

Cycle 7, 8 operation and Cycle 9 prospects

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Role of the ALMA Regional Centers (ARCs)

Joint ALMA Observatory
Effective array operations: Execution of programs under suitable conditions
High availability of the array for science : Repairs, Preventive maintenance

Science operations in regional centers with **functions agreed in EA, EU, and NA, in close coordination with JAO**

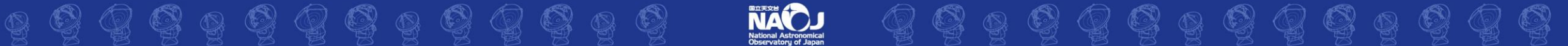
EA ARC
EA ALMA users

EU ARC
EU ALMA users

NA ARC
NA ALMA users



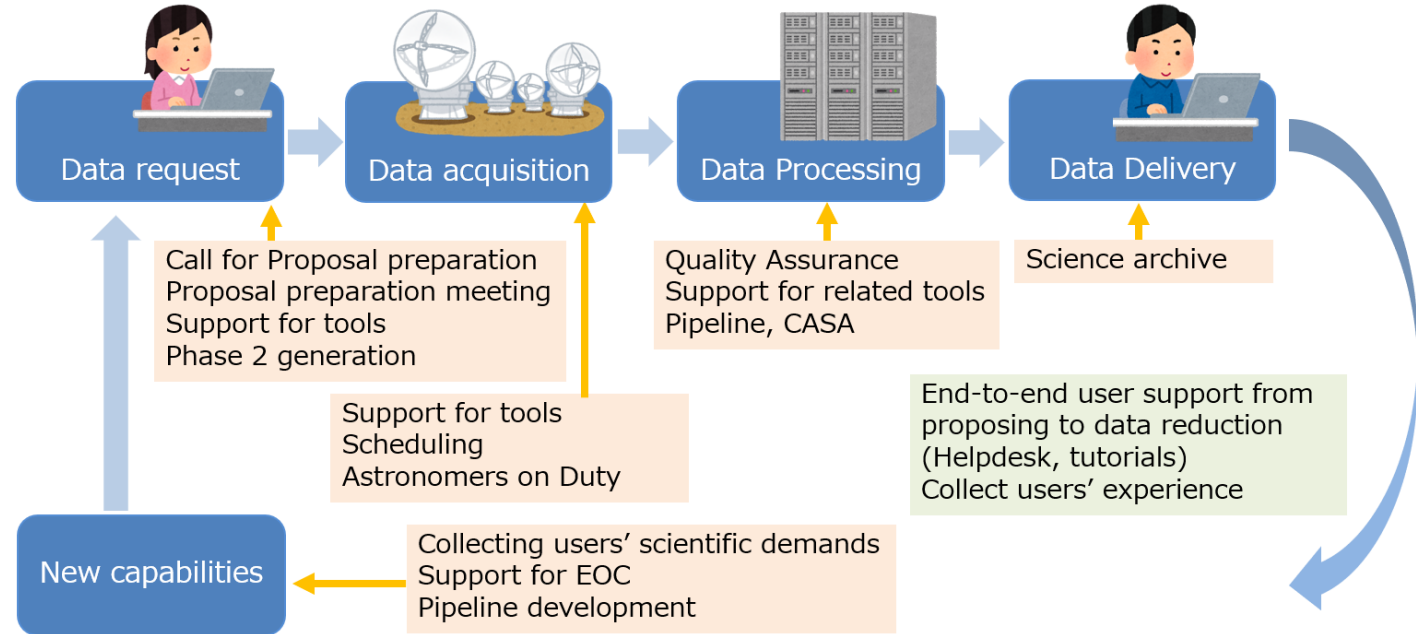
ARCs provide support for users in the respective regions so that they can concentrate on observing proposals and data analysis.





Working as "one ALMA" on daily basis

- Development of the single-dish part of the Pipeline, single-dish part of CASA
- QA2, QA3, and data processing tools
- Archive, Helpdesk, Improvements for Phase 2 generation, Observing Tool, Scheduling, Science Portal etc.
- **Contribution to commissioning of new observing capabilities, to preparations of offering the new modes** (polarization, long-baseline high-freq, Solar, TP-related, ACA spectrometer, Band 1)
- Contribution in the WG to investigate the algorithm for data combination (TP, 7 m, 12 m)
- **Working on regional user-support items**



Each management team, subsystem and working group basically consists of representatives from all the regions of ALMA.





Science Portal – almost everything is here



<https://almascience.nao.ac.jp/>

Registration is necessary to propose observations, getting data under the proprietary period

Observatory News

Amplitude calibration issue affecting some ALMA data
Jun 15, 2021

ALMA Cycle 7 Science Observations Status Update
May 31, 2021

Cycle 8 2021 Proposal Submission Statistics

NAOJ News

ALMA Cycle 8 2021 Proposal Preparation Meeting
May 27, 2021

East Asian ALMA Science Workshop 2021
Dec 03, 2020

ALMA/45m/ASTE Users Meeting 2020
Dec 03, 2020

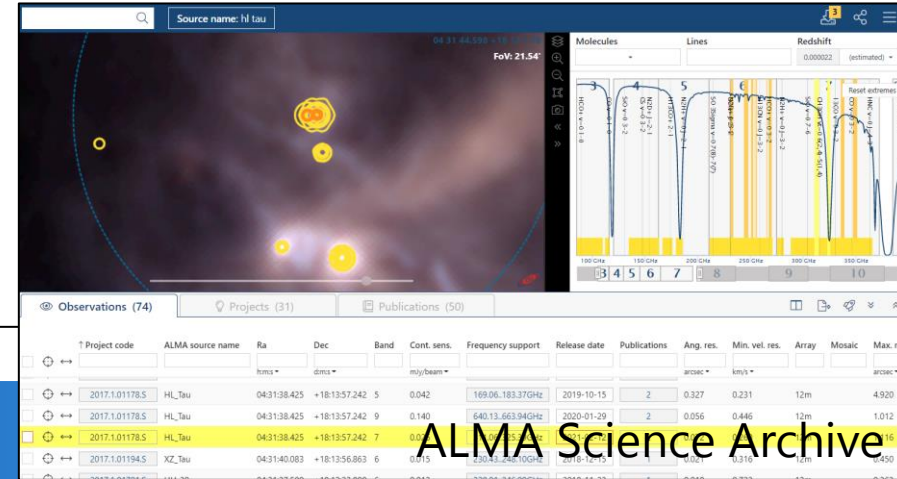
Status

ALMA Proposal Review

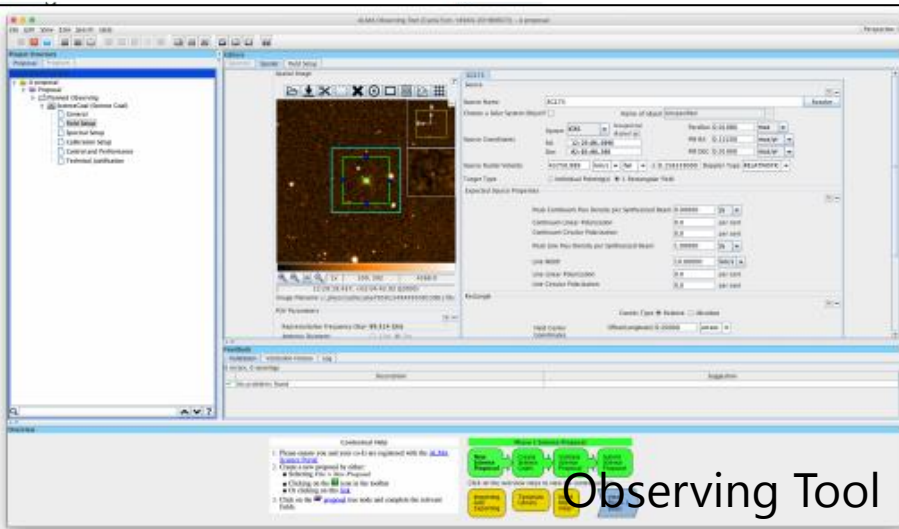
Refereed publications: 2370

Last observed source: NGC7025

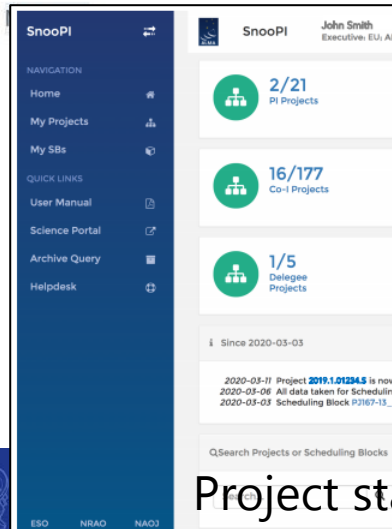
Current configuration: C43-6



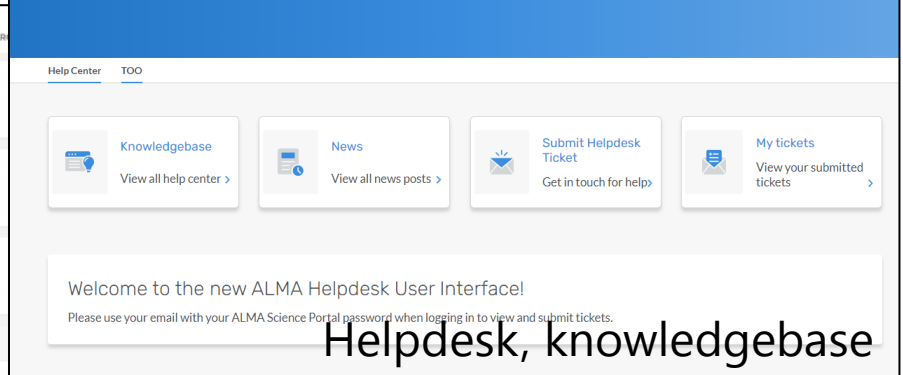
ALMA Science Archive



Observing Tool



Project status tracking tool



Helpdesk, knowledgebase

2022/1/



Completion of Cycle 7, smooth start of Cycle 8

Cycle 7 has been the most challenging cycle in ALMA's history

Array Recovery Status Update

Jan 25, 2021

Dear colleagues,
ALMA anticipates resuming science observations

Mar 15, 2021

Dear colleagues,
ALMA is now accepting Cycle 7 DDT proposals

Mar 18, 2021

ALMA Cycle 7 science observations have re-started

Mar 24, 2021

ALMA Cycle 7 Science Observations Status Update

Apr 15, 2021

ALMA Cycle 7 Science Observations Status Update

May 31, 2021

ALMA Cycle 7 Science Observations Status Update

Jul 15, 2021

ALMA Cycle 7 Science Observations Status Update

Sep 07, 2021

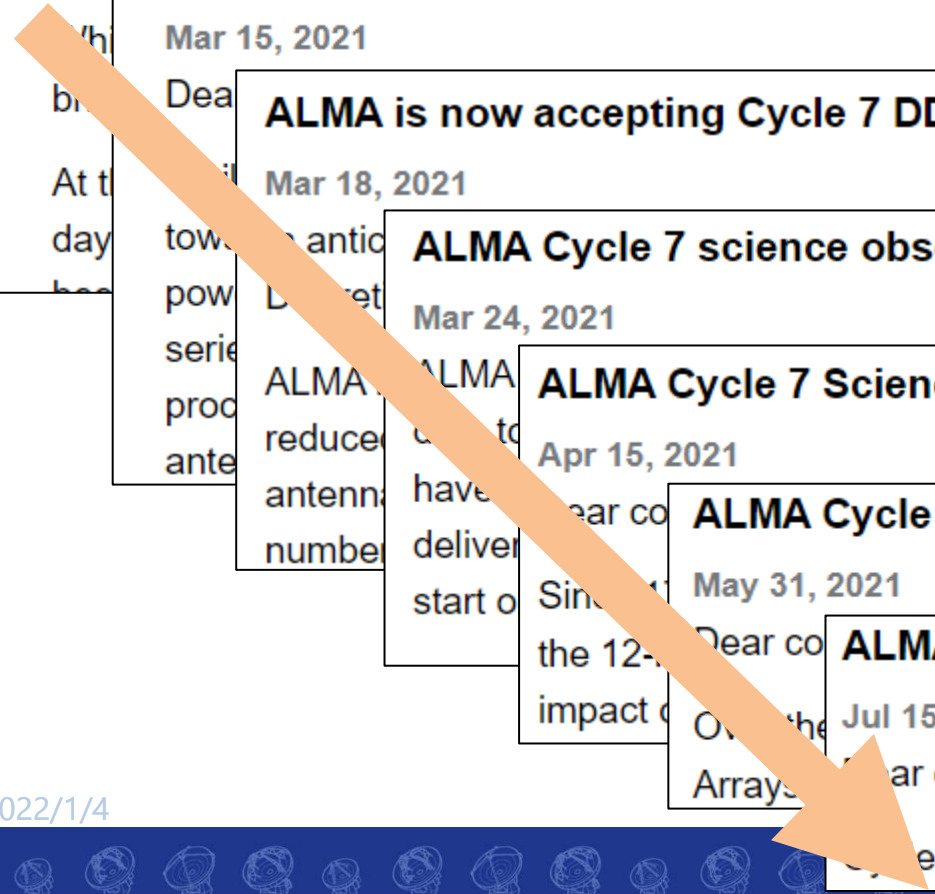
Dear colleagues,

Cycle 8 2021 has started!

Oct 04, 2021

Dear colleagues,

On Friday 1 October the last Cycle 7 science observations have been completed. This cycle has been the most challenging Cycle in ALMA's history. During the last month, science data have been taken from the array. The array is now in a state of spatial resolution observations. Now, the antenna configuration is being updated for Cycle 8.





Reached to the longest baseline in Cycle 7

- Execution status in Cycle 7 → Alvaro's presentation

Cycle 7

Start date	Configuration	Longest baseline	LST: Best conditions
1-Oct-19	C-4	0.78 km	22-10
20-Oct-19	C-3	0.50 km	23-11
10-Nov-19	C-2	0.31 km	1-13
30-Nov-19	C-1	0.16 km	2-14
20-Dec-19	C-2	0.31 km	4-15
10-Jan-20	C-3	0.50 km	5-17
1-Feb-20	No observations due to maintenance		
1-Mar-20	C-4	0.78 km	8-21
20-Mar-20	C-5	1.4 km	9-23
20-Apr-20	C-6	2.5 km	11-1
20-May-20	C-7	3.6 km	13-3
20-Jun-20	C-8	8.5 km	15-5
11-Jul-20	C-9	13.9 km	16-6
30-Jul-20	C-10	16.2 km	17-7
20-Aug-20	C-9	13.9 km	19-8
10-Sep-20	C-8	8.5 km	20-9

After resuming PI science observations in March 2020, it was tried to follow the original configuration +1 year. The antenna relocations were delayed however due to the impact by the COVID-19 and the bad weather as announced in the Science Portal.

Thanks to the great effort at the observatory, the hybrid C-9/10 configuration started from September 1, which enabled the highest angular resolution observations in Cycle 7.





Data delivery time in Cycle 7

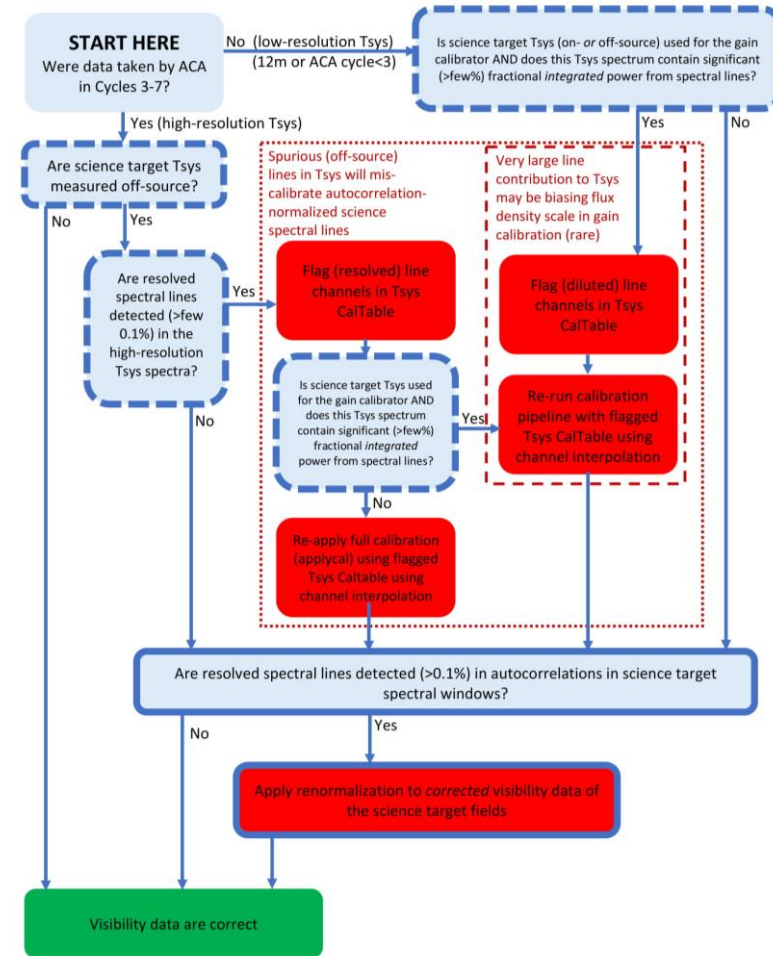
- The data delivery in ~June-August 2021 was impacted by the amplitude renormalization issue and QA3, but now the delivery status is back to normal.



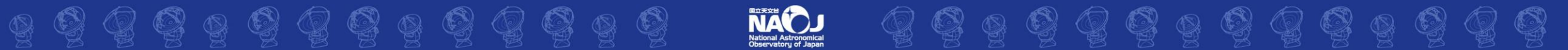


Amplitude scaling with Tsys for bright sources

- Two knowledge base articles in the Helpdesk:
 - [“What errors could originate from the correlator spectral normalization and Tsys calibration?”](#)
 - [“What are the amplitude calibration issues caused by ALMA's normalization strategy?”](#)
- Cases affected by this issue
 - Target sources with bright line/continuum, not negligible compared to Tsys, e.g., strong CO in galactic objects
 - both 12-m and 7-m
- How are the data affected?
 - Absolute flux density will be underestimated by $\sim T_{\text{antenna}} / T_{\text{sys}}$
- If the necessary renormalization factor is >2% at the spectral peak, the re-scaling is performed in the quality assurance in Cycle 8 (+ some data in Cycle 7).
- Please ask us in the Helpdesk if you are worried about the data in early Cycles.



2019Nov20, gmoellen, v1





Note on the scheduling

- Users do not have to be worried about the antenna configurations in OT. The scheduling is done based on the requested angular resolution.
- What is the min/max angular resolution for the scheduling block?
 - Please see the Proposer's Guide (at the proposal planning stage) about the "range"
 - You can check in SnooPI, and in the Phase 2 part in the OT.

Project Code: 2019.1.01234.S ARC node: [Italian](#). Contact scientist: Jack Brown [Download Proposal \[pdf\]](#) [Project report](#)

- 2019.1.01234.S**
- Observing stars, planets, nebulae, open clusters, globular galaxies and galaxy clusters with ALMA**
- Observing Program**
- SG OUS (PJ308 - environment)
 - Group OUS
 - Member OUS (PJ308-SMG1)
 - PJ308-SM_a_06_TM1
- SG OUS (PJ231 - environment)
 - Group OUS
 - Member OUS (PJ231-SMG1)
 - PJ231-SM_a_06_TM1
- SG OUS (J0305 - environment)
 - Group OUS
 - Member OUS (J0305-SMG2)
 - J0305-SM_a_06_TM1**

Scheduling Block Name: J0305-SM_a_06_TM1 [History](#)

Scientific Goal Name: SG OUS (J0305 - environment)

Member ObsUnitSet: uid://A001/X1465/X1e7a [History](#) [Archive query](#)

Array: 12m

RA, Dec: 3^h 5^m 22.3^s, -31° 49' 47.8"

Pointing information: Multiple sources, individual pointings

Band: 6

Representative Frequency, GHz: 248.69

Nominal configuration: C43-1,C43-2 [Schedule](#)

Min/Max Angular Resolution [arcsec]: 0.700 / 1.435

Progress:

QA2: [Report](#)

End time	Duration [min]	Execution Block UID	QA0
2019-11-08 03:35:30	58.44	uid://A002/Xe31981/Xd084	Report

Execution block uid://A002/Xe31981/Xd084 [Print](#)

Temperatures [°K]		Array	
Average T _{sys}	84.80	Number of antennas	45.0
σ	9.09	Shortest baseline	15.059 m
T _{sys} .min	64.90	Longest baseline	500.184 m





Regional support User Support

- Calibrated MS delivery
 - We offer this service for data in all the cycles (but Cycle 0 where you can get the calibrated MS from the Archive)
- Japanese material
 - Website, textbook for data reduction
- Items from user end-to-end experience survey (interviews with users)
 - Reported by Shimajiri-san in the discussion session later

Taiwan node → Yu-Nung's talk
Korea node → Jihyun's talk

Supplemental website
<https://www2.nao.ac.jp/~eaarc/DATARED/index.html>

ALMA データ解析に関する情報

研究者向けの公式情報は全て ALMA サイエンス・ポータル (<https://almascience.nao.ac.jp/>) にあります。このサイトは、なるべく日本語で情報を提供するとともに、東アジア・アルマ地域センター (EA ARC) が提供するデータ解析に関連したサービスの詳細をお知らせすることを目的としています。

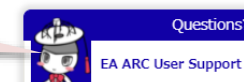
The screenshot shows a website with several navigation items:

- データ解析講習会** (Data Analysis Workshop): 過去の講習会の情報やテキストを掲載しています。
- 論文出版サポート** (Paper Publication Support): ALMA のデータを用いた論文の出版サポートです。
- 解析サポート** (Analysis Support): プロデスクを通じたサポートや個別サポートを行っています。
- 観測プロポーザル情報** (Observation Proposal Information)
- FAQ** (Frequently Asked Questions)
- リンク集** (Link Collection): 干渉計の原理、データ解析やCASAに関する資料を集めています。
- CASA の使い方** (CASA Usage): CASA の使い方を日本語で解説したページです。
- ALMA 入門** (ALMA Introduction): ALMA の概要をすばやく掴むために情報の宝庫をお知らせするページです。
- MAPS TO SCIENCE** (Maps to Science): イメージの解析方法の例を研究分野ごとに示します。

You can get a template to request calibrated MS

Next set of examples on star formation is coming very soon (Jupyter Notebook)

The chatbot will also guide you.





Regional support User Support

- ALMA data reduction tutorials
 - (1) June 15, 16 in 2021 for beginners
 - (2) November 2, 5 in 2021 for imaging
 - Co-organized with NAOJ Astronomy Data Center
 - Textbook in Japanese on the website
 - Online tutorial worked well
-
- A larger, lecture-based summer school on radio astronomy
 - Realized based on the ALMA user survey!
 - September 16, 17, 21, 22, 24 in 2021
 - Online lectures

Supplemental website

<https://www2.nao.ac.jp/~eaarc/DATARED/index.html>

ALMA データ解析に関する情報

研究者
サイト
データ

...or, you can google with
"アルマデータ解析講習会"



データ解析講習会

過去の講習会の情報やテキストを掲載しています。



論文出版サポート

ALMA のデータを用いた論文へのサポートです。



解析サポート

ヘルプデスクを通じたサポートや対話的サポートを行っています。



リンク集

干渉計の原理、データ解析やCASAに関する資料を集めています。



MAPS TO SCIENCE

イメージの解析方法の例を研究分野ごとに示します。



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Regional support Publication support

- Publication Support program
 - Publication fee, English editing fee, conference registration fee, Images in PR led by universities
 - Based on the inputs in the UM, JSAC, and discussion in the project
 - Post-COVID-19 (not yet): conference/colloquium **abroad with oral presentations**
 - **1st authors** who has the affiliation in Japan, and who **submitted (will surely submit for English editing) papers** with ALMA data
- Motivation
 1. Improving the scientific productivity, including papers with archival data
 2. Advertising science results in the international community

ALMA データ解析に関する情報

Please see here for details

ce.nao.ac.jp/) があります。このセンター (EA ARC) が提供するデータ解析に関連したサービスの詳細をお知らせいたします。

 <p>データ解析講習会</p> <p>過去の講習会の情報やテキストを掲載しています。</p>	 <p>論文出版サポート</p> <p>ALMA のデータを用いた論文へのサポートです。</p>	 <p>解析サポート</p> <p>ヘルプデスクを通じたサポートや対話的サポートを行っています。</p>
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Internationalization will be important in particular for the young generation.





Archive updates/features

You can access the ALMA Science Archive through the Science Portal

The screenshot shows the ALMA Science Portal website. At the top left is the ALMA logo with the text "Atacama Large Millimeter/submillimeter Array" and "In search of our Cosmic Origins". To the right is the NAOJ logo. Below the header is a search bar labeled "Search Site". The navigation menu includes "About", "Science", "Proposing", "Observing", "Data", "Processing", "Tools", "Documentation", and "Help". The "Data" menu is open, showing options: "Archive", "Large Programs", "Calibrator Catalogue", "Science Verification", "Publication", "Acknowledgement", and "ARI-L". The "Archive" option is highlighted, and a sub-menu is visible with "Archive Query Interface", "Archive Documentation", and "Archive notebooks". The "Archive notebooks" option is highlighted in blue. Below the navigation menu, the page content includes the heading "ALMA Science Archive notebooks" and an "Introduction" section. The introduction text states: "This page contains Jupyter Notebooks to programatically... ALMA's ObsCore Table Access Protocol (TAP) service." and "Queries in TAP are written in the SQL-like Astronomical D... properties/columns of the database. This also allows the u... the most common queries. For this we will be using the as... observatories."

Go to the archive search interface

NEW!
Link to the Jupyter notebooks





Archive updates/features

ALMA Science Archive in the Request Handler page

Source name: hd 142527

② After choosing the data, click this for data request.

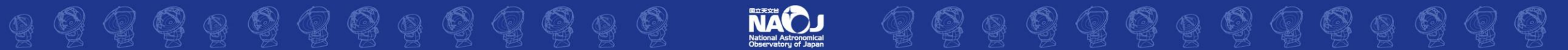
① Search the data as usual
NEW! “Object type” search is possible.

NEW!
Automatic search for similar proposals with a mouse over of “...”

Observation	Project	Proposal	Source name	RA	Dec	Chan	Flux	Frequency support	Release date
2011.0.00465.S	HD 142527	15:56:41.887	-42:19:23.341	6	0.1041	218.46..232.44GHz	2013-08-06		
2011.0.00318.S	HD 142527	15:56:41.881	-42:19:23.581	7	0.1594	329.10..343.15GHz	2013-10-30		
2011.0.00465.S	HD 142527	15:56:41.887	-42:19:23.341	9	1.0674	690.52..714.27GHz	2014-02-26		
2012.1.00725.S	HD_142527	15:56:41.874	-42:19:23.652	7	0.0489	329.21..343.99GHz	2016-07-31		

③ Click “Request download”

Explore and download





Archive updates/features

ALMA Science Archive in the Request Handler page

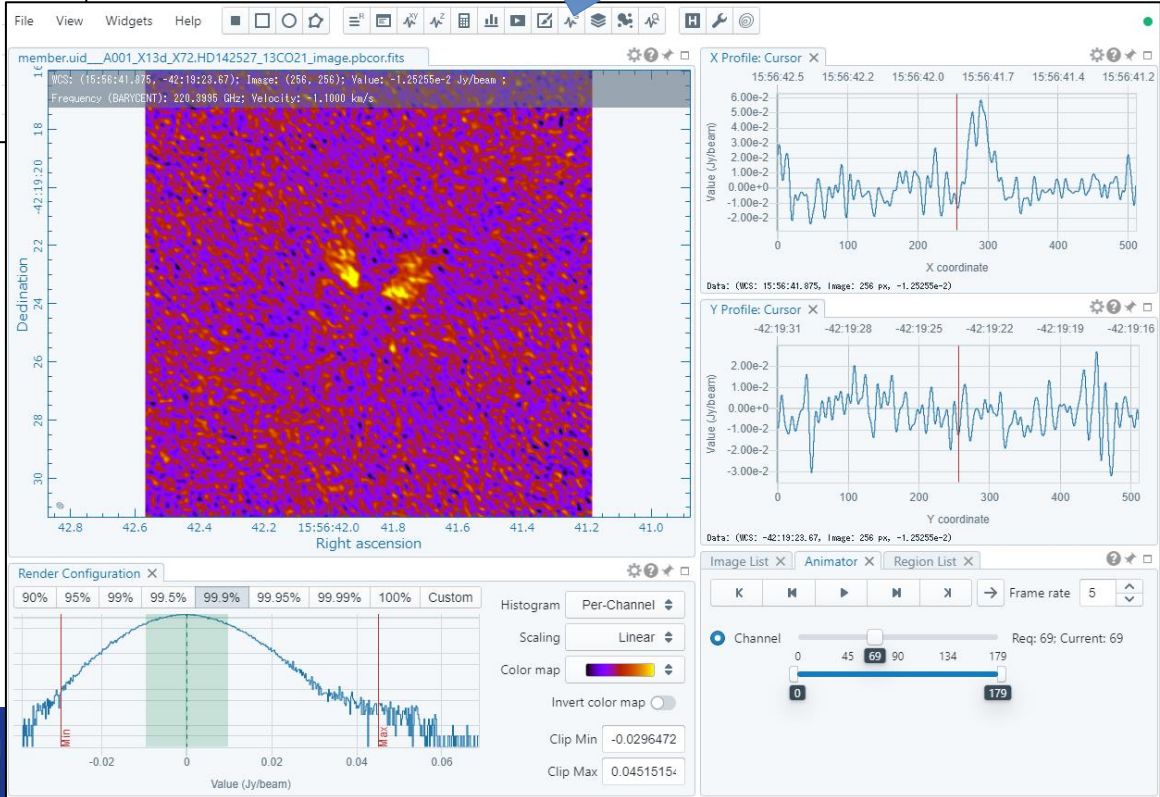
Group OUS uid://A001/X13d/X71			
Member OUS uid://A001/X13d/X72			
SB HD_14252_a_06_TE			
readme	member_uid__A001_X13d_X72.README.txt	11 KiB	
product	2013.1.00305.S_uid__A001_X13d_X72_001_of_001.tar	1 GiB	
product	member_uid__A001_X13d_X72.HD142527_13CO21_image.flux.fits.gz	52 MiB	✓
product	member_uid__A001_X13d_X72.HD142527_13CO21_image.image.fits	180 MiB	✓
product	member_uid__A001_X13d_X72.HD142527_13CO21_image.pbcor.fits	180 MiB	✓
product	member_uid__A001_X13d_X72.HD142527_C18O21_image.flux.fits.gz	52 MiB	✓
product	member_uid__A001_X13d_X72.HD142527_C18O21_image.image.fits	180 MiB	✓
product	member_uid__A001_X13d_X72.HD142527_C18O21_image.pbcor.fits	180 MiB	✓
product	member_uid__A001_X13d_X72.HD142527_CO21_image.flux.fits.gz	55 MiB	✓
product	member_uid__A001_X13d_X72.HD142527_CO21_image.image.fits	180 MiB	✓

⑤ Click the link icon to CARTA as a viewer

④ Open the file tree by clicking ▶

A new webpage automatically opens in your browser! (You do not have to install CARTA desktop version).

You can check and analyze the images/cubes without downloading the data to your local disk. (e.g., you can generate and immediately check moment maps in CARTA)

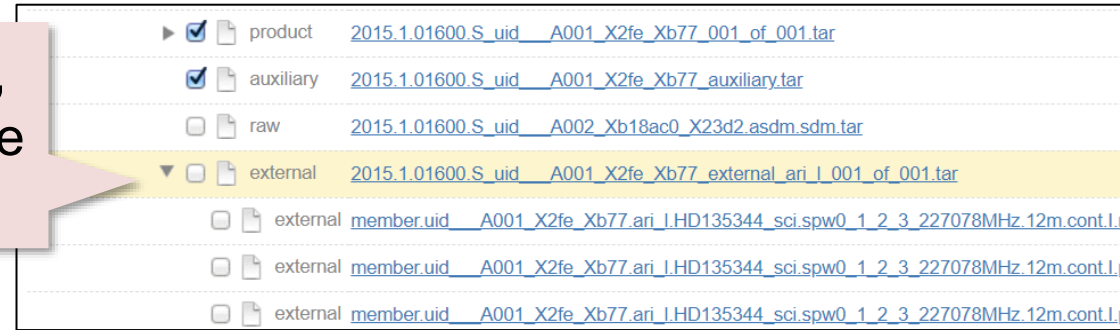




Archive features: ARI-L

Additional Representative Images for Legacy (ARI-L):
A uniform set of **full data cubes and continuum images** of the data from Cycles 2-4.

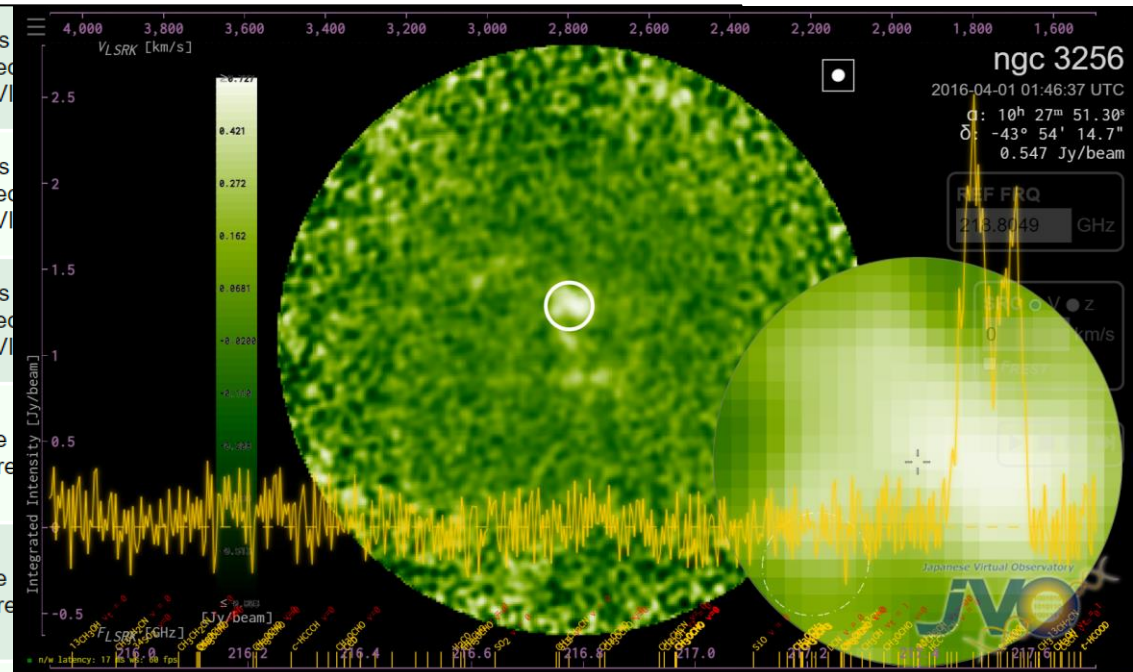
In the Request Handler page, you will see “external” with the package name “ari_l”.



ARI-L images are also in the JVO archive in NAOJ

In the search results page, it says “ARI-L”

T	<input type="checkbox"/>	Download WebQLv4 VO Search	ALMA official	The properties mergers detected
T	<input type="checkbox"/>	Download WebQLv4 VO Search	ALMA official	The properties mergers detected
S	<input type="checkbox"/>	Download WebQLv4 VO Search	ARI-L	Chemistry in the Infrared
S	<input type="checkbox"/>	Download WebQLv4 VO Search	ARI-L	Chemistry in the Infrared





Pre-announcement for Cycle 9

The pre-announcement provides you a plan to assist the early proposal planning. Please wait for the CfP for details.

- What's new, new observing capabilities → Nagai-san's talk
- Cycle 9 starts from October 2022
- Supplemental Call for the ACA only if needed for scheduling purposes. Please assume that there is no Supplemental Call in your proposal planning.
- We would like to encourage high-frequency proposals.
- As done in Cycle 8 2021, all Cycle 9 proposals will be reviewed through a dual-anonymous procedure.

December 15, 2021	Pre-announcement
March 24, 2022 (anticipated)	Call for Proposals
April 21, 2022	Proposal submission deadline



Observatory News

ALMA Cycle 9 Pre-Announcement

Dec 15, 2021

ALMA Science Archive object-type search, transparency search and similarity search and Jupyter

Please check the pre-announcement and further updates in the Science Portal.

Next Slide 17

