculate Integration Time Calculate Sensitivity

Submit with the ALMA Observing Tool

My new idea - Observing Tool for ALMA (Early Science), version R8.0.1

File Edit View Tool Search Help Perspective 1

Project Structure

Proposal Program

My new idea

- My new idea
 - Proposal
 - Planned Observing
 - Science Goal ()
 - Description
 - Field Setup
 - Calibration Setup Parameters
 - Spectral Setup
 - Control and Performance Parameters

Template library. Turn the keys on the JTree below & read the

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 - Proposal
 - Planned Observing
 - Science Goal (Band 3 100 GHz (rest frame) d
 - Science Goal (Band 3 Nyquist-sampled mosa
 - Science Goal (Band 6 Mixed 219 GHz SSB Co
 - Science Goal (Band 6 13CO J=2-1 mapping c
 - Science Goal (Band 6 Mixed simultaneous 12
 - Science Goal (Band 9 700 GHz search for pat

Editors

Spectral Spatial Proposal Catalog

Tab menu for viewer

Proposal Information

Proposal Title: My new idea

Proposal Cycle: 9999.4

Editors Panel

Abstract (max. 300 words)

Feedback



Problems Information Log

Description	Suggestion

Feedback Panel

Project Overview

Contextual Help

- Please ensure you and your co-Is are registered with the [ALMA user portal](#)
- Create a new proposal by either:
 - Selecting *File > New Proposal*
 - Clicking on the  icon in the toolbar
 - Or clicking on this [link](#)
- Click on the  [proposal](#) tree node and complete the relevant fields.

Phase I: Science Proposal

New Science Proposal → Create Science Goals → Validate Science Proposal → Submit Science Proposal

Click on the overview steps to view the contextual help

Importing And Exporting Template Library Need More Help? View Phase 2 Steps

(see Viviana & Rosita's talks)

Get support for Cycle 2 from the Italian node!

For your proposals, data reduction with CASA and ALMA related stuff contact us and/or organize your visit to the Italian ARC node

- 3 visitor stations available
- 1 ARC node member dedicated to each visitor
- 10 TB disk space available during your visit + 3 month for download

Enjoy your ALMA Cycle 2 proposal!

Deadline: 15:00 UT on December 5, 2013

