The ALMA Proposal Preparation Process

How to get started and what to expect

Kate Rowlands (Johns Hopkins University)

Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array

This talk is for you if…

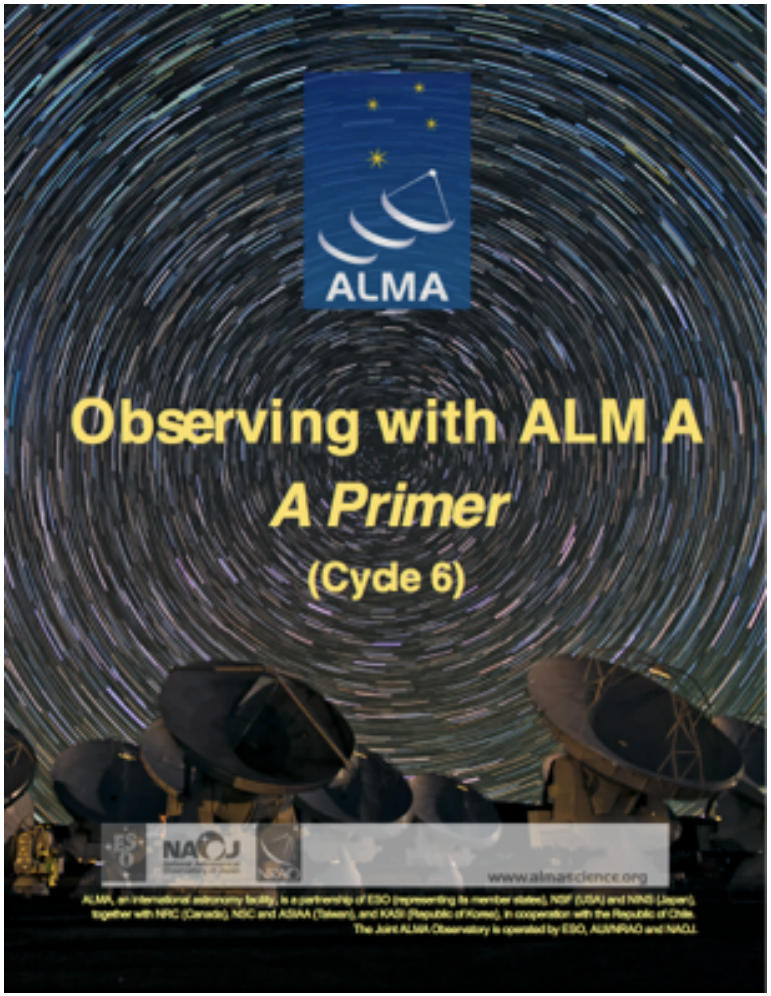
- You are new to ALMA.
- You have not used the ALMA Observing Tool (OT) before.
- You have a fabulous science case that is essential to follow-up with ALMA
- You would like examples of science use cases for ALMA.
- You were familiar with past Cycles and wonder what Cycle 6 capabilities are now available.

This talk will be available online for reference after this workshop.

https://almascience.eso.org/documents-and-tools/cycle6/alma-ot-quickstart

Cycle 6 Documentation & Timeline

- Call for Proposals
- Proposer's Guide
- ALMA Primer
- OT Guide
- ALMA Tech Handbook
- Timeline for Cycle 6
  - Mar. 20 – Call for Proposals
  - Apr. 19 – Proposal Deadline
  - End July – Results to PIs
  - Aug 2018 – PIs submit SBs
  - Oct. 2018 – Start of Cycle 6
  - Sept 2019 – End of Cycle 6



Proposal Checklist

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ALMA

Atacama Large Millimeter/submillimeter Array

In search of our Cosmic Origins

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Status

ALMA Cycle 5 Config Schedule

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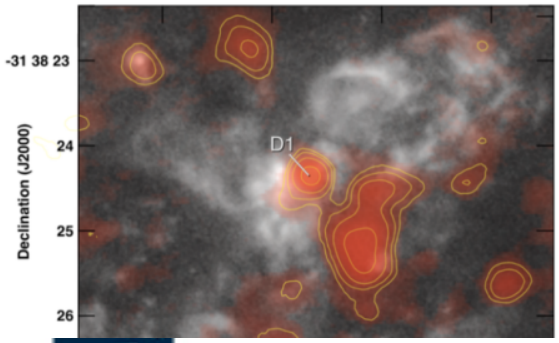
Last observed source: W43-MM1
Current configuration: C43-5

More...

Science Highlights - Molecular Gas Within the Supernebula of the Dwarf Galaxy NGC 5253



One of the areas of extragalactic research which makes great use of ALMA's resolution and sensitivity is the study of the molecular gas properties of dwarf galaxies. In a recent study by Dr. Jean Turner and her collaborators, they make use of Band 7 ALMA observations to detect warm ^{12}CO(3-2) and ^{13}CO(3-2) emission (Cloud D1) from the core of a giant star-forming region, in the dwarf galaxy NGC 5253. This "supernebula" is the source of one-third of the galaxy's infrared luminosity and is in proximity to optical clusters with measured stellar ages of ~ 1 Myr. From radio recombination line analysis, the region is estimated to have 1400-1800 O stars..

Full Summary...

NRAO

www.almascience.org

ALMA Science Portal @ NRAO

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Downloading the ALMA OT

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Observing Tool

The ALMA Observing Tool (OT) is a Java application used for the preparation and submission of ALMA Phase 1 (observing proposal) and Phase 2 (telescope runfiles for accepted proposals) materials. It is also used for preparing and submitting Director's Discretionary Time (DDT) proposals. The current *Cycle 5* release of the OT is configured for the present capabilities of ALMA as described in the Cycle 5 Call For Proposals. Note that in order to submit proposals you will have to register with the ALMA Science Portal beforehand.

Note that preparation of Cycle 4 DDT proposals needs to be done using the Cycle 4 version of the Observing Tool. This version of the OT can be found in the DDT page, or the Phase 2 menu.

Download & Installation

The OT will run on most common operating systems, as long as a **64-bit version of Java 8** is installed (see the troubleshooting page if you are experiencing Java problems). The ALMA OT is available in two flavours: Web Start and tarball.

The **Web Start** application is the recommended way of using the OT. It has the advantage that the OT is automatically downloaded and installed on your computer and it will also automatically detect and install updates. There are some issues with Web Start, particularly that it does not work with the Open JDK versions of Java such as the "Iced Tea" flavour common on many modern Linux installations. The Oracle variant of Java should therefore be installed instead. If this is not possible, then the tarball installation of the OT is available.

The **tarball** version must be installed manually and will not automatically update itself, however there should be no installation issues. For Linux users, we also provide a download complete with a recommended version of the Java Runtime Environment. Please use this if you have any problems running the OT tarball with your default Java.

Webstart | Tarball

Documentation

Extensive documentation is available to help you work with the OT and optimally prepare your proposal:

OT Video Tutorials

About Science Proposing Observing Data Processing Tools Documentation Help Search Site

OT Video Tutorials

The OT video tutorials provide an audio-visual demonstration of different aspects of proposal preparation in the OT. Novice users should start with the first video and work their way down, while more experienced users may want to jump straight to one of the specialised videos.

OT Video Tutorial 1: Useful to Know

This video will help you get started with the OT and introduce you to some handy tips and tricks. Topics covered include navigating the OT, using the help function, the template library, time estimation, validation, opening & submitting projects including re-submissions, and the concept of non-standard modes. **Note**: this video is from Cycle 4, some things have changed slightly in Cycle 5. In particular, time constraints can now also include simultaneous 12-m and 7-m observations, and re-submissions are no longer defined by the user. Also, the time estimate interface has changed a bit.

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Science Case

- Must include:
  - Astronomical Importance
  - Estimated intensity, S/N
- May include:
  - Figures
  - Tables
  - References
- Free-form PDF document
  - 12+ font, English only
  - 20 MB file size
  - 4 pages (6 for Large Projects)

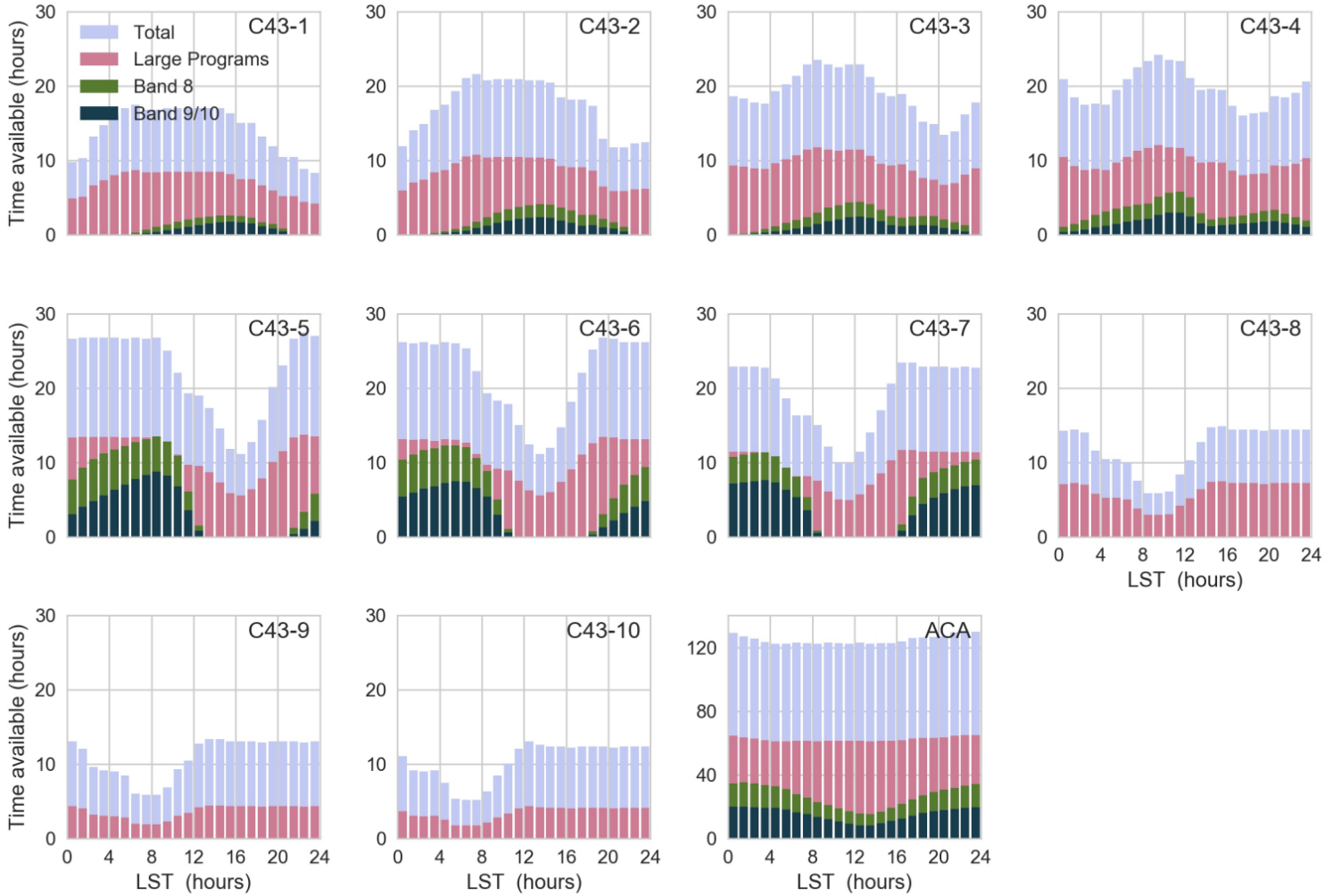
Science Case

Best weather in extended configurations in Cycle 6

Table 1: Cycle 6 configuration schedule

Start date	Configuration	Longest baseline	LST for best observing conditions
2018 October 1	C43-6	2.5 km	~ 22h – 10h
2018 October 15	C43-5	1.4 km	~ 0h – 12h
2018 November 25	C43-4	0.78 km	~ 2h – 14h
2018 December 15	C43-3	0.50 km	~ 4h – 15h
2019 January 5	C43-2	0.31 km	~ 5h – 16h
2019 January 20	C43-1	0.16 km	~ 6h – 17h
2019 February 1-28	*No observations due to February shutdown*		
2019 March 1	C43-1	0.16 km	~ 8h – 21h
2019 March 15	C43-2	0.31 km	~ 8h – 22h
2019 April 1	C43-3	0.50 km	~ 9h – 23h
2019 April 15	C43-4	0.78 km	~ 10h – 0h
2019 May 1	*No observations due to major antenna relocation*		
2019 June 1	C43-10	16.2 km	~ 13h – 3h
2019 June 20	C43-9	13.9 km	~ 14h – 5h
2019 July 10	C43-8	8.5 km	~ 16h – 6h
2019 August 1	C43-7	3.6 km	~ 18h – 8h
2019 September 5	C43-6	2.5 km	~ 20h – 9h

Cycle 6 Observing Strategies



Anticipated observing time available versus LST for antenna configurations in Cycle 6

Cycle 6 Capabilities

- **Antennas:** >43 antennas in 12-m Array, ten 7-m antennas (for short baselines) and three 12-m antennas (for single dish maps)
- **Receiver bands:** 3, 4, 5, 6, 7, 8, 9, & 10 (wavelengths of about 3.1, 2.1, 1.5, 1.3, 0.87, 0.74, 0.44, and 0.35 mm, respectively)
- **Baselines:** Maximum baselines up to 3.5 km for Bands 8 - 10, up to 8.5 km for Band 7 and up to 16.2 km for Bands 3 - 6
- Spectral line, continuum, and mosaic observations

New Capabilities

- Circular polarization for line and continuum in bands 3, 4, 5, 6, and 7
- Larger Band 6 IF bandwidth by 0.5 GHz
- Time simultaneous observations between 12-m and 7-m arrays allowed
- Band 8 as Standard Observing Mode, allows ACA-only observations in Band 8

Regular Projects

- Observations than can be fully specified by the regular proposal submission.
- Includes standard and non-standard modes.

Large Projects

- 15% of available time
- Any 12-m project >50 hours, or standalone ACA > 150 hours
- Standard observing modes
- Automatic ‘A’ grade
- +2 pages for Science Case
    - Data/Project management plans
    - Enhanced Data Products

ToO (Target of Opportunity)

- Transient events occurring at frequent and unpredictable intervals (e.g. gamma ray bursts).
- Regular proposal submission.
- Target list may be left unspecified, observing modes and sensitivity requests must be specified
- Triggers needed and maximum response time

VLBI

- 5% of available time
- ALMA VLBI programs must have been submitted to the appropriate VLBI network by their independent deadline.

DDT (Director's Discretionary Time)

- 5% of available time
- Submission at any time, for current cycle

1. Immediate (<3 weeks) observation of a sudden and *unexpected* astronomical event.
2. Observations of a highly competitive scientific topic, motivated by developments that have taken place after the regular proposal submission deadline.
3. Follow-up observations of a program recently conducted with ALMA or any other observing facility, quick implementation is expected to provide breakthrough results.

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ALMA Observing Tool (Cycle6) - Project

File Edit View Tool Search Help

Perspective 1

Project Structure

Proposal | Program

Insubmitted Proposal

- Project
  - Proposal
    - Planned Observing
      - ScienceGoal (Cop
        - General
        - Field Setup
        - Spectral Setu
        - Calibration Se
        - Control and F
        - Technical Jus

Cycle5 Template Library (re...

- enceGoal (B7 Continuum: Pluto/
- General
- Field Setup
- Spectral Setup
- Calibration Setup
- Control and Performance
- Technical Justification
- enceGoal (Multi-source mosaics
- enceGoal (GRB Target of oppor
- enceGoal (Full Polarization: 3C2
- enceGoal (Disk: TW Hya: Band
- enceGoal (Single-point spectral
- enceGoal (Solar observations; B
- enceGoal (Bright molecular gas
- enceGoal (Bright molecular gas
- enceGoal (ACA Standalone: 10'
- enceGoal (Widely scattered, hig

Editors

Spectral | Spatial | Field Setup

Spatial Image

N

E

1x | 318, 564 | 0.0

Image Filename

FOV Parameters

Representative Frequency (Sky) 337.605 GHz

Antenna Diameter ◉ 12m ○ 7m

Antenna Beamsize (HPBW) 17.248 arcsec

Show Antenna Beamsize ☑

NGC1232

Source

Source Name NGC1232 Resolv

Choose a Solar System Object? ☐ Name of object Unspecified

Source Coordinates

System ICRS Sexagesimal display? ☑

RA 03:09:45.5140

Dec -20:34:45.480

Parallax 0.00000 mas

PM RA 0.00000 mas/yr

PM DEC 0.00000 mas/yr

Source Radial Velocity 1677.400 km/s lsrk z 0.005610945 Doppler Type RELATIVISTIC

Target Type ○ Individual Pointing(s) ◉ 1 Rectangular Field

Expected Source Properties

Peak Continuum Flux Density per Synthesized Beam	0.00000	Jy
Continuum Linear Polarization	0.0	per cent
Continuum Circular Polarization	0.0	per cent
Peak Line Flux Density per Synthesized Beam	35.00000	mJy
Line Width	15.00000	km/s
Line Linear Polarization	0.0	per cent
Line Circular Polarization	0.0	per cent

Rectangle

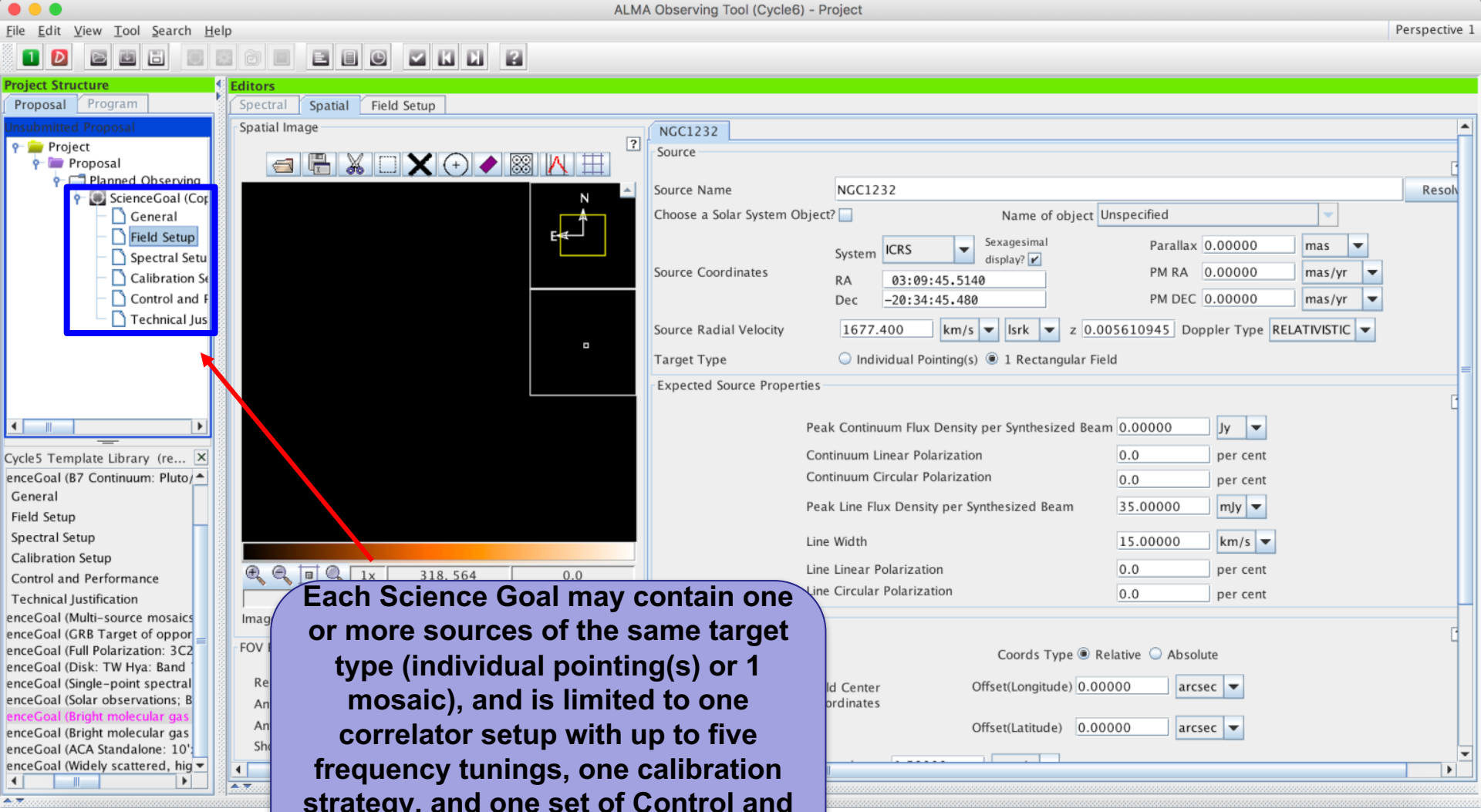
Coords Type ◉ Relative ○ Absolute

Field Center Coordinates

Offset(Longitude) 0.00000 arcsec

Offset(Latitude) 0.00000 arcsec

NRAO



Each Science Goal may contain one or more sources of the same target type (individual pointing(s) or 1 mosaic), and is limited to one correlator setup with up to five frequency tunings, one calibration strategy, and one set of Control and Performance parameters. Max 150 pointings.

Things to bear in mind

- What time of year is your source observable in your chosen configuration?
- Be aware of source declination, particularly for compact configurations – antenna shadowing.
- High data rate (70 MB/s limit) – can you spectrally average?
- Angular resolution and largest angular scale. Will you resolve out flux? Do you need the ACA, TP array?
- Justify correlator setup and number of spectral resolution elements per line.
- Anticipation of high dynamic range.
- Duplication checks.
- Why ALMA?

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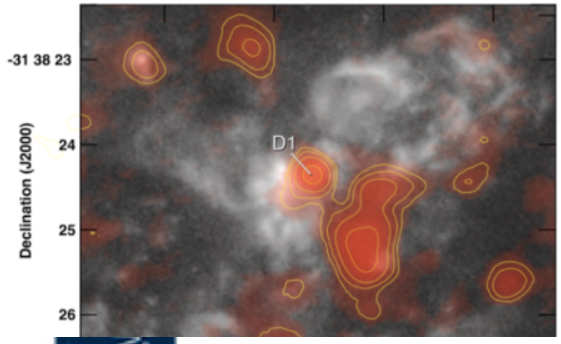

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Full Summary...

NRAO

www.almascience.org

ALMA Science Portal @ NRAO

I could use a hand…

ALM

Have no fear, the ALMA Helpdesk is here…

<< Science Portal | Home | Knowledgebase | News | English (U.S.)

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» Knowledgebase

- General ALMA Queries (13)
- Early Science - Cycle 1 (31)
- Resources & Observer Support (12)
- Project Planning (14)
- ALMA Observing Tool (OT) (29)
- Proposal Handling (5)
- Archive & Data Retrieval (4)
- Offline Data Reduction and/or CASA (14)
- Development Program (1)

Live Chat Software by Kayako

Please type your search query here | SEARCH

Knowledgebase

General ALMA Queries (13)

- Can I submit a ticket in Japanese?
- How close can ALMA observe to the Sun?

Early Science - Cycle 1 (31)

- Can I use "breakpoints" in ALMA cycle 1?
- The Cycle 1 Technical Handbook has some gaps in its discussion of ALMA receivers (SSB, 2SB, DSB). What else can you tell me about them?

Resources & Observer Support (12)

- How do I arrange a visit to one of the ARCs?
- Where can I find ALMA documentation and manuals?

Project Planning (14)

- What should I include for the content of the Technical Justification and in what format should I submit it?
- Where can I find the online ALMA observing simulator developed by the University of Manchester?

ALMA Observing Tool (OT) (29)

- What do I do if I can't get the OT to work?
- How do I deal with targets with unspecified coordinates in the OT?

Proposal Handling (5)

- May I submit an identical proposal to more than one category, e.g. submitting a proposal on distant galaxies both to cosmology and to galaxy categories?
- Which category should I submit a proposal on distant galaxies: "cosmology/high-z" or "Galaxies/Nuclei"?

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» Knowledgebase
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Please type your question here

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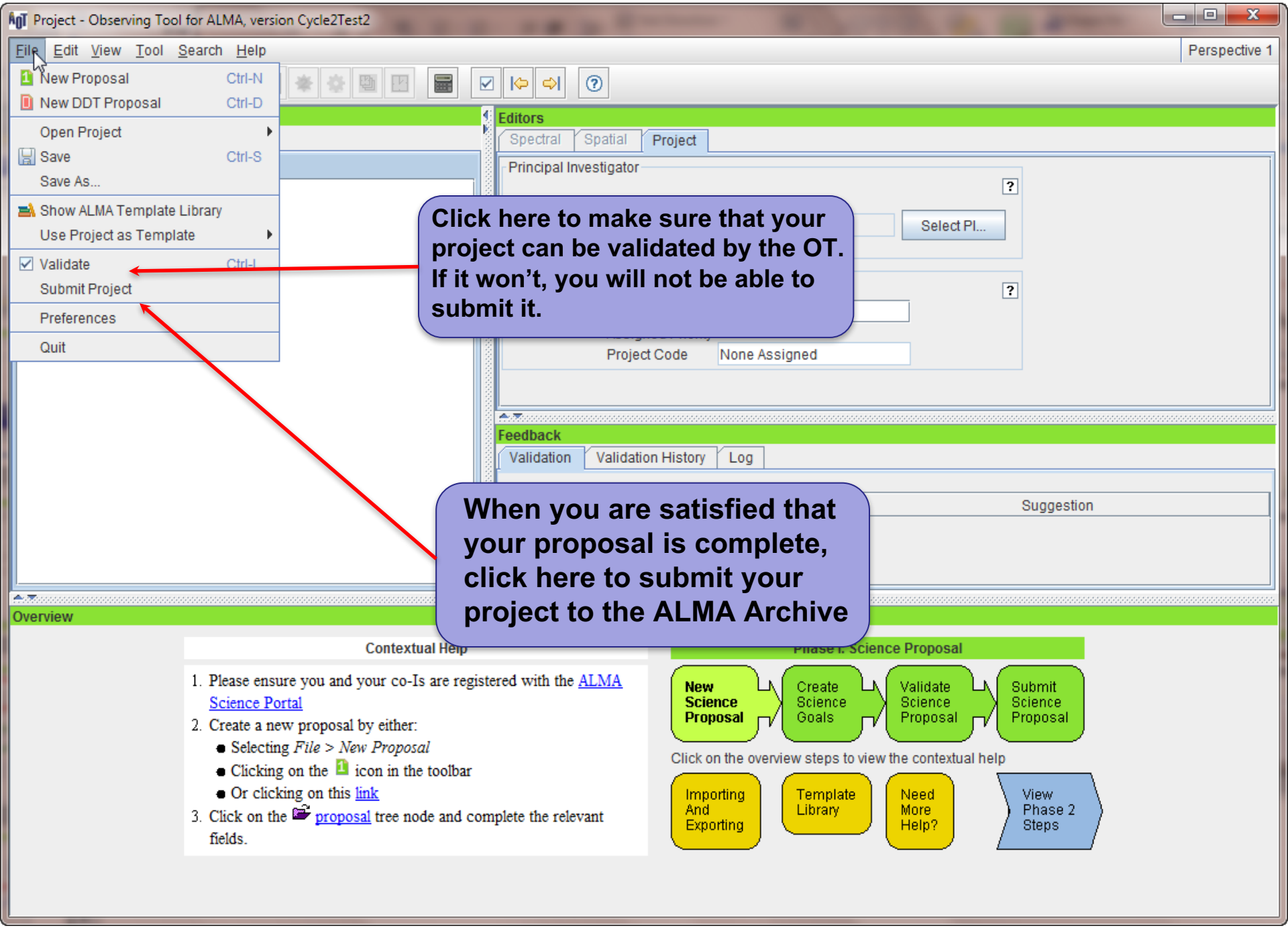
Latest Updates

No information available in this view

help.almascience.org

ALMA Helpdesk @ NRAO (logged in view)



Click here to make sure that your project can be validated by the OT. If it won't, you will not be able to submit it.

When you are satisfied that your proposal is complete, click here to submit your project to the ALMA Archive

After submission

- Can resubmit as often as needed, keep in mind server is busy right before the deadline.
- Standard and ToO proposals reviewed by the ALMA Proposal Review Committee (APRC) and the ALMA Review Panels (ARP).
- All proposals subject to Technical Assessment by JAO and ARC experts.
- Proposals assessed overall scientific merit of proposed investigation and potential contribution to the advancement of scientific knowledge.
- Outcome of the Proposal Review Process communicated to PIs end of July 2018.

After submission

- A: Proposal was assigned the highest priority and will be carried over into Cycle 7 if it is not completed in Cycle 6.
- B: was assigned a high priority but will not be carried over into Cycle 7.
- C: Scientifically fruitful proposals, will be observed if a higher-grade proposal is not available for current conditions.

After submission

Phase II

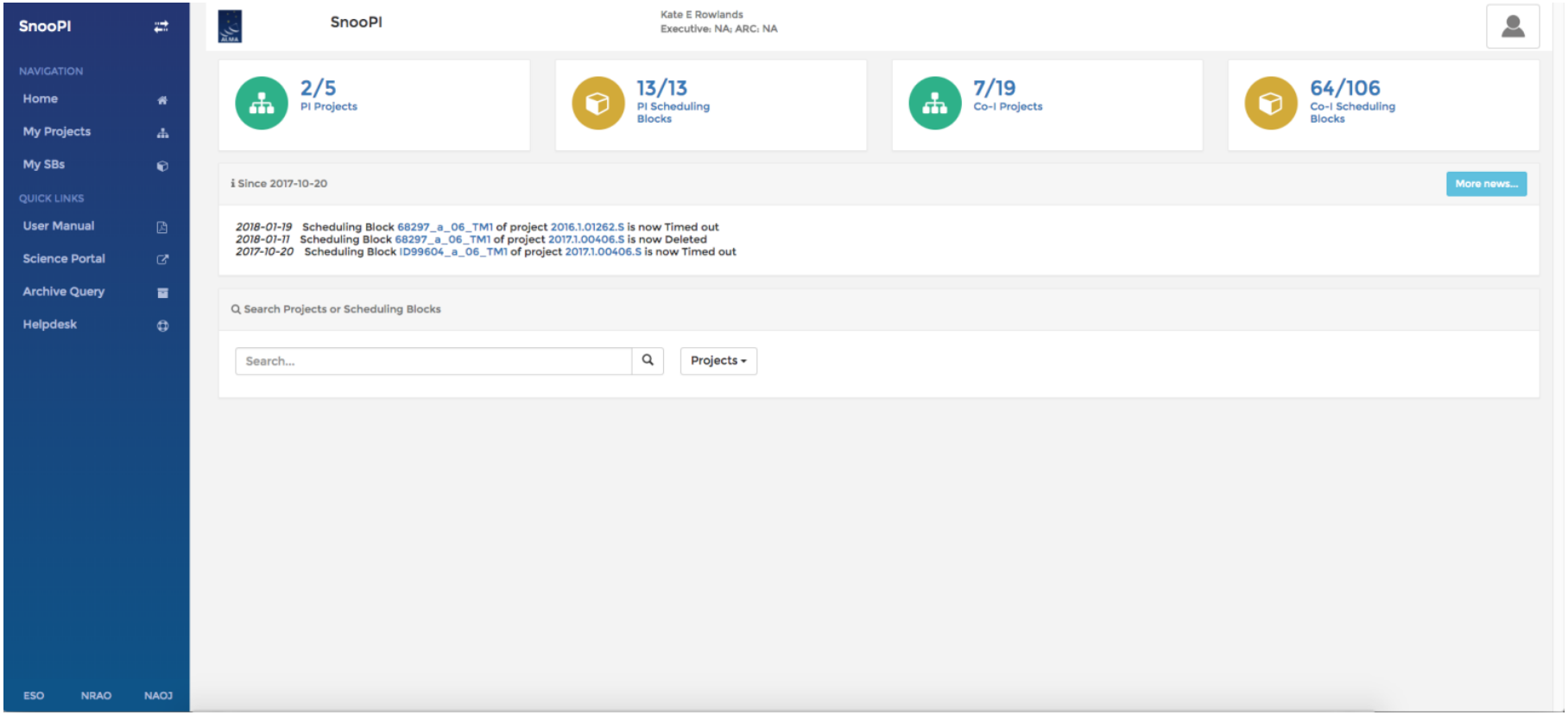
- PIs review their scheduling blocks
- Change requests go to the Helpdesk, and possibly a formal change request
- Being prompt helps ensure your project can be observed!

- Then wait – dynamic scheduling means your Contact Scientist doesn't know when your project will run. As observations are made, updates are shown in the SnooPI tool on the Science Portal:

https://almascience.nrao.edu/observing/snoopi

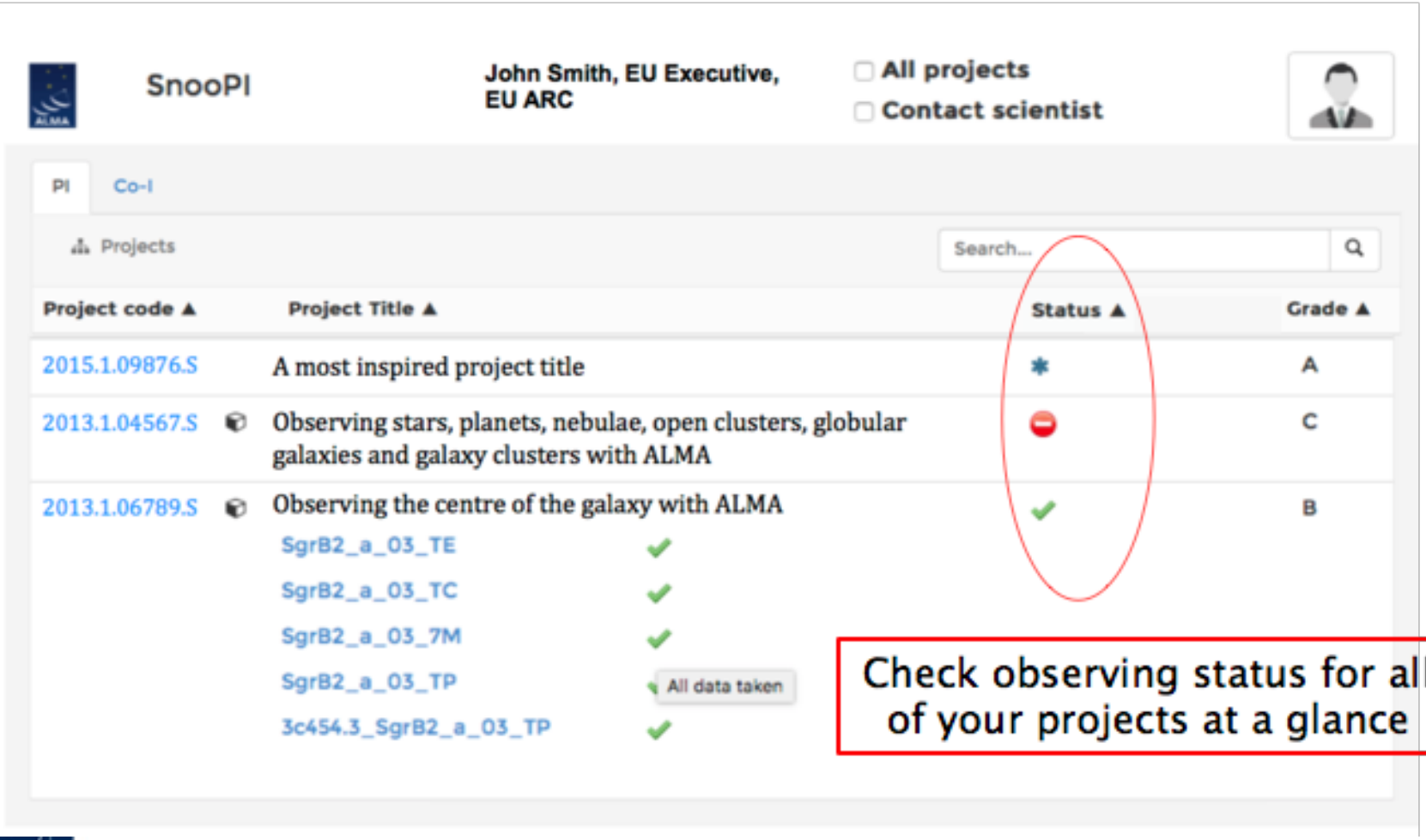
Monitor project status - SnooPI

https://almascience.eso.org/observing/snoopi



Monitor Project Status: *SnooPI*

Listing of PI'ed projects



Check observing status for all of your projects at a glance

Data delivery

- Data delivered after passing Quality Assurance (QA)
- Download data from *Archive Query* and *Request Handler* tools on the ALMA Science Portal
- Delivered data include:
    - Calibration tables and diagnostics
    - Preliminary images (*better products may be possible with more careful continuum identification & interactive cleaning*)
- Sections 11, 12, 14, and Appendix C of ALMA Technical Handbook

Goals of Quality Assurance (QA) Process

- Ensure reliable final data product
- Desired sensitivity, resolution (as specified by PI)
- Ensure calibration and QA imaging free from major artifacts

- Warning: Errors in PI-supplied parameters are outside scope of QA process, including:
    - Incorrect source coordinates
    - Inadequate frequency specification
    - Inadequate sensitivity limits

See ALMA Technical Handbook for details.

QA2 Data Products Package: the processed data

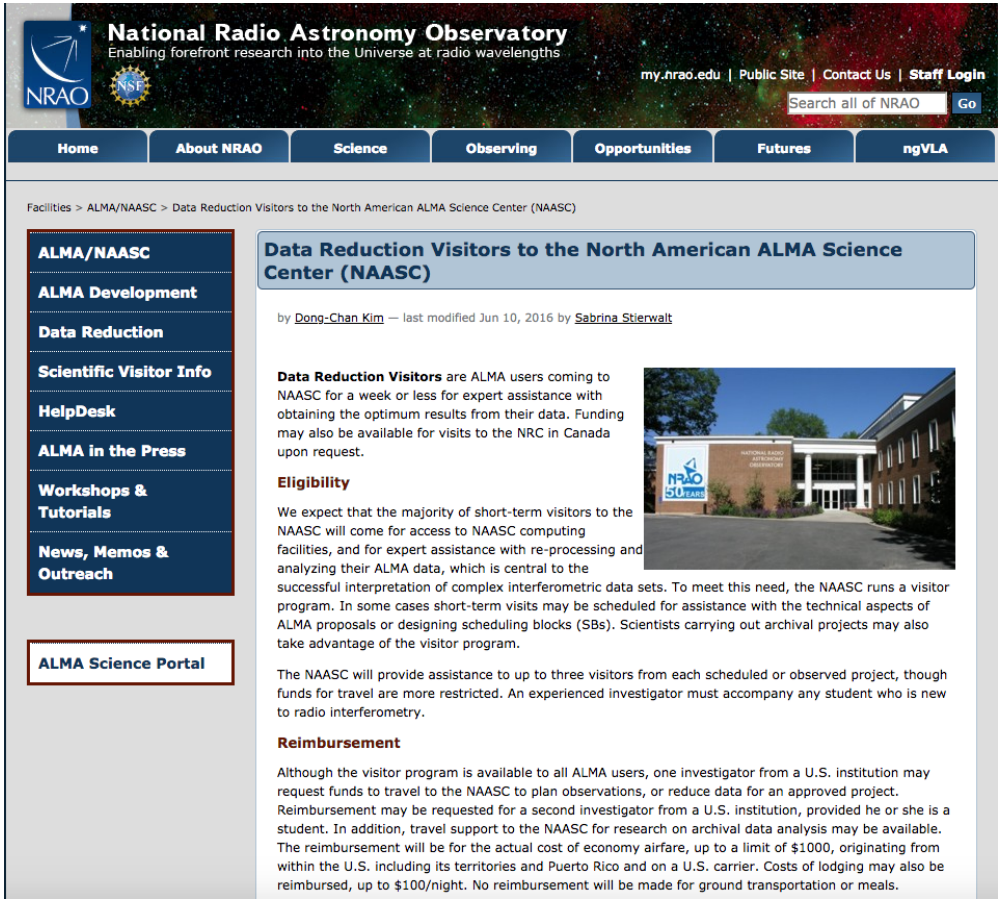
After un-tarring the processed data we have a directory tree:

```
2017.1.05267.S/
`-- science_goal.uid___A001_X1299_X2z
    `-- group.uid___A001_X1299_X25
        `-- member.uid___A001_X1299_X39
            |-- calibration
            |-- log
            |-- member.uid___A001_X1299_X39.README.txt
            |-- product
            |-- qa
            |-- script
```

Resources After Delivery

- HelpDesk
- Face-to-face visits in Charlottesville:

https://science.nrao.edu/facilities/alma/visitors-shortterm



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Facilities > ALMA/NAASC > Data Reduction Visitors to the North American ALMA Science Center (NAASC)

- ALMA/NAASC
- ALMA Development
- Data Reduction
- Scientific Visitor Info
- HelpDesk
- ALMA in the Press
- Workshops & Tutorials
- News, Memos & Outreach

ALMA Science Portal

Data Reduction Visitors to the North American ALMA Science Center (NAASC)

by Dong-Chan Kim — last modified Jun 10, 2016 by Sabrina Stierwalt

Data Reduction Visitors are ALMA users coming to NAASC for a week or less for expert assistance with obtaining the optimum results from their data. Funding may also be available for visits to the NRC in Canada upon request.

Eligibility

We expect that the majority of short-term visitors to the NAASC will come for access to NAASC computing facilities, and for expert assistance with re-processing and analyzing their ALMA data, which is central to the successful interpretation of complex interferometric data sets. To meet this need, the NAASC runs a visitor program. In some cases short-term visits may be scheduled for assistance with the technical aspects of ALMA proposals or designing scheduling blocks (SBs). Scientists carrying out archival projects may also take advantage of the visitor program.

The NAASC will provide assistance to up to three visitors from each scheduled or observed project, though funds for travel are more restricted. An experienced investigator must accompany any student who is new to radio interferometry.

Reimbursement

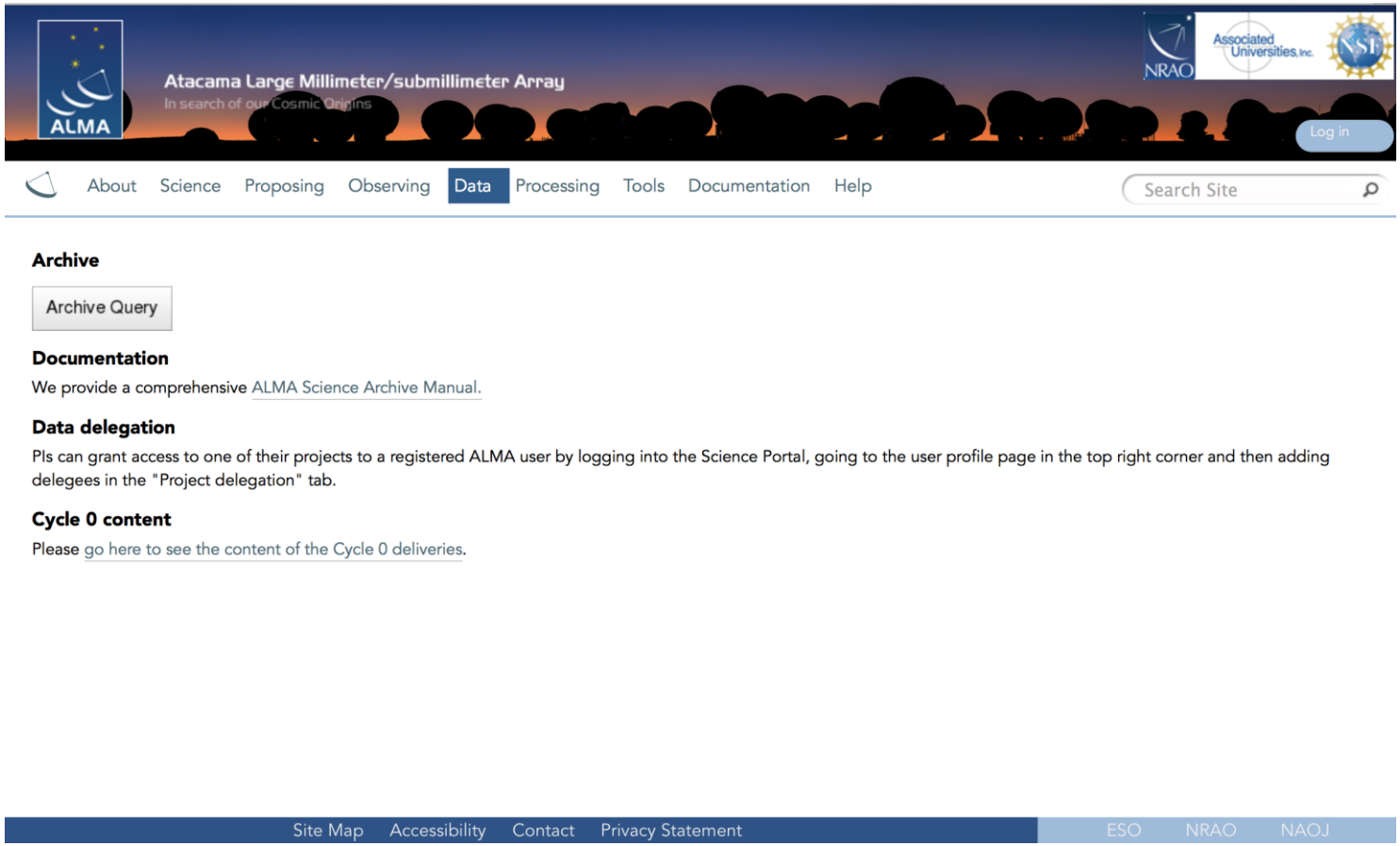
Although the visitor program is available to all ALMA users, one investigator from a U.S. institution may request funds to travel to the NAASC to plan observations, or reduce data for an approved project. Reimbursement may be requested for a second investigator from a U.S. institution, provided he or she is a student. In addition, travel support to the NAASC for research on archival data analysis may be available. The reimbursement will be for the actual cost of economy airfare, up to a limit of $1000, originating from within the U.S. including its territories and Puerto Rico and on a U.S. carrier. Costs of lodging may also be reimbursed, up to $100/night. No reimbursement will be made for ground transportation or meals.

The ALMA Archive

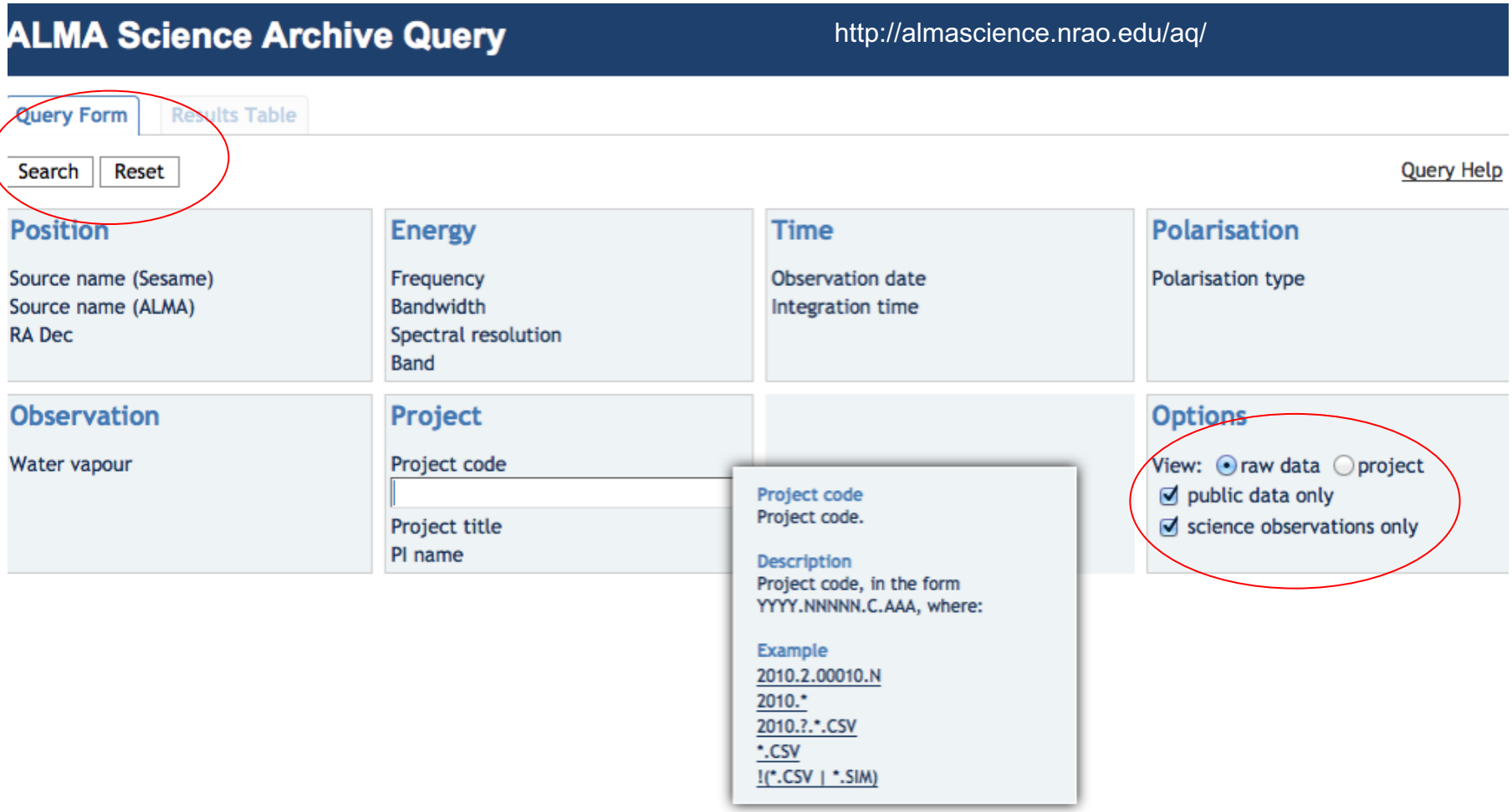
Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array

How to find the archive

Go to the science portal: https://almascience.nrao.edu
- Click on “Data” and select “Archive”



Find data in archive:
Archive Query



Archive Query

Query Form | Results Table

Submit download request

Results Bookmark Export Table Results Help

Showing 30 rows (30 before filtering). More columns

	Project code	Source name	RA	Dec	Band	Integration	*Release date*	Velocity resolution	Frequency support
Filter:								m/s	
☑	2012.1.00090.S	S2CLS_UDS110	02:18:48.44	-05:18:05.0	7	9.326	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☑	2012.1.00090.S	S2CLS_UDS156	02:18:24.23	-05:22:53.4	7	8.836	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☑	2012.1.00090.S	S2CLS_UDS160	02:18:23.86	-05:11:36.2	7	8.842	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS168	02:18:20.34	-05:31:41.6	7	8.843	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☑	2012.1.00090.S	S2CLS_UDS199	02:18:07.38	-04:44:11.7	7	8.812	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS204	02:18:03.01	-05:28:39.8	7	8.873	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS216	02:17:56.80	-04:52:39.6	7	8.82	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS252	02:17:37.79	-05:20:10.2	7	8.827	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS286	02:17:25.76	-05:25:36.5	7	9.657	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS292	02:17:21.85	-05:19:03.3	7	8.815	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS298	02:17:19.90	-05:09:36.4	7	9.55	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS334	02:17:02.81	-04:57:24.9	7	8.856	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS408	02:16:22.59	-05:11:06.0	7	8.819	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS421	02:16:17.62	-05:09:02.0	7	8.803	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz
☐	2012.1.00090.S	S2CLS_UDS47	02:19:24.97	-05:09:19.9	7	8.785	2014-11-07T09:35:00.000	27236.96	336.00..351.99GHz

Downloading the data: *Request Handler*

ALMA Request Handler | Login

Anonymous User: Request #436233140 ✓

Request Title: Click to edit

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Project / OUSet / Executionblock	File	Size	Accessible
Request 436233140			
Project 2012.1.00090.S			
Science Goal OUS uid://A002/X5eed86/X25			
Group OUS uid://A002/X5eed86/X26			
Member OUS uid://A002/X5eed86/X27			
☑ product	2012.1.00090.S_uid___A002_X5eed86_X27_001_of_001.tar	374.9MB	✓
☐ raw	2012.1.00090.S_uid___A002_X7143f6_Xca4.asdm.sdm.tar	4.0GB	✓
Science Goal OUS uid://A002/X5eed86/X29			
Group OUS uid://A002/X5eed86/X2a			
Member OUS uid://A002/X5eed86/X2b			
☑ product	2012.1.00090.S_uid___A002_X5eed86_X2b_001_of_001.tar	377.8MB	✓
☐ raw	2012.1.00090.S_uid___A002_X7143f6_Xf9b.asdm.sdm.tar	4.0GB	✓
		Total: 8.7GB	

Downloading the data: *Request Handler*

- All data downloaded as tar files
- Large data sets may be broken into several pieces
  - Name is [project_code]_[OUS_ID]_m_of_n.tar
  - Raw data packaged as one tar file per execution block (EB)
    - name is [project_code]_[EB_ID].asdm.sdm.tar
- For Cycle 0-5 projects, cannot directly download individual data products but potentially coming in Cycle 6…
  - FITS images
  - Diagnostic plots, etc.

ALMA

For more info:

https://almascience.nrao.edu/

The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership of Europe, North America and East Asia in cooperation with the Republic of Chile. ALMA is funded in Europe by the European Organization for Astronomical Research in the Southern Hemisphere (ESO), in North America by the U.S. National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC) and the National Science Council of Taiwan (NSC), and in East Asia by the National Institutes of Natural Sciences (NINS) of Japan in cooperation with the Academia Sinica (AS) in Taiwan. ALMA construction and operations are led on behalf of Europe by ESO, on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI), and on behalf of East Asia by the National Astronomical Observatory of Japan (NAOJ). The Joint ALMA Observatory (JAO) provides the unified leadership and management of the construction and operation of ALMA.

NRAO