

The ALMA Science Archive

George Bendo

UK ALMA Regional Centre Node
Jodrell Bank Centre for Astrophysics
The University of Manchester



The ALMA Science Archive was updated within the past year. The website is <https://almascience.eso.org/aq/>. The default view shows the entire contents of the archive.

The screenshot displays the ALMA Science Archive interface. On the left, a spectral plot shows intensity versus frequency (100-900 GHz) with labeled lines for various molecules and transitions. On the right, a table lists observations with columns for Project code, ALMA source name, Ra, Dec, Band, Cont. sens., Frequency support, Release date, Publications, Ang. res., Min. vel. res., Array, Mosaic, Max. reco. scale, FOV, Scientific category, and Sck.

Spectral Plot Labels:

- 3: CO v=0-0-3-2
- 4: HCN v=0-0-1-8-7
- 5: CO v=0-0-3-2
- 6: CO v=0-0-3-2
- 7: CO v=0-0-3-2
- 8: CO v=0-0-4-3
- 9: CO v=0-0-5-4
- 10: CO v=0-0-5-4

Observations Table:

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Sck
2011.0.00191.S	Fomalhaut b	22:57:38.685	-29:37:12.616	7	0.1181	343.08..358.84GHz	2012-12-06	2	1.021	0.816	12m		14.433	16.592	Disks and planet formati...	D
2011.0.00131.S	R Scl	01:26:58.079	-32:32:36.424	7	0.9115	330.25..346.11GHz	2012-12-06	5	1.241	0.846	12m	mosaic	14.979	62.007	Stars and stellar evolution	A
2011.0.00101.S	GRB021004	00:26:54.680	+18:55:41.600	7	0.1136	337.01..353.00GHz	2012-12-06	2	1.322	26.541	12m		14.682	16.878	Active galaxies	S
2011.0.00397.S	J035448.24-330827.2	03:54:48.240	-33:08:27.200	7	0.4848	337.03..353.01GHz	2012-12-20	3	1.372	26.541	12m		10.183	16.877	Active galaxies	A
2011.0.00397.S	J041754.10-281655.9	04:17:54.100	-28:16:55.900	7	0.4848	337.02..353.01GHz	2012-12-20	3	1.400	26.541	12m		10.521	16.877	Active galaxies	A
2011.0.00397.S	J063027.81-212058.6	06:30:27.810	-21:20:58.600	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.279	26.541	12m		8.285	16.878	Active galaxies	A
2011.0.00397.S	J061200.23-062209.6	06:12:00.230	-06:22:09.600	7	0.5346	337.00..352.99GHz	2012-12-20	3	1.303	26.541	12m		8.827	16.878	Active galaxies	A
2011.0.00397.S	J054930.06-373940.1	05:49:30.060	-37:39:40.100	7	0.4848	337.02..353.00GHz	2012-12-20	3	1.388	26.541	12m		13.892	16.878	Active galaxies	A
2011.0.00397.S	J070257.20-280842.3	07:02:57.200	-28:08:42.300	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.272	26.541	12m		8.044	16.878	Active galaxies	A

The interface has three sections:

- The sky viewer
- The spectral viewer
- The results table

The screenshot displays the ALMA Science Archive interface. The top section features a sky viewer on the left showing a mosaic of the sky with a field of view (FoV) of 176.29°. The right section is a spectral viewer showing a spectrum from 100 GHz to 900 GHz with various molecular lines identified. The bottom section is a results table listing observations.

Spectral Viewer Data:

Line #	Molecule	Transition	Frequency (GHz)
3	CO	v=0-0 3-2	115.271
4	CS	v=0-0 3-2	144.861
5	HCN	v=0-0 1-0	144.913
6	ClO	v=0-0 3-2	177.491
7	ClO	v=0-0 3-2	177.491
8	ClO	v=0-0 3-2	177.491
9	HCN	v=0-0 1-0	144.913
10	CO	v=0-0 3-2	115.271

Observations Table:

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category
2011.0.00191.S	Fomalhaut b	22:57:38.685	-29:37:12.616	7	0.1181	343.08..358.84GHz	2012-12-06	2	1.021	0.816	12m		14.433	16.592	Disks and planet formati...
2011.0.00131.S	R Scl	01:26:58.079	-32:32:36.424	7	0.9115	330.25..346.11GHz	2012-12-06	5	1.241	0.846	12m	mosaic	14.979	62.007	Stars and stellar evolution
2011.0.00101.S	GRB021004	00:26:54.680	+18:55:41.600	7	0.1136	337.01..353.00GHz	2012-12-06	2	1.322	26.541	12m		14.682	16.878	Active galaxies
2011.0.00397.S	J035448.24-330827.2	03:54:48.240	-33:08:27.200	7	0.4848	337.03..353.01GHz	2012-12-20	3	1.372	26.541	12m		10.183	16.877	Active galaxies
2011.0.00397.S	J041754.10-281655.9	04:17:54.100	-28:16:55.900	7	0.4848	337.02..353.01GHz	2012-12-20	3	1.400	26.541	12m		10.521	16.877	Active galaxies
2011.0.00397.S	J063027.81-212058.6	06:30:27.810	-21:20:58.600	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.279	26.541	12m		8.285	16.878	Active galaxies
2011.0.00397.S	J061200.23-062209.6	06:12:00.230	-06:22:09.600	7	0.5346	337.00..352.99GHz	2012-12-20	3	1.303	26.541	12m		8.827	16.878	Active galaxies
2011.0.00397.S	J054930.06-373940.1	05:49:30.060	-37:39:40.100	7	0.4848	337.02..353.00GHz	2012-12-20	3	1.388	26.541	12m		13.892	16.878	Active galaxies
2011.0.00397.S	J070257.20-280842.3	07:02:57.200	-28:08:42.300	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.272	26.541	12m		8.044	16.878	Active galaxies

The results table actually has three tabs:

- Observation
- Project
- Publication

The screenshot displays the ALMA Science Archive interface. The top section features a spectral plot with a frequency range from 100 GHz to 900 GHz. The plot shows several absorption lines, with labels for various molecules and transitions. The x-axis is labeled with frequencies (100 GHz, 200 GHz, 300 GHz, 400 GHz, 500 GHz, 600 GHz, 700 GHz, 800 GHz, 900 GHz). The y-axis represents flux density. The plot is divided into 10 numbered regions (3-10) corresponding to different molecules. The right side of the plot has tabs for 'Molecules', 'Lines', and 'Redshift'. The 'Molecules' tab is selected, showing a list of molecules and their transitions. The 'Lines' tab shows a list of lines with their corresponding frequencies and transitions. The 'Redshift' tab shows the estimated redshift for each line. The bottom section of the screenshot shows a table of project results, with tabs for 'Observations (53522)', 'Projects (3756)', and 'Publications (2661)'. The 'Projects' tab is selected, showing a list of projects with columns for Project Code, Project Title, Type, PI Name, Proposal authors, Max. Release Date, Publications, and Observations.

Project Code	Project Title	Type	PI Name	Proposal authors	Max. Release Date	Publications	Observations
2011.0.00236.S	The Dynamics of Massive Starless Cores	S	Tan, Jonathan	Butler, Michael; Font...	2013-01-23	4	
2011.0.00268.S	Metallicity of a Submillimeter Galaxy at z=5	S	Nagao, Tohru	De Brueck, Carlos; H...	2013-02-09	3	
2011.0.00454.S	(Why) Is CenA a source of Ultra High Energy Cosmic Rays: Shock acceleration, jet and UHECR composition	S	Nagar, Neil	Smith, Rory; Finlez, C...	2013-02-14	1	
2011.0.00851.S	The Origin of the Destroyed Minor Planet at G29-38: a Main Belt or Kuiper Belt Analog?	S	Farihi, Jay	Greaves, Jane; Bonso...	2013-02-14	1	
2011.0.00294.S	More than LESS: The first fully-identified submillimetre survey	S	Smail, Ian	Rix, Hans-Walter; Ch...	2013-02-15	20	
2011.0.00510.S	Probing the Molecular Outflows of the Coldest Known Object in the Universe: The Boomerang Nebula	S	Sahai, Raghvendra	Nyman, Lars-Ake; Vl...	2013-03-13	2	
2011.0.00131.S	Piecing the shell together: ALMA and the detached shell around R Scl	S	Maercker, Matthias	Ramstedt, Sofia; Pala...	2013-03-29	5	
2011.0.00808.S	Probing the vertical structure of Saturn's storm with ALMA	S	Cavalié, Thibault	Moreno, Raphael; Fo...	2013-04-23	0	
2011.0.00101.S	Shedding Light on Distant Starburst Galaxies Hosting Gamma-ray Bursts v9	S	Wang, Wei-Hao	Huang, Kuiyun; Chen...	2013-05-01	2	

The results table actually has three tabs:

- Observation
- Project
- Publication

The screenshot displays the ALMA Science Archive interface. On the left, a spectral plot shows intensity versus frequency (100 GHz to 900 GHz) with various molecular lines labeled. On the right, a table lists the detected molecules and their corresponding lines and redshifts. Below the plot, there are three tabs: Observations (53522), Projects (3756), and Publications (2661). The Publications tab is active, showing a table of search results.

BibCode	First Author	Journal	Year	Publication Title	↑ Max. Release Date	Projects	Observations	Authors
2013ApJ...779...96T	Tan, Jonathan C.	ApJ	2013	The Dynamics of Massive Starless Cores with ALMA	2013-01-23	1	7	Tan, Jonathan C.
2016ApJ...828..100F	Feng Q, Siyi	ApJ	2016	Outflow Detection in a 70 μ m Dark High-Mass Core	2013-01-23	1	7	Feng Q, Siyi; E
2016ApJ...821...94K	Kong, Shuo	ApJ	2016	The Deuterium Fraction in Massive Starless Cores and Dynamical Implications	2013-01-23	1	7	Kong, Shuo; F
2012A&A...542L..34N	Nagao, T.	A&A	2012	ALMA reveals a chemically evolved submillimeter galaxy at $z = 4.76$	2013-02-09	1	4	Nagao, T.; M
2014MNRAS.444.1821F	Farihi, J.	MNRAS	2014	ALMA and Herschel observations of the prototype dusty and polluted white dwarf G29-38	2013-02-14	1	8	Farihi, J.; Wye
2016A&A...586A..45S	Salomé, Q.	A&A	2016	Star formation efficiency along the radio jet in Centaurus A	2013-02-14	1	8	Salomé, Q.; S
2017ApJ...840...78D	Danielson, A. L. R.	ApJ	2017	An ALMA Survey of Submillimeter Galaxies in the Extended Chandra Deep Field South: Spectroscopic Redshifts	2013-02-15	1	140	Danielson, A.
2016MNRAS.462.1192L	Lindroos, L.	MNRAS	2016	Estimating sizes of faint, distant galaxies in the submillimetre regime	2013-02-15	1	140	Lindroos, L.; I
2014ApJ...788..125S	Simpson, J. M.	ApJ	2014	An ALMA Survey of Submillimeter Galaxies in the Extended Chandra Deep Field South: The Redshift Distribution and Evolution of...	2013-02-15	1	140	Simpson, J. N.

Searches can be done in one of two ways. The best way to start a search, especially for a single object, is to use the search menu that is displayed when hovering over the rectangle with the magnifying glass.

The screenshot shows the ALMA Science Archive search interface. A yellow arrow points to the search bar at the top left. The interface is divided into a left sidebar with filters (Position, Energy, Project, Publication, Observation) and a main content area with a spectral plot and a table of search results.

Search Filters:

- Position:** Source name, ALMA source name, RA Dec, Galactic, Target List, Angular Resolution, Maximum Recoverable Scale.
- Energy:** Frequency, Band, Spectral resolution, Continuum sensitivity, Line sensitivity (10 km/s).
- Project:** Project code, Project Title, Project abstract, PI Full Name, Proposal authors, Science keyword.
- Publication:** BibCode, Publication Title, Abstract, First Author, Authors.
- Observation:** Observation Date, Polarisation Type, Member ous id, Object type.

Spectral Plot: Shows a spectrum with 10 labeled lines. The x-axis is frequency in GHz (100 to 900). The y-axis is intensity. The lines are labeled with their corresponding chemical species and quantum numbers.

Line	Species
3	CO v=0-0-3-2
4	CS v=0-0-3-2
5	HCN v=0-0-1-0-0-1
6	C ₂ H v=0-0-3-2
7	CO v=0-0-3-2
8	CO v=0-0-4-3
9	HCN v=0-0-1-0-0-1
10	CO v=0-0-5-4

Search Results Table:

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category
2011.0.00191.S	Fomalhaut b	22:57:38.685	-29:37:12.616	7	0.1181	343.08..358.84GHz	2012-12-06	2	1.021	0.816	12m		14.433	16.592	Disks and planet formati...
2011.0.00131.S	R Scl	01:26:58.079	-32:32:36.424	7	0.9115	330.25..346.11GHz	2012-12-06	5	1.241	0.846	12m	mosaic	14.979	62.007	Stars and stellar evolution
2011.0.00101.S	GRB021004	00:26:54.680	+18:55:41.600	7	0.1136	337.01..353.00GHz	2012-12-06	2	1.322	26.541	12m		14.682	16.878	Active galaxies
2011.0.00397.S	J035448.24-330827.2	03:54:48.240	-33:08:27.200	7	0.4848	337.03..353.01GHz	2012-12-20	3	1.372	26.541	12m		10.183	16.877	Active galaxies
2011.0.00397.S	J041754.10-281655.9	04:17:54.100	-28:16:55.900	7	0.4848	337.02..353.01GHz	2012-12-20	3	1.400	26.541	12m		10.521	16.877	Active galaxies
2011.0.00397.S	J063027.81-212058.6	06:30:27.810	-21:20:58.600	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.279	26.541	12m		8.285	16.878	Active galaxies
2011.0.00397.S	J061200.23-062209.6	06:12:00.230	-06:22:09.600	7	0.5346	337.00..352.99GHz	2012-12-20	3	1.303	26.541	12m		8.827	16.878	Active galaxies
2011.0.00397.S	J054930.06-373940.1	05:49:30.060	-37:39:40.100	7	0.4848	337.02..353.00GHz	2012-12-20	3	1.388	26.541	12m		13.892	16.878	Active galaxies
2011.0.00397.S	J070257.20-280842.3	07:02:57.200	-28:08:42.300	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.272	26.541	12m		8.044	16.878	Active galaxies

The other method is to type in search criteria in the entry fields above each column in the results table. This can also be done after initially setting up a search using the search menu.

The screenshot displays the ALMA Science Archive interface. The top section features a spectral plot with frequency on the x-axis (100 GHz to 900 GHz) and intensity on the y-axis. The plot shows several absorption lines, with labels for molecules and transitions. A yellow highlight is present under the x-axis labels 3 through 10. The right side of the plot includes tabs for 'Molecules', 'Lines', and 'Redshift', with 'Redshift' currently selected and showing an estimated value of 0.

Below the plot is a search results table with the following columns: Project, ALMA source name, Ra, Dec, Band, Cont. sens., Frequency support, Release date, Publications, Ang. res., Min. vel. res., Array, Mosaic, Max. reco. scale, FOV, Scientific category, and Sch. A yellow arrow points to the 'Project' column header.

Project	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Sch
2011.0.00191.S	Fomalhaut b	22:57:38.685	-29:37:12.616	7	0.1181	343.08..358.84GHz	2012-12-06	2	1.021	0.816	12m		14.433	16.592	Disks and planet formati...	D
2011.0.00131.S	R Scl	01:26:58.079	-32:32:36.424	7	0.9115	330.25..346.11GHz	2012-12-06	5	1.241	0.846	12m	mosaic	14.979	62.007	Stars and stellar evolution	A
2011.0.00101.S	GRB021004	00:26:54.680	+18:55:41.600	7	0.1136	337.01..353.00GHz	2012-12-06	2	1.322	26.541	12m		14.682	16.878	Active galaxies	S
2011.0.00397.S	J035448.24-330827.2	03:54:48.240	-33:08:27.200	7	0.4848	337.03..353.01GHz	2012-12-20	3	1.372	26.541	12m		10.183	16.877	Active galaxies	A
2011.0.00397.S	J041754.10-281655.9	04:17:54.100	-28:16:55.900	7	0.4848	337.02..353.01GHz	2012-12-20	3	1.400	26.541	12m		10.521	16.877	Active galaxies	A
2011.0.00397.S	J063027.81-212058.6	06:30:27.810	-21:20:58.600	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.279	26.541	12m		8.285	16.878	Active galaxies	A
2011.0.00397.S	J061200.23-062209.6	06:12:00.230	-06:22:09.600	7	0.5346	337.00..352.99GHz	2012-12-20	3	1.303	26.541	12m		8.827	16.878	Active galaxies	A
2011.0.00397.S	J054930.06-373940.1	05:49:30.060	-37:39:40.100	7	0.4848	337.02..353.00GHz	2012-12-20	3	1.388	26.541	12m		13.892	16.878	Active galaxies	A
2011.0.00397.S	J070257.20-280842.3	07:02:57.200	-28:08:42.300	7	0.5346	337.01..352.99GHz	2012-12-20	3	1.272	26.541	12m		8.044	16.878	Active galaxies	A

When the number of results in the results table changes, the map and spectrum panels will automatically adjust to show the observed fields and spectra in more detail.

ALMA Science Archive

Source name: Z_CMa

07 03 43.164 -11 33 6.22
FoV: 3.79'

Molecules Lines Redshift

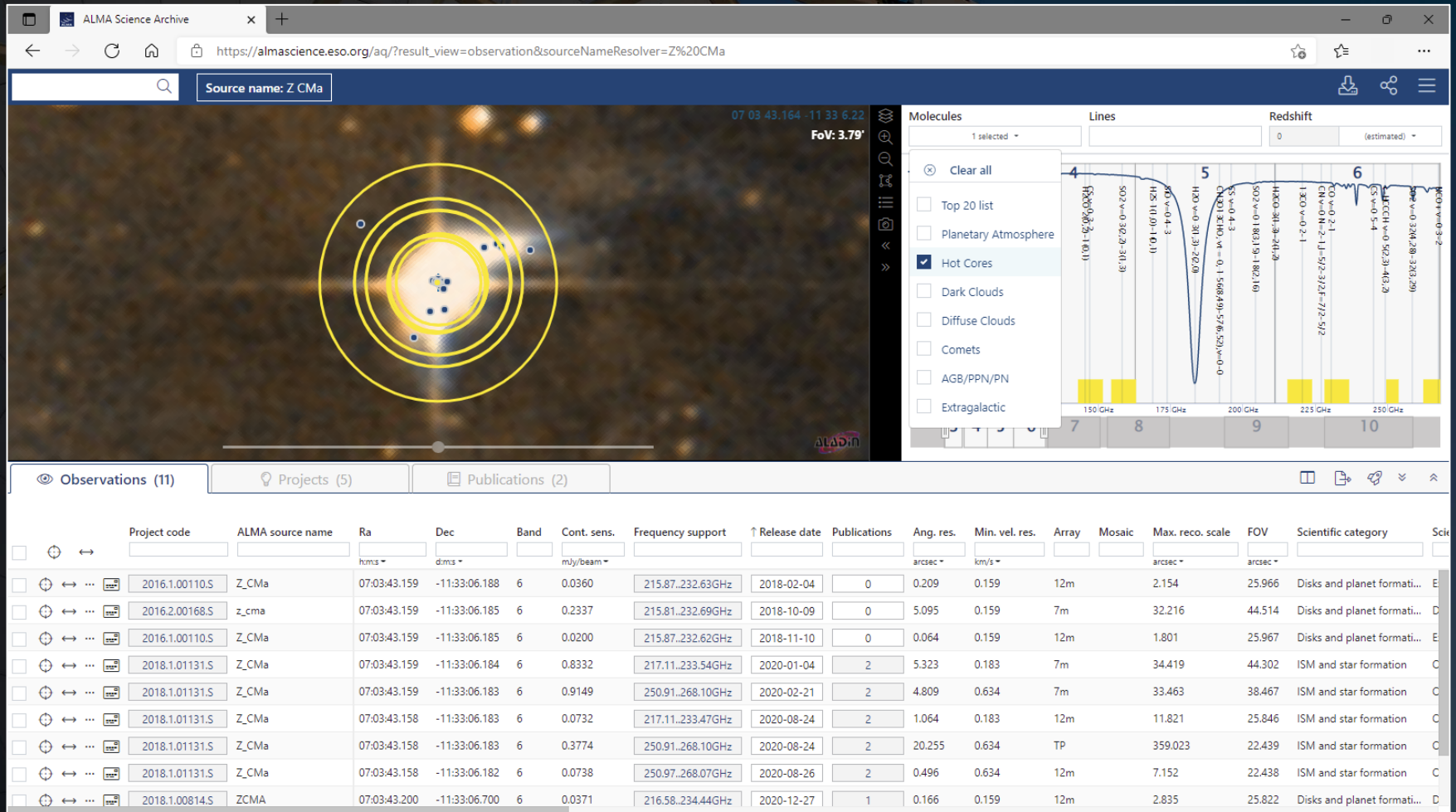
0 1 2 3 4 5 6 7 8 9 10

100 GHz 125 GHz 150 GHz 175 GHz 200 GHz 225 GHz 250 GHz

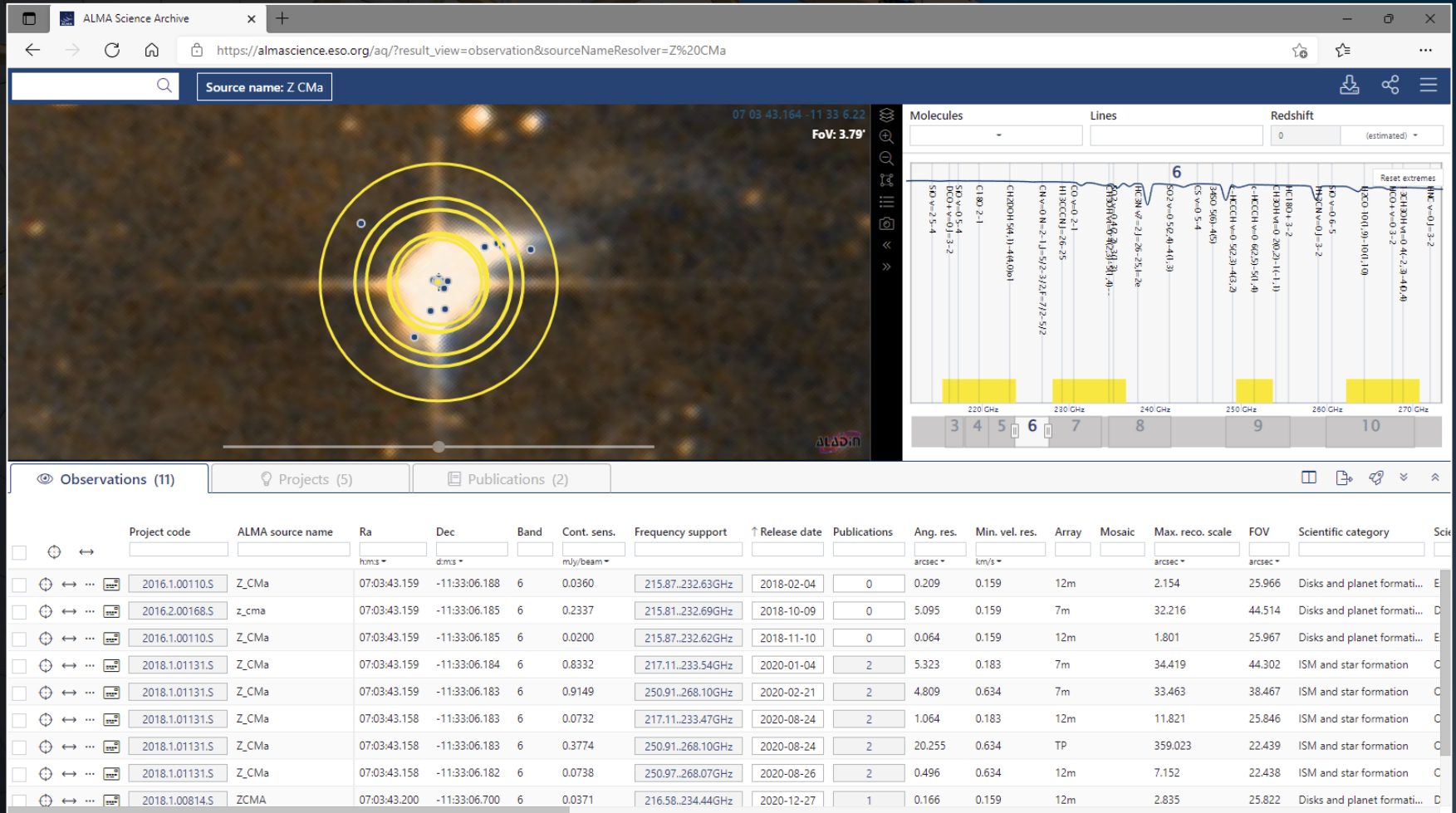
Observations (11) Projects (5) Publications (2)

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Sch
		hms	dms		mJy/beam				arcsec	km/s			arcsec	arcsec		
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.188	6	0.0360	215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m		2.154	25.966	Disks and planet formati...	E
2016.2.00168.S	z_cma	07:03:43.159	-11:33:06.185	6	0.2337	215.81..232.69GHz	2018-10-09	0	5.095	0.159	7m		32.216	44.514	Disks and planet formati...	D
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m		1.801	25.967	Disks and planet formati...	E
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.184	6	0.8332	217.11..233.54GHz	2020-01-04	2	5.323	0.183	7m		34.419	44.302	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m		33.463	38.467	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m		11.821	25.846	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.3774	250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP		359.023	22.439	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m		7.152	22.438	ISM and star formation	C
2018.1.00814.S	Z_CMA	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m		2.835	25.822	Disks and planet formati...	D

The map display can be adjusted to display different wavebands. The spectrum can be adjusted to show broader or narrower frequency ranges, to show different spectral lines, and to show those lines at different redshifts.



The map display can be adjusted to display different wavebands. The spectrum can be adjusted to show broader or narrower frequency ranges, to show different spectral lines, and to show those lines at different redshifts.

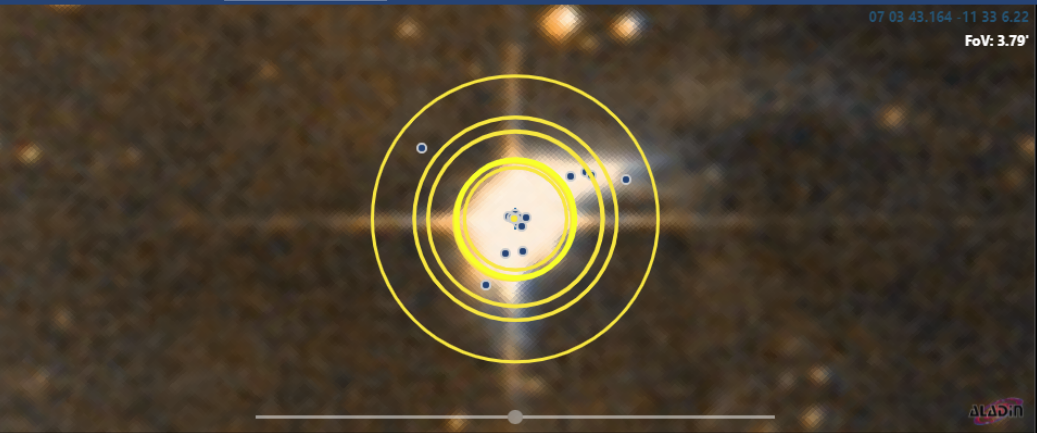


Hovering over an entry in the results table will highlight the row, the field in the map panel, and the frequency ranges in the spectrum panel.

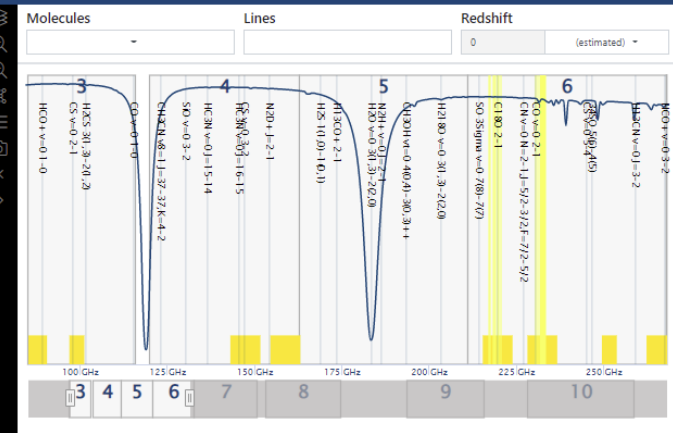
ALMA Science Archive

Source name: Z_CMa

07 03 43.164 -11 33 6.22
FoV: 3.79'



Molecules: Lines: Redshift: 0 (estimated)



Observations (11) | Projects (5) | Publications (2)

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Sch
		hms	dms		mJy/beam				arcsec	km/s			arcsec	arcsec		
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.188	6	0.0360	215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m		2.154	25.966	Disks and planet formati...	E
2016.2.00168.S	z_cma	07:03:43.159	-11:33:06.185	6	0.2337	215.81..232.69GHz	2018-10-09	0	5.095	0.159	7m		32.216	44.514	Disks and planet formati...	D
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m		1.801	25.967	Disks and planet formati...	E
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.184	6	0.8332	217.11..233.54GHz	2020-01-04	2	5.323	0.183	7m		34.419	44.302	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m		33.463	38.467	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m		11.821	25.846	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.3774	250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP		359.023	22.439	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m		7.152	22.438	ISM and star formation	C
2018.1.00814.S	Z_CMA	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m		2.835	25.822	Disks and planet formati...	D

Hovering the cursor over items in boxes will reveal a pop-up window with extra information.

ALMA Science Archive

Source name: Z_CMa

07 03 43.164 -11 33 6.22
FoV: 3.79'

Molecules Lines Redshift

Project title
A molecular line survey of FU Ori Outflows

PI name
Ruiz-Rodriguez, Dary

Proposal abstract
YSOs that are undergoing rapid accretion episodes, i.e. FU Ori objects (FUors), display strong outflow activity. These outflows release large amounts of energy, thereby dispersing the infalling envelope that feeds the disk. X-ray emission can be produced during FUor eruptions and is known to be a critical ionizing source in disks, playing an important role in disk dispersal. However, the potential for high-energy-induced molecular ionization and chemistry at earlier (protostellar) evolutionary stages, and the importance of such radiative processes relative to outflows (shocks), is unexplored. We propose ALMA band 6 observations of HCO+, CO, HCN (and isotopologues), and molecular shock tracers to characterize the outflow/disk system energetics and molecular ionization of FUor object environments. Our sample for this pilot study comprises four of the best studied FUor and FUor-like YSOs, all of which have well-characterized X-ray emission properties. By combining the ALMA 12 m and ACA arrays and using their multi-scale mapping capabilities (resolution between 0.2" and 30"), we will thoroughly investigate the chemical and physical structures and kinematics of the sample objects.

Acknowledgement
This paper makes use of the following ALMA data: ADS/JAO.ALMA#2018.1.01131.S. ALMA is a partnership of ESO (representing its member states), NSF (USA) and NINS (Japan), together with NRC (Canada), MOST and ASIAA (Taiwan), and KASI (Republic of Korea), in cooperation with the Republic of Chile. The Joint ALMA Observatory is operated by ESO, AUI/NRAO and NAOJ. In addition, publications from NA authors must acknowledge the standard NRAO acknowledgement: The National Radio Astronomy Observatory is funded by the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.

Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Sch
215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m		2.154	25.966	Disks and planet formati...	E
215.81..232.69GHz	2018-10-09	0	5.095	0.159	7m		32.216	44.514	Disks and planet formati...	D
215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m		1.801	25.967	Disks and planet formati...	E
217.11..233.54GHz	2020-01-04	2	5.323	0.183	7m		34.419	44.302	ISM and star formation	C
250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m		33.463	38.467	ISM and star formation	C
217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m		11.821	25.846	ISM and star formation	C
250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP		359.023	22.439	ISM and star formation	C
250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m		7.152	22.438	ISM and star formation	C
216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m		2.835	25.822	Disks and planet formati...	D

Additionally, hovering over the box with the squares inside it on the left will reveal preview images and links to quality assurance information.

The screenshot displays the ALMA Science Archive interface for observation 2018.1.01131.S. The main view shows a spectral plot with several absorption lines labeled with chemical species and quantum numbers. A yellow box highlights a specific observation in the table below, which is also highlighted in the table's data rows.

Observation Details:

- Source name: Z_CMa
- Frequency range: 217.11..217.17 GHz, 141.11kHz, XX YY
- Band: 6
- Frequency resolution: 141.11 kHz
- Continuum sensitivity (estimate): 0.07 mJy/beam@10km/s
- Line sensitivity 10km/s (estimate): 1.46 mJy/beam@10km/s
- Line sensitivity native (estimate): 0.51 uJy/beam@native
- Polarizations: XX YY
- Array: 12m

Table of Observations:

Obs ID	Source	RA	Dec	Band	Frequency Range	Date	Integration	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP		359.023	22.439	ISM and star formation
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m		7.152	22.438	ISM and star formation
2018.1.00814.S	Z_CMa	07:03:43.200	-11:33:06.700	6	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m		2.835	25.822	Disks and planet formati...

The results from a search can be sorted by any column. The results can also be further filtered.

The screenshot displays the ALMA Science Archive interface. At the top, the browser address bar shows the URL: https://almascience.eso.org/aq/?result_view=observation&sourceNameResolver=Z%20Cma. The search bar contains "Source name: Z CMa".

The main view is split into two panels. The left panel shows a spatial map of the source with concentric yellow circles representing the beam size. The right panel shows a spectral plot with several absorption lines labeled with their corresponding transitions. A yellow arrow points to the "Art. Res. (km/s)" column in the table below.

Below the spectral plot, there are tabs for "Observations (11)", "Projects (5)", and "Publications (2)". The "Observations (11)" tab is active, showing a table of search results.

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Art. Res. (km/s)	Max. reco. scale	FOV	Scientific category	Sch
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m	11.821	25.846	ISM and star formation	C
2019.1.01144.S	Z_CMa	07:03:43.164	-11:33:06.220	3	0.0300	85.06..100.94GHz	2022-09-13	0	0.073	3.416	12m	1.434	62.612	Disks and planet formati...	D
2018.1.00814.S	Z_CMa	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m	2.835	25.822	Disks and planet formati...	D
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m	1.801	25.967	Disks and planet formati...	E
2019.1.01144.S	Z_CMa	07:03:43.164	-11:33:06.220	4	0.0431	145.06..160.94GHz	2022-09-08	0	0.056	2.128	12m	1.095	38.058	Disks and planet formati...	D
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m	7.152	22.438	ISM and star formation	C
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.188	6	0.0360	215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m	2.154	25.966	Disks and planet formati...	E
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m	33.463	38.467	ISM and star formation	C
2016.2.00168.S	z_cma	07:03:43.159	-11:33:06.185	6	0.2337	215.81..232.69GHz	2018-10-09	0	5.095	0.159	7m	32.216	44.514	Disks and planet formati...	D

The results from a search can be sorted by any column. The results can also be further filtered.

ALMA Science Archive

Source name: Z CMa + 1 tab-subfilter

07 03 43.164 -11 33 6.22
FoV: 3.79'

The interface displays a spectral plot with various molecular lines labeled, including HCO, HCN, HNC, N₂O, and SiO. The plot shows intensity versus frequency from 100 GHz to 250 GHz. Below the plot is a table of observations with columns for Project code, ALMA source name, Ra, Dec, Band, Cont. sens., Frequency support, Release date, Publications, Ang. res., Min. vel. res., Array, Max. reco. scale, FOV, Scientific category, and Scl.

Observations (7)

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Max. reco. scale	FOV	Scientific category	Scl
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.188	6	0.0360	215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m	2.154	25.966	Disks and planet formati...	Exo
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m	1.801	25.967	Disks and planet formati...	Exo
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m	11.821	25.846	ISM and star formation	Out
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m	7.152	22.438	ISM and star formation	Out
2018.1.00814.S	Z_CMa	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m	2.835	25.822	Disks and planet formati...	Dis
2019.1.01144.S	Z_CMa	07:03:43.164	-11:33:06.220	4	0.0431	145.06..160.94GHz	2022-09-08	0	0.056	2.128	12m	1.095	38.058	Disks and planet formati...	Dis
2019.1.01144.S	Z_CMa	07:03:43.164	-11:33:06.220	3	0.0300	85.06..100.94GHz	2022-09-13	0	0.073	3.416	12m	1.434	62.612	Disks and planet formati...	Dis

Clicking on the checkbox next to an observation will select the data for download. The row will change to orange as will the field in the map panel and the frequency range in the spectral plot.

The screenshot displays the ALMA Science Archive interface for the source Z CMa. The interface is divided into several panels:

- Map Panel:** Shows a spatial map of the source with concentric yellow circles representing the field of view (FoV). The FoV is labeled as 3.79'.
- Spectral Plot:** A plot showing the frequency range from 100 GHz to 250 GHz. The plot includes a blue line representing the spectrum and yellow bars representing the frequency support of various observations. The plot is divided into sections labeled 3 through 10.
- Observations Table:** A table listing 11 observations. The row for observation 2018.1.01131.S is highlighted in orange, indicating it is selected. A yellow arrow points to the checkbox in the first column of this row.

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category
		hms	dms		mJy/beam				arcsec	km/s			arcsec	arcsec	
<input type="checkbox"/>	2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.188	6	0.0360	215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m	2.154	25.966	Disks and planet formati...
<input type="checkbox"/>	2016.2.00168.S	z_cma	07:03:43.159	-11:33:06.185	6	0.2337	215.81..232.69GHz	2018-10-09	0	5.095	0.159	7m	32.216	44.514	Disks and planet formati...
<input type="checkbox"/>	2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m	1.801	25.967	Disks and planet formati...
<input type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.184	6	0.8332	217.11..233.54GHz	2020-01-04	2	5.323	0.183	7m	34.419	44.302	ISM and star formation
<input type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m	33.463	38.467	ISM and star formation
<input checked="" type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m	11.821	25.846	ISM and star formation
<input type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.3774	250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP	359.023	22.439	ISM and star formation
<input type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m	7.152	22.438	ISM and star formation
<input type="checkbox"/>	2018.1.00814.S	Z_CMA	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m	2.835	25.822	Disks and planet formati...

Proprietary data can be selected but cannot be downloaded. The checkbox will appear red when these data are selected. Other data (such as for programs where the observations are not yet complete or where the data are in QA3) cannot be selected.

ALMA Science Archive

Source name: Z CMa

07 03 43.164 -11 33 6.22
FoV: 3.79'

Molecules Lines Redshift

0 (estimated)

100 GHz 125 GHz 150 GHz 175 GHz 200 GHz 225 GHz 250 GHz

Observations (11) Projects (5) Publications (2)

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Sch	
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.004	0.159	12m		1.801	25.967	Disks and planet formati...	E	
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.184	6	0.8332	217.11..233.54GHz	2020-01-04	2	5.323	0.183	7m		34.419	44.302	ISM and star formation	C	
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m		33.463	38.467	ISM and star formation	C	
<input checked="" type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m		11.821	25.846	ISM and star formation	C
<input type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.3774	250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP		359.023	22.439	ISM and star formation	C
<input type="checkbox"/>	2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m		7.152	22.438	ISM and star formation	C
<input type="checkbox"/>	2018.1.00814.S	Z_CMa	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m		2.835	25.822	Disks and planet formati...	D
<input checked="" type="checkbox"/>	2019.1.01144.S	Z_CMa	07:03:43.164	-11:33:06.220	4	0.0431	145.06..160.94GHz	2022-09-08	0	0.056	2.128	12m		1.095	38.058	Disks and planet formati...	D
<input type="checkbox"/>	2019.1.01144.S	Z_CMa	07:03:43.164	-11:33:06.220	3	0.0300	85.06..100.94GHz	2022-09-13	0	0.073	3.416	12m		1.434	62.612	Disks and planet formati...	D

The interface has several other options as well. These include saving the search results (or a link to those results), accessing documentation, and adjusting the display.

The screenshot displays the ALMA Science Archive interface. The top section shows a search for 'Source name: Z CMa' with a spectral plot. The plot shows several absorption lines labeled with chemical species and quantum numbers, such as CO v=0-0, HCN v=0-0, and HCO v=0-0. A yellow arrow points to the 'Observations (11)' tab, which is active. Below the plot is a table of observations.

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.188	6	0.0360	215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m		2.154	25.966	Disks and planet formati...
2016.2.00168.S	z_cma	07:03:43.159	-11:33:06.185	6	0.2337	215.81..232.69GHz	2018-10-09	0	5.095	0.159	7m		32.216	44.514	Disks and planet formati...
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m		1.801	25.967	Disks and planet formati...
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.184	6	0.8332	217.11..233.54GHz	2020-01-04	2	5.323	0.183	7m		34.419	44.302	ISM and star formation
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m		33.463	38.467	ISM and star formation
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m		11.821	25.846	ISM and star formation
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.3774	250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP		359.023	22.439	ISM and star formation
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m		7.152	22.438	ISM and star formation
2018.1.00814.S	Z_CMA	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m		2.835	25.822	Disks and planet formati...

Selected data can be downloaded by clicking on the download icon at the top right. When request download is selected, this will open a new browser window or tab. If proprietary data were selected, a login screen will appear first.

The screenshot displays the ALMA Science Archive interface. At the top, the browser address bar shows the URL: https://almascience.eso.org/aq/?result_view=observation&sourceNameResolver=Z%20Cma. The source name is "Z_CMa".

The main view is split into two panels. The left panel shows a spatial map of the source with concentric yellow circles representing the beam size. The right panel shows a spectral plot with frequency on the x-axis (100 GHz to 250 GHz) and flux density on the y-axis. The plot is labeled "Molecules", "Lines", and "Redshift". A yellow arrow points to a download icon in the top right corner of the interface.

Below the spectral plot is a table of observations. The table has columns for Project code, ALMA source name, Ra, Dec, Band, Cont. sens., Frequency support, Release date, Publications, Ang. res., Min. vel. res., Array, Mosaic, Max. reco. scale, FOV, Scientific category, and Sci. The table contains 11 rows of data, with the 5th row highlighted in yellow.

Project code	ALMA source name	Ra	Dec	Band	Cont. sens.	Frequency support	Release date	Publications	Ang. res.	Min. vel. res.	Array	Mosaic	Max. reco. scale	FOV	Scientific category	Sci
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.188	6	0.0360	215.87..232.63GHz	2018-02-04	0	0.209	0.159	12m		2.154	25.966	Disks and planet formati...	E
2016.2.00168.S	z_cma	07:03:43.159	-11:33:06.185	6	0.2337	215.81..232.69GHz	2018-10-09	0	5.095	0.159	7m		32.216	44.514	Disks and planet formati...	D
2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87..232.62GHz	2018-11-10	0	0.064	0.159	12m		1.801	25.967	Disks and planet formati...	E
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.184	6	0.8332	217.11..233.54GHz	2020-01-04	2	5.323	0.183	7m		34.419	44.302	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.91..268.10GHz	2020-02-21	2	4.809	0.634	7m		33.463	38.467	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.11..233.47GHz	2020-08-24	2	1.064	0.183	12m		11.821	25.846	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.3774	250.91..268.10GHz	2020-08-24	2	20.255	0.634	TP		359.023	22.439	ISM and star formation	C
2018.1.01131.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.97..268.07GHz	2020-08-26	2	0.496	0.634	12m		7.152	22.438	ISM and star formation	C
2018.1.00814.S	ZCMA	07:03:43.200	-11:33:06.700	6	0.0371	216.58..234.44GHz	2020-12-27	1	0.166	0.159	12m		2.835	25.822	Disks and planet formati...	D

The new page displays the data associated with the entries selected in the search interface. Data are sorted by Science Goal, Group OUS, and Member OUS. (A Member OUS is a unit of data containing one SB.)

ALMA Science Archive x Alma Request Handler - Request x +

https://almascience.eso.org/rh/submission

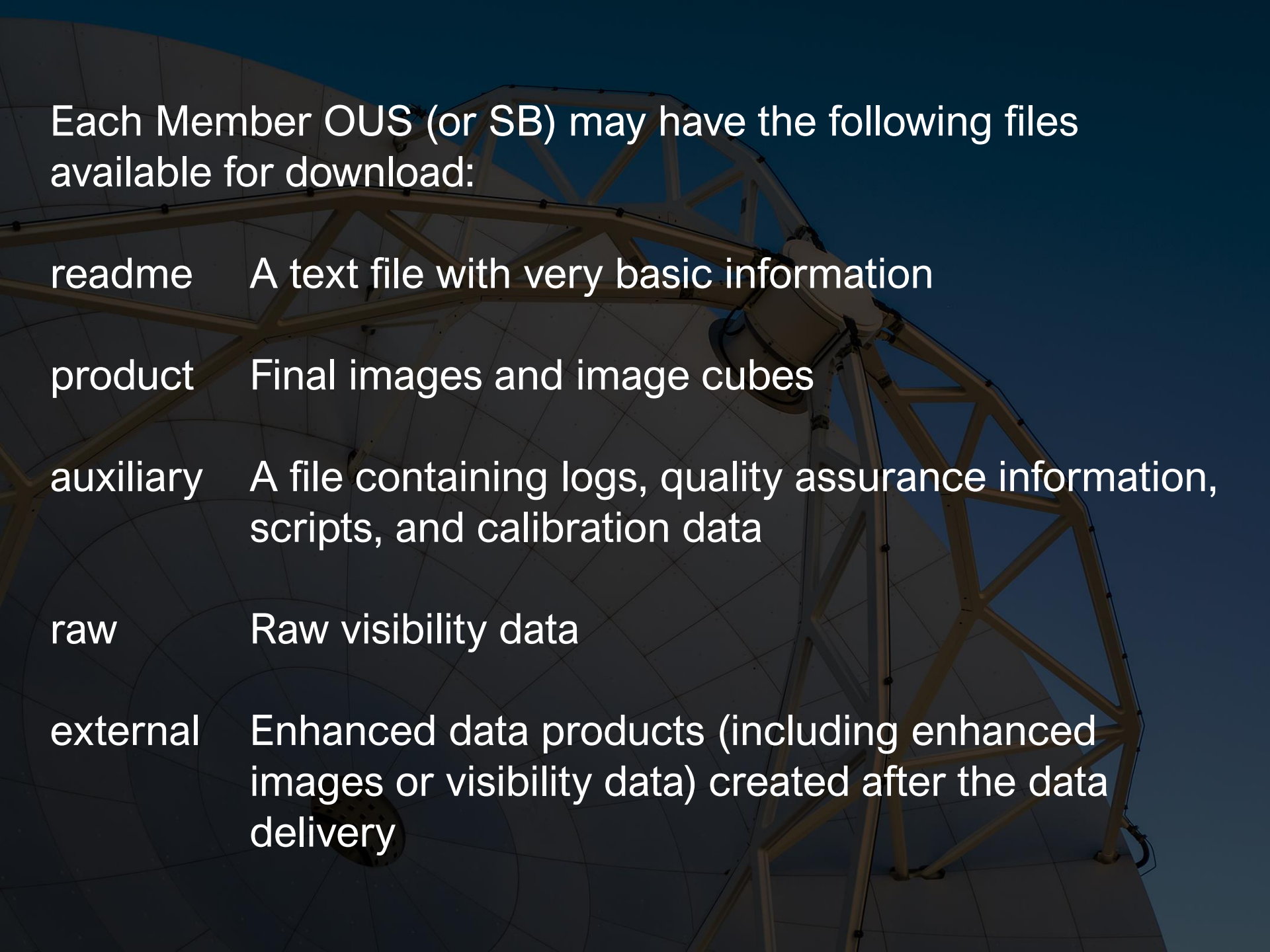
ALMA Request Handler

Anonymous User: Request #2158293739538 ✓
 Request Title: [click to edit](#)

Download Selected

readme product auxiliary raw (semipass) external

Project / OUSet / Executionblock	Updated	File	Size	Accessible	Actions
Request 2158293739538			6 GB		
Project 2018.1.01131.S					
Science Goal OUS uid://A001/X135b/X60					
Group OUS uid://A001/X135b/X61					
Member OUS uid://A001/X135b/X64	2019-05-22				
SB V1647_Or_a_06_TM2					
<input checked="" type="checkbox"/> readme		member.uid_A001_X135b_X64_README.txt	4 kB	✓	
<input checked="" type="checkbox"/> product		2018.1.01131.S uid_A001_X135b_X64_001_of_001.tar	2 GB	✓	
<input checked="" type="checkbox"/> auxiliary		2018.1.01131.S uid_A001_X135b_X64_auxiliary.tar	354 MB	✓	
<input type="checkbox"/> raw		2018.1.01131.S uid_A002_Xd9668b_Xa8e1.asdm.sdm.tar	7 GB	✓	
Member OUS uid://A001/X135b/X66	2019-06-06				
SB V1647_Or_a_06_7M					
<input checked="" type="checkbox"/> readme		member.uid_A001_X135b_X66_README.txt	4 kB	✓	
<input checked="" type="checkbox"/> product		2018.1.01131.S uid_A001_X135b_X66_001_of_001.tar	232 MB	✓	
<input checked="" type="checkbox"/> auxiliary		2018.1.01131.S uid_A001_X135b_X66_auxiliary.tar	186 MB	✓	
<input type="checkbox"/> raw		2018.1.01131.S uid_A002_Xd8fc22_X5da.asdm.sdm.tar	815 MB	✓	
Group OUS uid://A001/X135b/X68					
Member OUS uid://A001/X135b/X6b	2019-05-22				
SB Z_CMa_a_06_TM2					
<input checked="" type="checkbox"/> readme		member.uid_A001_X135b_X6b_README.txt	4 kB	✓	
<input checked="" type="checkbox"/> product		2018.1.01131.S uid_A001_X135b_X6b_001_of_001.tar	2 GB	✓	
<input checked="" type="checkbox"/> auxiliary		2018.1.01131.S uid_A001_X135b_X6b_auxiliary.tar	364 MB	✓	
<input type="checkbox"/> raw		2018.1.01131.S uid_A002_Xd98580_X354.asdm.sdm.tar	8 GB	✓	
Member OUS uid://A001/X135b/X6d	2019-01-03				
SB Z_CMa_b_06_7M					
<input checked="" type="checkbox"/> readme		member.uid_A001_X135b_X6d_README.txt	4 kB	✓	



Each Member OUS (or SB) may have the following files available for download:

readme A text file with very basic information

product Final images and image cubes

auxiliary A file containing logs, quality assurance information, scripts, and calibration data

raw Raw visibility data

external Enhanced data products (including enhanced images or visibility data) created after the data delivery

Clicking on the triangles pointing to the right will produce an expanded list that will show the contents of the individual tar files. (These lists can be collapsed again by clicking on the downwards-pointing arrows.)

File Name	Member ID	File Size	Status
readme	member.uid_A001_X135b_X66_README.txt	4 kB	✓
product	2018.1.01131.S.uid_A001_X135b_X66_001_of_001.tar	232 MB	✓
auxiliary	2018.1.01131.S.uid_A001_X135b_X66_auxiliary.tar	186 MB	✓
raw	2018.1.01131.S.uid_A002_Xd8fc22_X5da.asdm.sdm.tar	815 MB	✓
Group OUS uid://A001/X135b/X68			
Member OUS uid://A001/X135b/X6b (2019-05-22)			
SB_Z_CMa_a_06_TM2			
readme	member.uid_A001_X135b_X6b_README.txt	4 kB	✓
product	2018.1.01131.S.uid_A001_X135b_X6b_001_of_001.tar	2 GB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw25.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw25.mfs.l.ob.fits.gz	97 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw25.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw27.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw27.mfs.l.ob.fits.gz	96 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw27.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw29.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw29.mfs.l.ob.fits.gz	96 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw29.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw31.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw31.mfs.l.ob.fits.gz	95 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw31.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw33.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw33.mfs.l.ob.fits.gz	97 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw33.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw35.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw35.mfs.l.ob.fits.gz	98 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw35.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw37.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw37.mfs.l.ob.fits.gz	98 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw37.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw39.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw39.mfs.l.ob.fits.gz	97 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw39.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw41.mfs.l.mask.fits.gz	2 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw41.mfs.l.ob.fits.gz	87 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw41.mfs.l.pbcor.fits	302 kB	✓
product	member.uid_A001_X135b_X6b_J0538-4405_bp.spw43.mfs.l.mask.fits.gz	2 kB	✓

Clicking on the triangles pointing to the right will produce an expanded list that will show the contents of the individual tar files. (These lists can be collapsed again by clicking on the downwards-pointing arrows.)

The screenshot shows a web browser window with the URL <https://almascience.eso.org/rh/submission>. The page displays a hierarchical tree view of data submissions. The tree is organized into groups and members, with subfolders for each. The 'SB_Z_CMa_a_06_TM2' group is expanded, showing a detailed list of files with their names, sizes, and status indicators (green checkmarks).

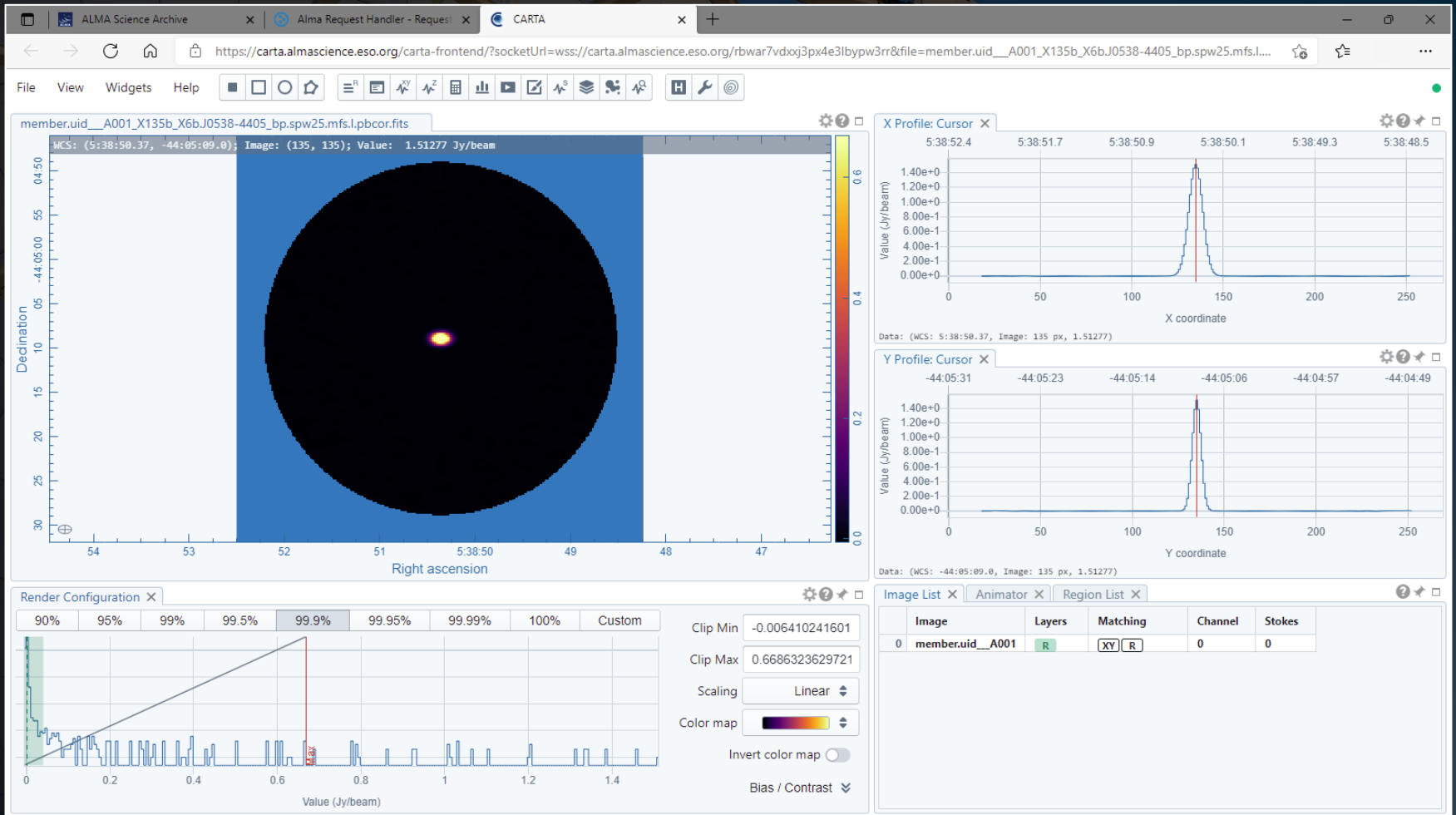
File Name	Size	Status
member.uid_A001_X135b_X6b_README.txt	4 kB	✓
2018.1.01131.S.uid_A001_X135b_X6b_001_of_001.tar	232 MB	✓
2018.1.01131.S.uid_A001_X135b_X6b_auxiliary.tar	186 MB	✓
2018.1.01131.S.uid_A002_Xd8fc22_X5da.asdm.sdm.tar	815 MB	✓
member.uid_A001_X135b_X6b_README.txt	4 kB	✓
2018.1.01131.S.uid_A001_X135b_X6b_001_of_001.tar	2 GB	✓
2018.1.01131.S.uid_A001_X135b_X6b_auxiliary.tar	364 MB	✓
member.uid_A001_X135b_X6b_hifa_calimage_aux_products.tgz	3 kB	✓
member.uid_A001_X135b_X6b_session_1_auxcallables.tgz	24 MB	✓
member.uid_A001_X135b_X6b_session_1.callables.tgz	8 MB	✓
uid_A002_Xd98580_X354.ms.calapply.txt	8 kB	✓
uid_A002_Xd98580_X354.ms.flagsversions.tgz	415 kB	✓
uid_A002_Xd98580_X354.target.ms.auxcalapply.txt	646 B	✓
member.uid_A001_X135b_X6b_calimage_product_rename.txt	24 kB	✓
member.uid_A001_X135b_X6b_hifa_calimage.casa.piperestorescript.py	164 B	✓
member.uid_A001_X135b_X6b_hifa_calimage.casa.piperescript.py	3 kB	✓
member.uid_A001_X135b_X6b_hifa_calimage.pipeline_manifest.xml	14 kB	✓
member.uid_A001_X135b_X6b_hifa_calimage.pprequest.xml	12 kB	✓
member.uid_A001_X135b_X6b_scriptForPI.py	20 kB	✓
member.uid_A001_X135b_X6b_hifa_calimage.casa.commands.log	483 kB	✓
member.uid_A001_X135b_X6b_hifa_calimage.weblog.tgz	330 MB	✓
member.uid_A001_X135b_X6b_qa2_report.html	143 kB	✓
member.uid_A001_X135b_X6b_qa2_report.pdf	71 kB	✓
uid_A002_Xd98580_X354.qa0_report.pdf	590 kB	✓
2018.1.01131.S.uid_A002_Xd98580_X354.asdm.sdm.tar	8 GB	✓
member.uid_A001_X135b_X6d_README.txt	4 kB	✓
2018.1.01131.S.uid_A001_X135b_X6d_001_of_001.tar	219 MB	✓
2018.1.01131.S.uid_A001_X135b_X6d_auxiliary.tar	154 MB	✓
2018.1.01131.S.uid_A002_Xd3c7c2_X5388.asdm.sdm.tar	711 MB	✓

It is also possible to preview individual images in the product tar file by clicking on the symbol with the C on the far right of the page. This will open a new page displaying the image using the CARTA interface.

The screenshot shows a web browser window with the URL <https://almascience.eso.org/rh/submission>. The page displays a hierarchical tree view of files and folders. The main content is a table listing files with columns for file name, size, and status. A yellow arrow points to a small icon with the letter 'C' in a circle, located at the end of the file list.

File Name	Size	Status	Action
member uid A001 X135b X66 README.txt	4 kB	✓	
2018.1.01131.S uid A001 X135b X66 001 of 001.tar	232 MB	✓	
2018.1.01131.S uid A001 X135b X66 auxiliary.tar	186 MB	✓	
2018.1.01131.S uid A002 Xd8fc22 X5da.asdm.sdm.tar	815 MB	✓	
Group OUS uid://A001/X135b/X68			
Member OUS uid://A001/X135b/X6b 2019-05-22			
SB_Z_CMa_a_06_TM2			
member uid A001 X135b X6b README.txt	4 kB	✓	
2018.1.01131.S uid A001 X135b X6b 001 of 001.tar	2 GB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw25.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw25.mfs.l.ob.fits.gz	97 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw25.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw27.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw27.mfs.l.ob.fits.gz	96 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw27.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw29.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw29.mfs.l.ob.fits.gz	96 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw29.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw31.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw31.mfs.l.ob.fits.gz	95 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw31.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw33.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw33.mfs.l.ob.fits.gz	97 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw33.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw35.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw35.mfs.l.ob.fits.gz	98 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw35.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw37.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw37.mfs.l.ob.fits.gz	98 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw37.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw39.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw39.mfs.l.ob.fits.gz	97 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw39.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw41.mfs.l.mask.fits.gz	2 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw41.mfs.l.ob.fits.gz	87 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw41.mfs.l.pbcor.fits	302 kB	✓	
member uid A001 X135b X6b J0538-4405 bp.spw43.mfs.l.mask.fits.gz	2 kB	✓	

It is also possible to preview individual images in the product tar file by clicking on the symbol with the C on the far right of the page. This will open a new page displaying the image using the CARTA interface.



Each file can be individually selected for download, or subsets of data can be selected for download. Proprietary data cannot be downloaded without logging in and without being delegate access to the data.

The screenshot shows the ALMA Request Handler web interface. At the top, there's a navigation bar with the ALMA Science Archive logo and the text "ALMA Request Handler - Request #2158293739538". Below this, the user is identified as "Anonymous User: Request #2158293739538" with a green checkmark. A "Request Title: [click to edit](#)" link is provided. A "Download Selected" button is visible. Below the button, there are checkboxes for file types: readme, product, auxiliary, raw (semipass), and external. The main content is a table with columns: Project / OUSet / Executionblock, Updated, File, Size, Accessible, and Actions. The table lists several folders and files, including "Request 2158293739538", "Project 2018.1.01131.S", "Science Goal OUS uid://A001/X135b/X60", "Group OUS uid://A001/X135b/X61", "Member OUS uid://A001/X135b/X64", "SB V1647_Or_a_06_TM2", "Member OUS uid://A001/X135b/X66", "SB V1647_Or_a_06_7M", "Group OUS uid://A001/X135b/X68", "Member OUS uid://A001/X135b/X6b", "SB Z_CMa_a_06_TM2", "Member OUS uid://A001/X135b/X6d", and "SB Z_CMa_b_06_7M". Each file entry includes a file name, a link to the file, its size, and a green checkmark in the "Accessible" column. The "Actions" column contains a download icon for each file.

Project / OUSet / Executionblock	Updated	File	Size	Accessible	Actions
Request 2158293739538			10 GB		
Project 2018.1.01131.S					
Science Goal OUS uid://A001/X135b/X60					
Group OUS uid://A001/X135b/X61					
Member OUS uid://A001/X135b/X64	2019-05-22	SB V1647_Or_a_06_TM2			
		readme member.uid_A001_X135b_X64_README.txt	4 kB	✓	
		product 2018.1.01131.S uid_A001_X135b_X64_001_of_001.tar	2 GB	✓	
		auxiliary 2018.1.01131.S uid_A001_X135b_X64_auxiliary.tar	354 MB	✓	
		raw 2018.1.01131.S uid_A002_Xd9668b_Xa8e1.asdm.sdm.tar	7 GB	✓	
Member OUS uid://A001/X135b/X66	2019-06-06	SB V1647_Or_a_06_7M			
		readme member.uid_A001_X135b_X66_README.txt	4 kB	✓	
		product 2018.1.01131.S uid_A001_X135b_X66_001_of_001.tar	232 MB	✓	
		auxiliary 2018.1.01131.S uid_A001_X135b_X66_auxiliary.tar	186 MB	✓	
		raw 2018.1.01131.S uid_A002_Xd8fc22_X5da.asdm.sdm.tar	815 MB	✓	
Group OUS uid://A001/X135b/X68					
Member OUS uid://A001/X135b/X6b	2019-05-22	SB Z_CMa_a_06_TM2			
		readme member.uid_A001_X135b_X6b_README.txt	4 kB	✓	
		product 2018.1.01131.S uid_A001_X135b_X6b_001_of_001.tar	2 GB	✓	
		auxiliary 2018.1.01131.S uid_A001_X135b_X6b_auxiliary.tar	364 MB	✓	
		raw 2018.1.01131.S uid_A002_Xd98580_X354.asdm.sdm.tar	8 GB	✓	
Member OUS uid://A001/X135b/X6d	2019-01-03	SB Z_CMa_b_06_7M			
		readme member.uid_A001_X135b_X6d_README.txt	4 kB	✓	



When data download is started, two options are available.

- The download script can be executed in a Linux/Mac console to download data. The file must be made executable using `chmod` before doing this. When the file is executed, the data will be downloaded to the current directory.

If the script is interrupted, it is possible to restart the downloads from where they were stopped by restarting the script.

- The other download option is the file list. The file list is just a set of links directly to the data.

The individual results in the ALMA request handler page include links that can also be clicked on to download the data.