

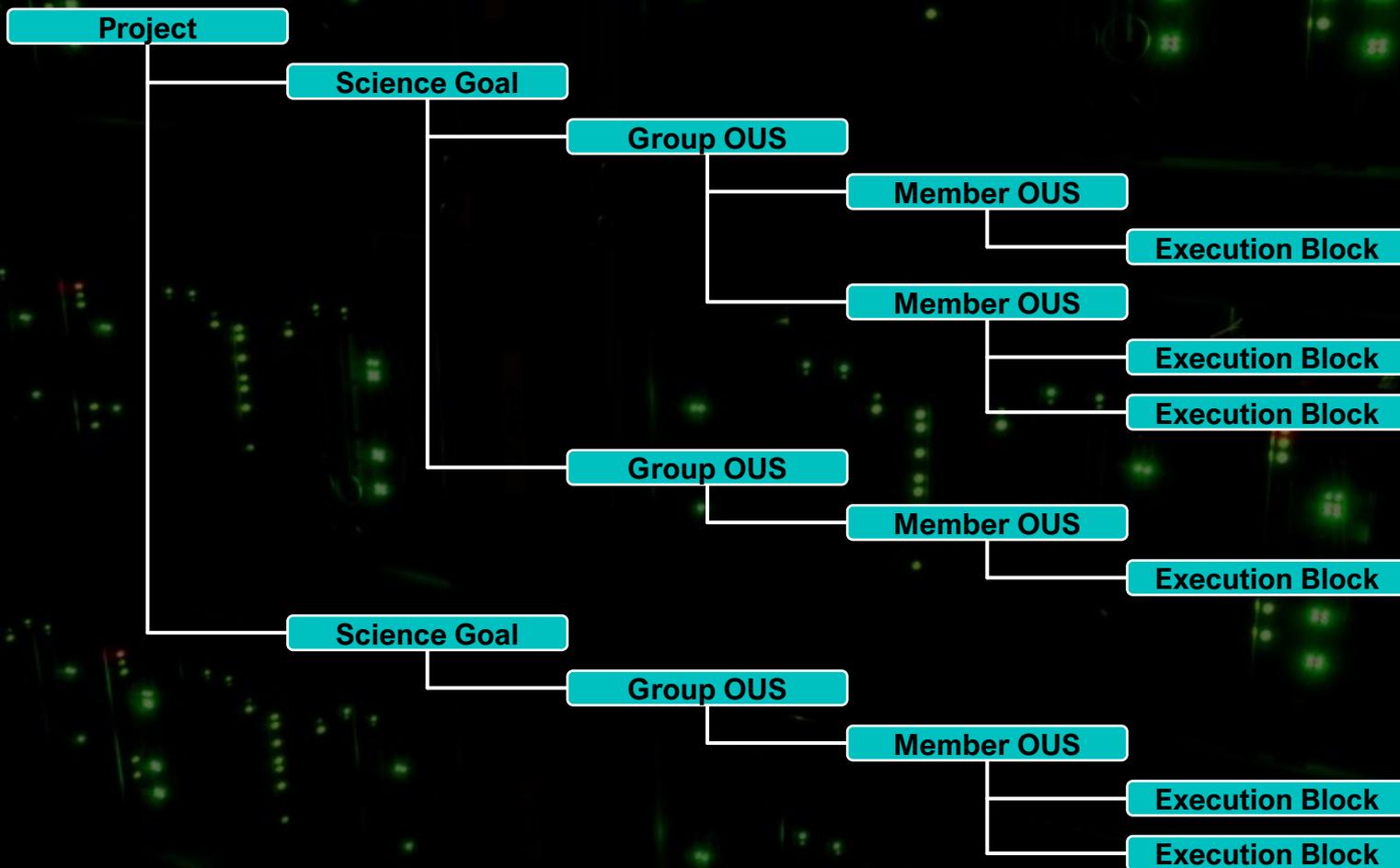
Archive content

George Bendo and Marcella Massardi

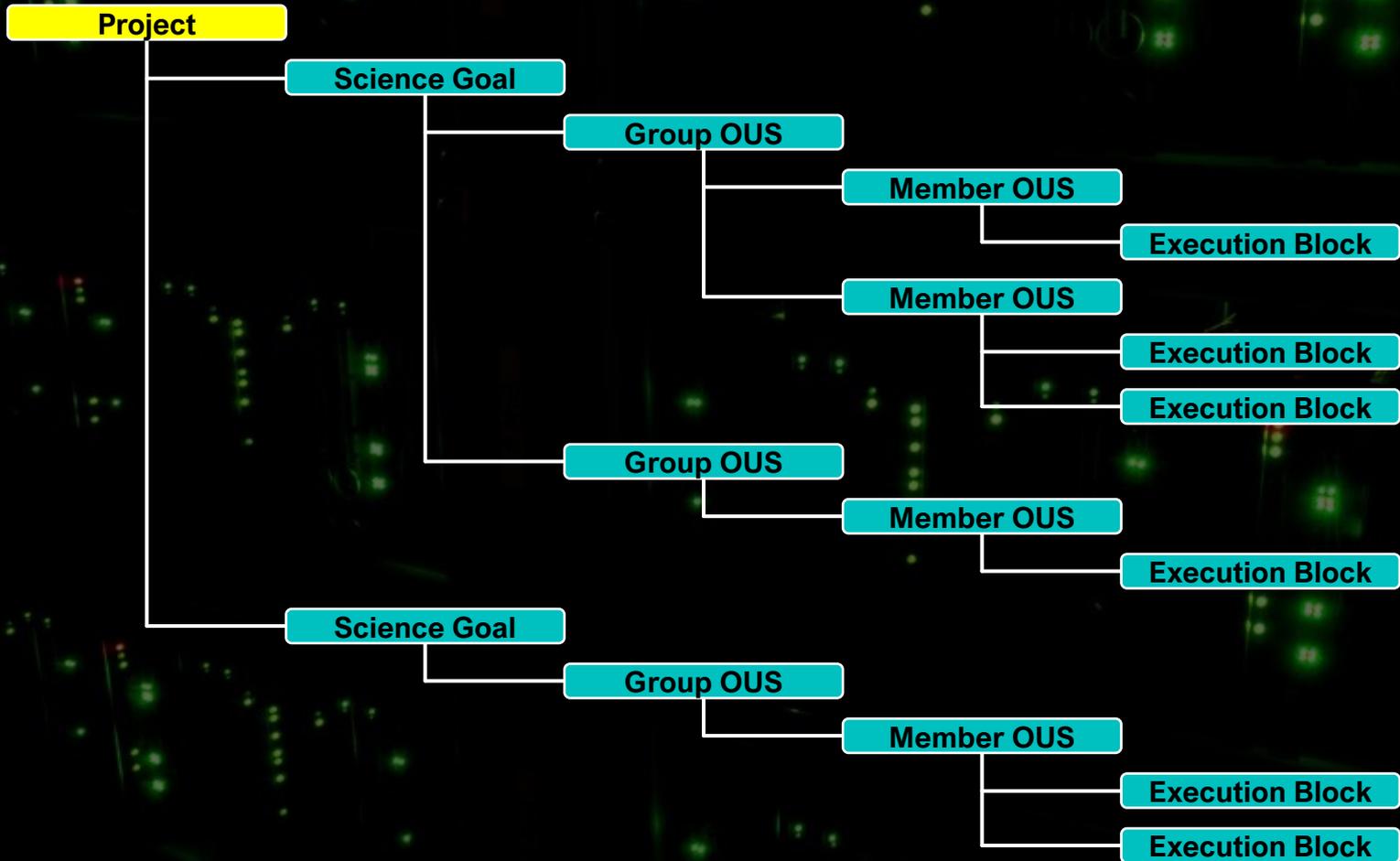
ALMA Science Archive School
Italian ARC node headquarters
05-07 October 2022



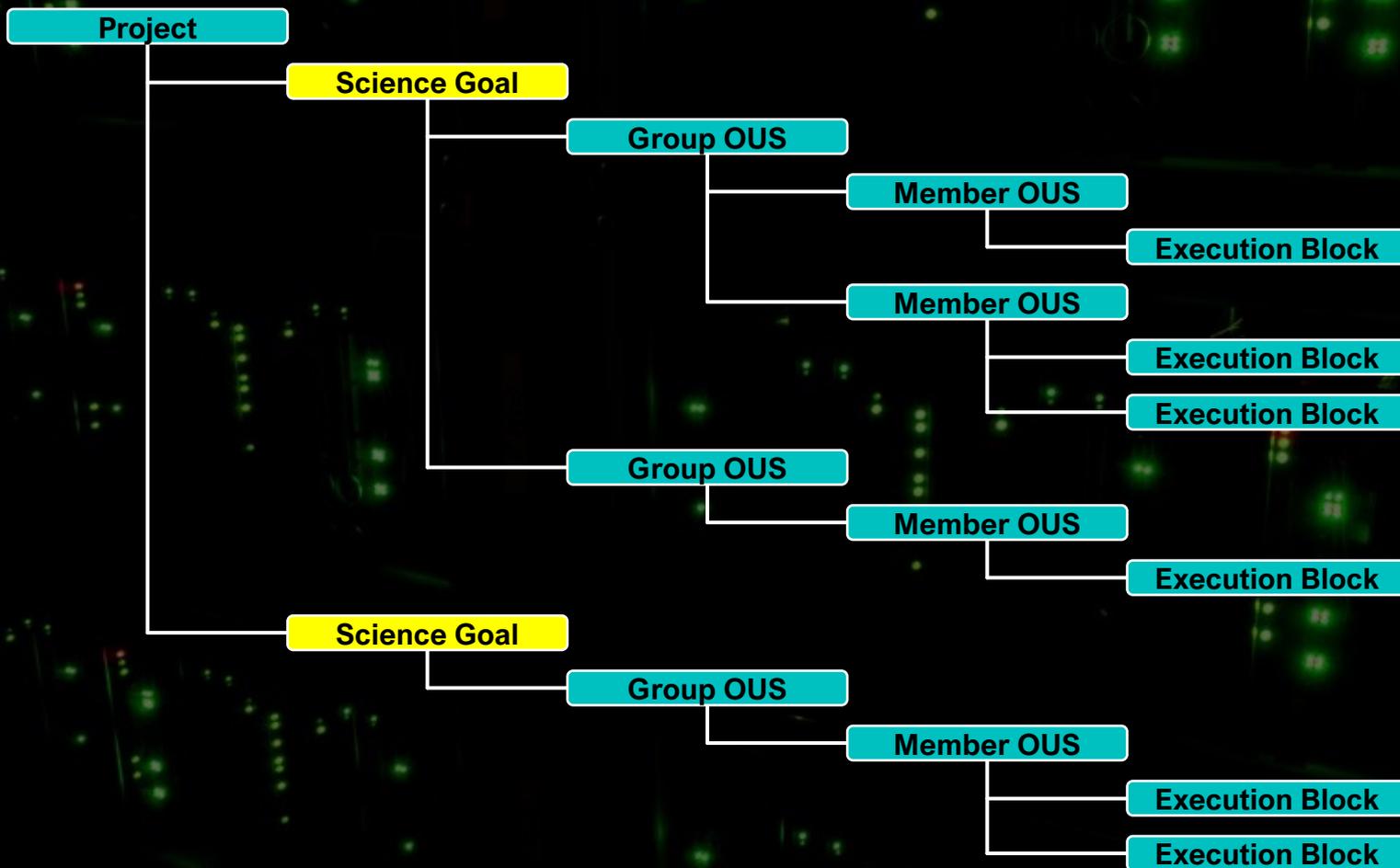
ALMA data in the archive (as well as downloaded ALMA data) are generally organized into the following structure.



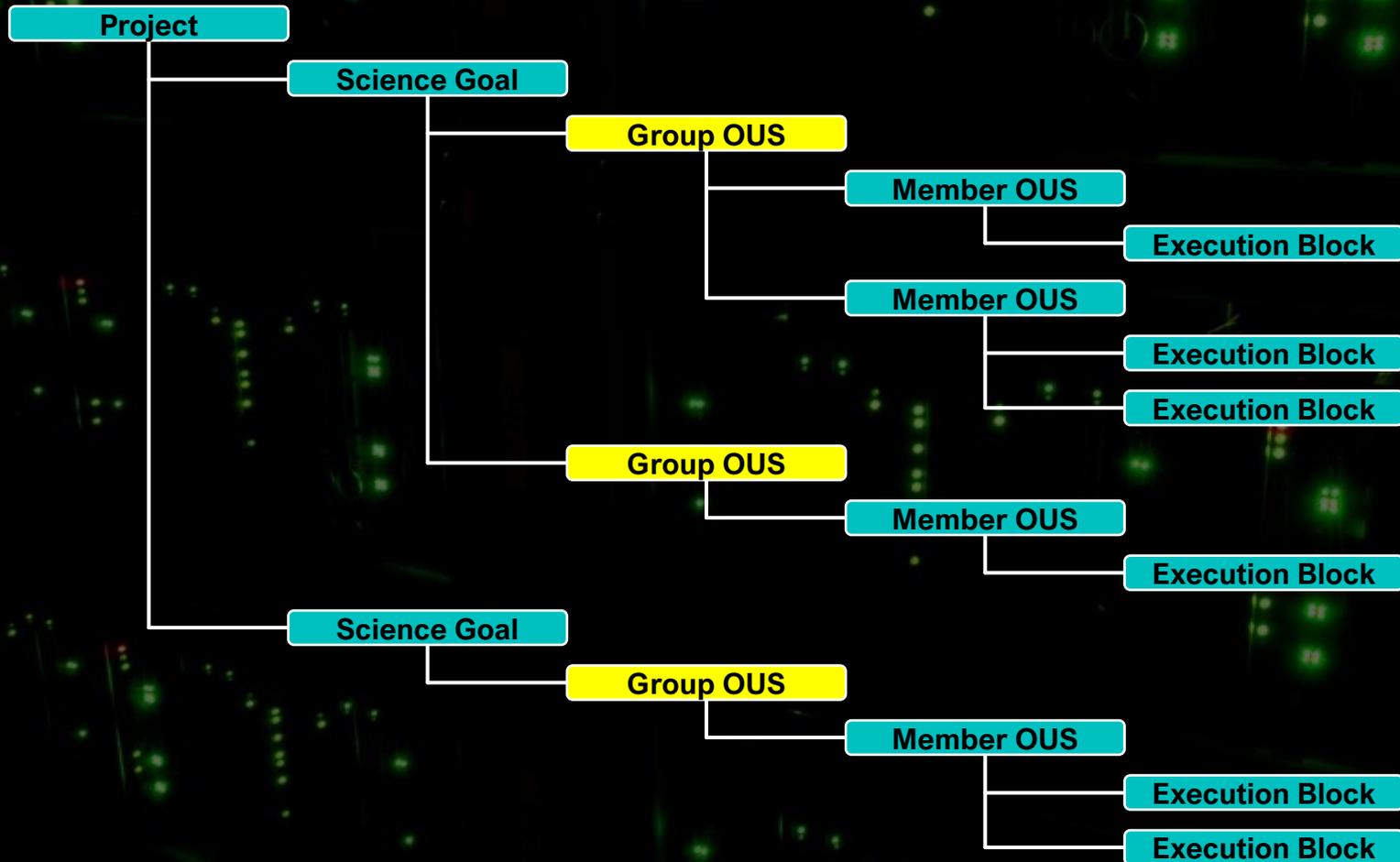
Project - All observations associated with a specific proposal.



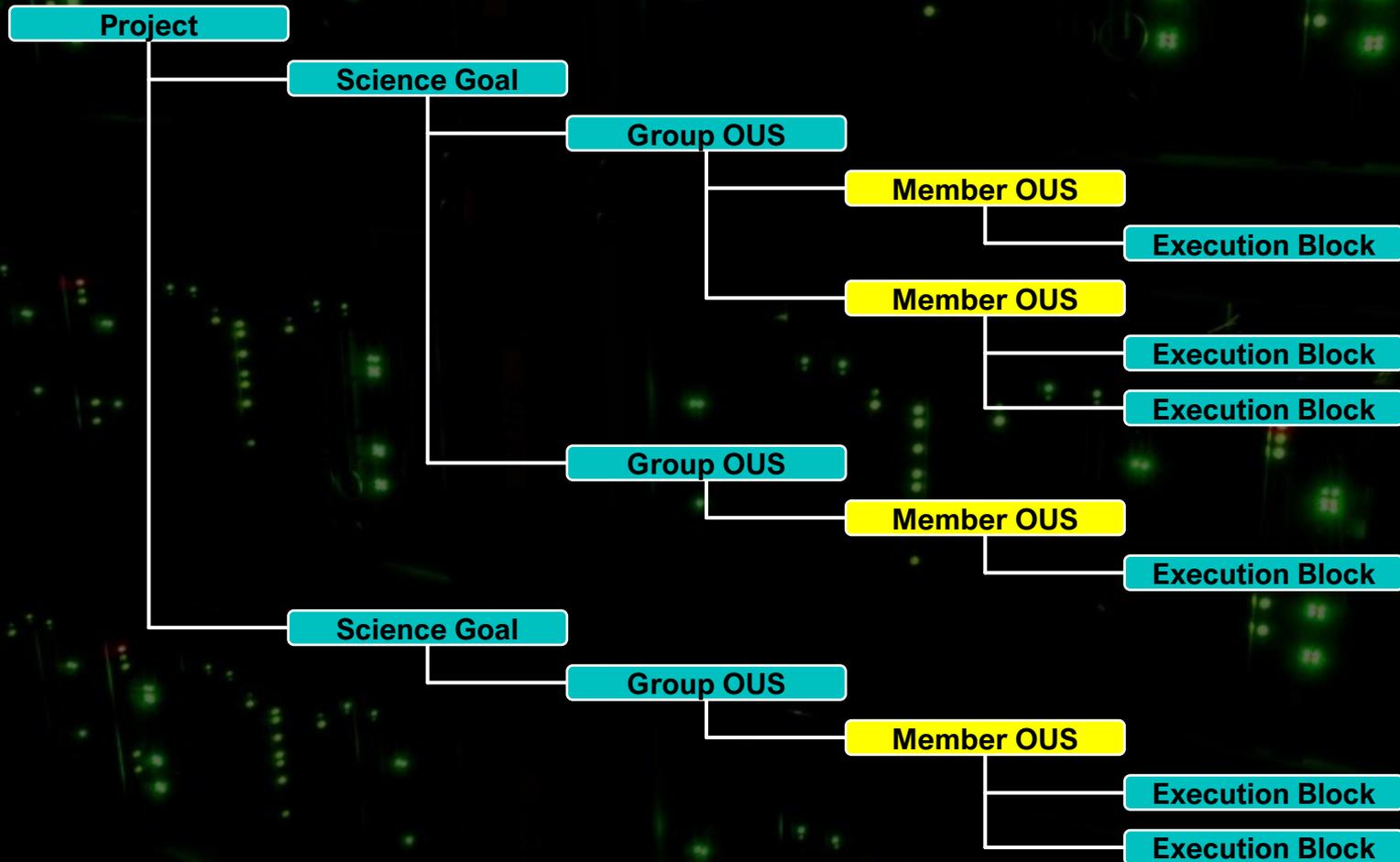
Science Goal OUS - All observations associated with a specific science goal in that proposal.



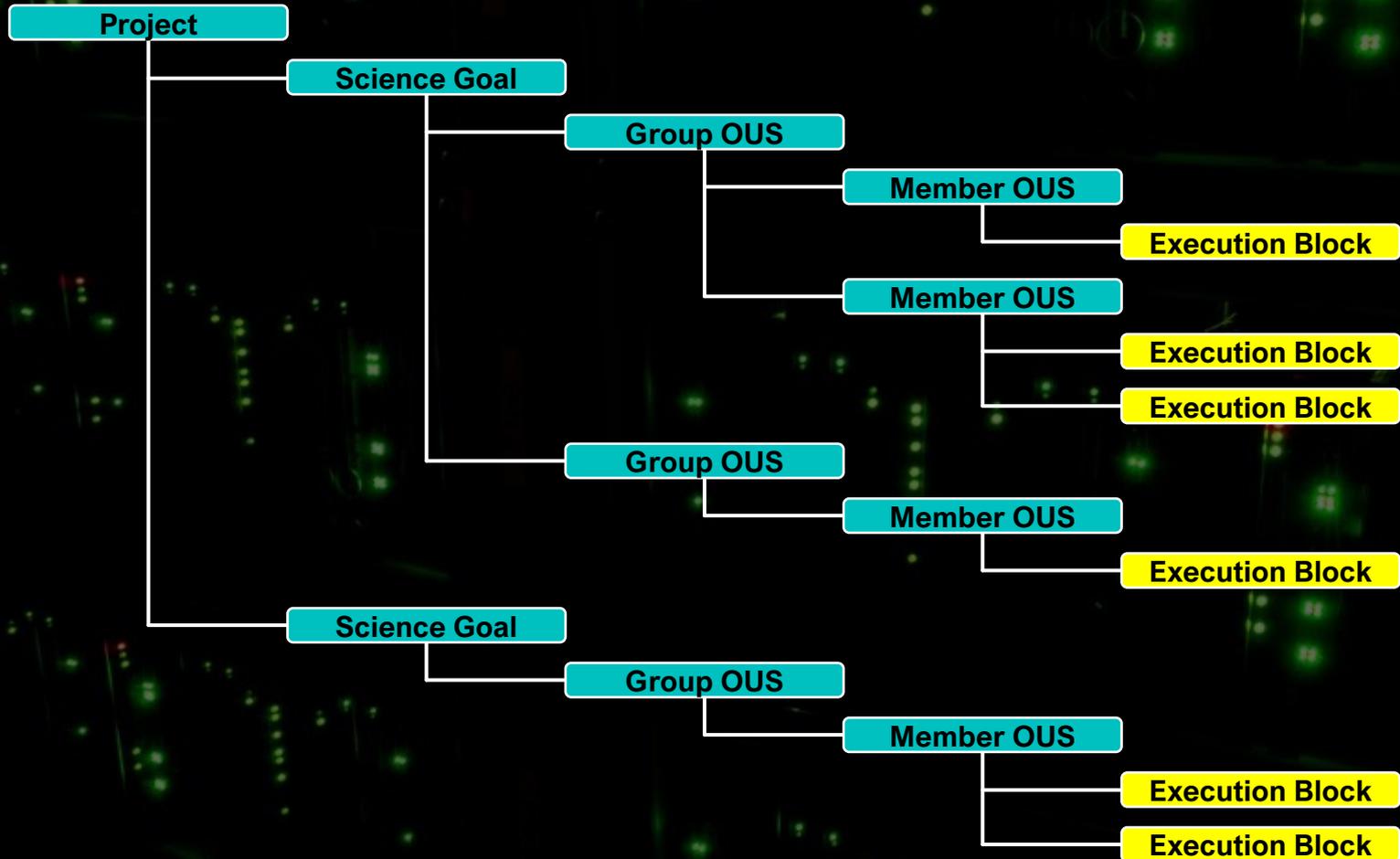
Group OUS – Associated observations within a Science Goal (e.g., observations of the same fields with the same spectral tunings but with different arrays or array configurations).



Member OUS – A specific set of observations of the same fields using the same tunings and array or array configuration.



Execution block – An individual “unit” of the observations needed for a Member OUS.



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

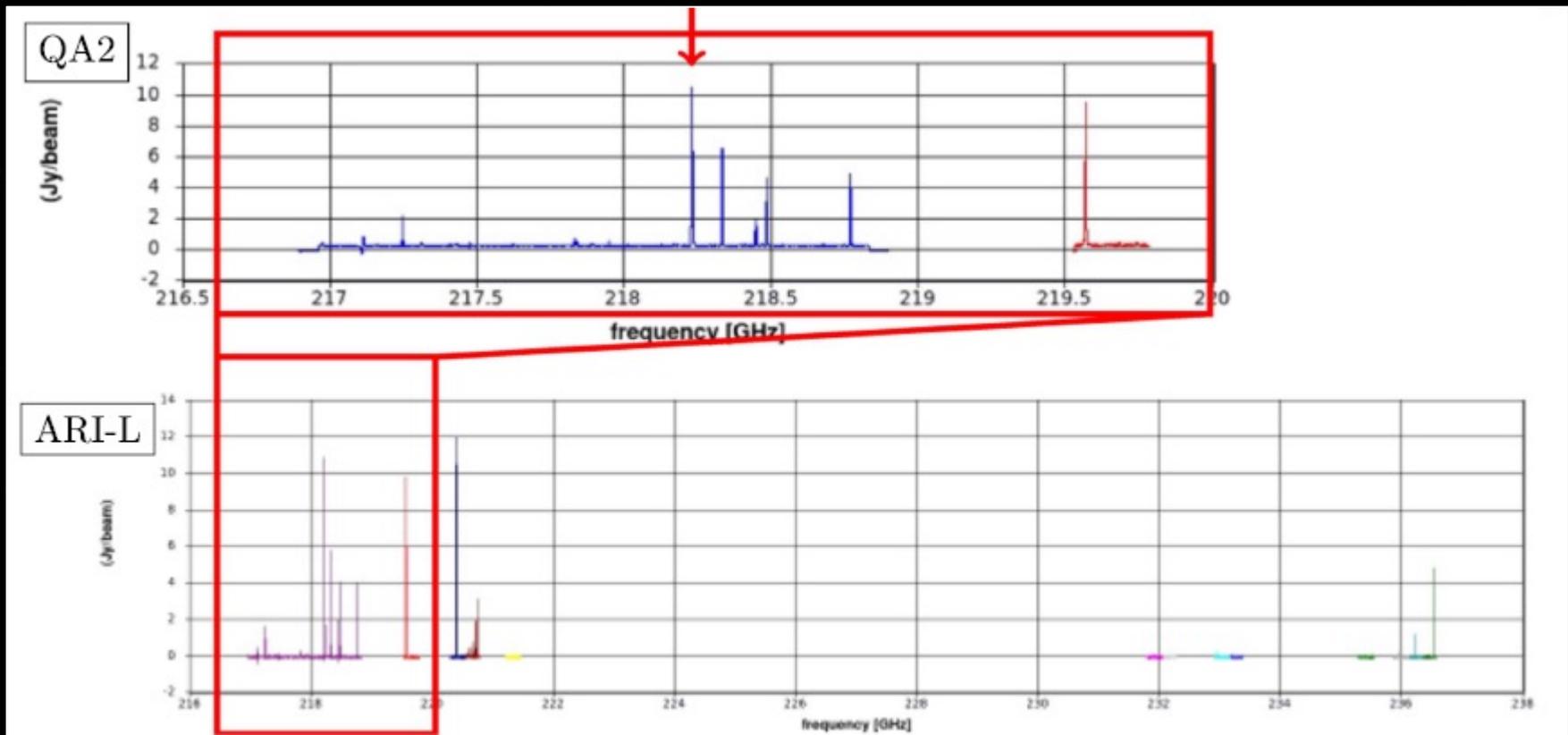
external Enhanced data products (including enhanced images or visibility data) created after the data delivery

Currently, two forms of external data products are available from the archive:

Large Program data products – Enhanced data from Large Programs

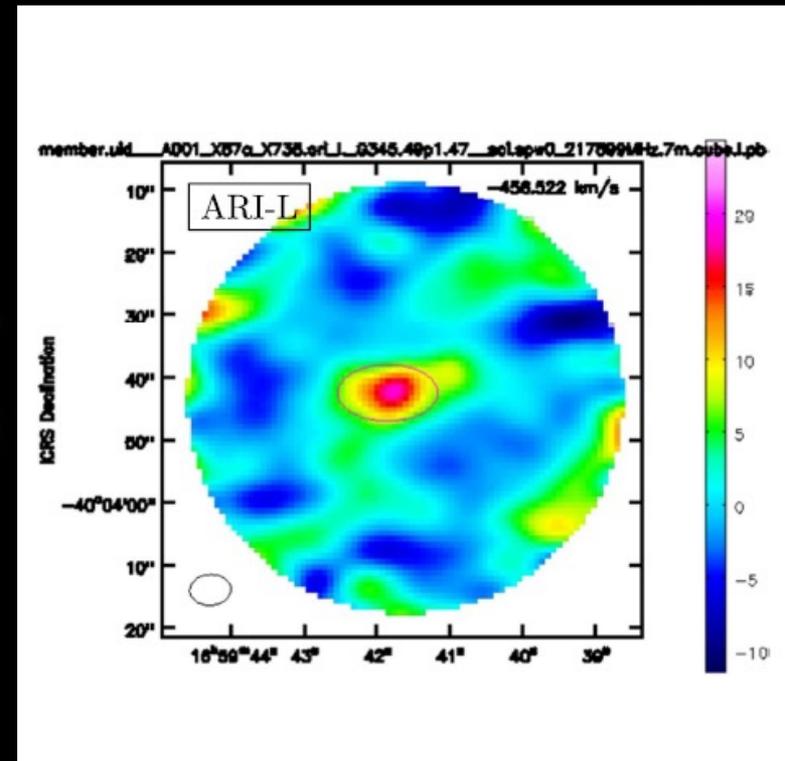
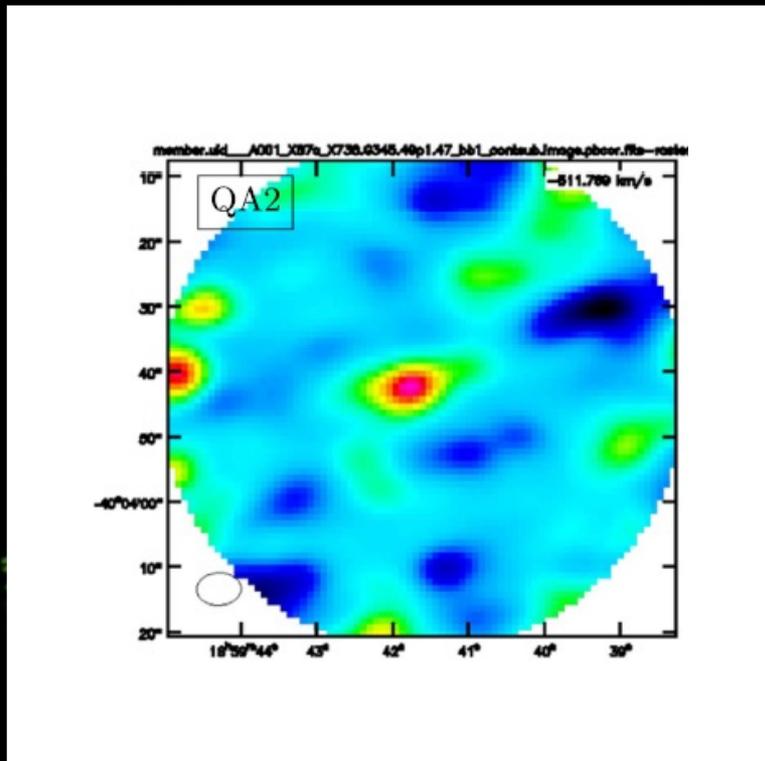
ARI-L data products – Data from Cycles 2-4 reprocessed using the CASA pipeline

ARI-L (the Additional Representative Images for Legacy) is an ALMA Development Project (PI: Massardi) that restored the ALMA calibration and performed imaging with the ALMA Pipeline. This was applied to data from Cycles 2-4 that lacked pipeline-processed data with representative images comparable to those of later cycles.



Old (**QA2**) versus new (**ARI-L**) data.

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Old (**QA2**) versus new (**ARI-L**) data.

Details about ARI-L:

- The data are generally available for Cycles 2, 3, 4 (Project Codes 2013*, 2015*, 2016*).
- The image products use native spectral resolution and Briggs 0.5 weighting.
- The images are included in the archive previews and visualization.
- The data can be queried as the collection “ari_l”.
- The files can be downloaded as external data products.
- The data for each pipeline processable MOUS include (for each source and calibrator):
 - Aggregate continuum image.
 - Images of the mfs continuum for each spectral window.
 - Cubes for each spw.

ARI-L statistics:

- 18 people
- 3.5 years
- 2649 MOUSs processed
- 411 652 files ingested into the ASA
- 126 302 090 channels imaged and available from the ASA

Website: <https://almascience.eso.org/alma-data/aril>

Acknowledgment: Massardi et al., 2021, PASP, 133, 085001
([2021PASP.133h5001M](#))

Most data that are delivered to the archive have passed ALMA's quality assurance steps. However, some data may be available from the archive that are labelled as Semi-pass.

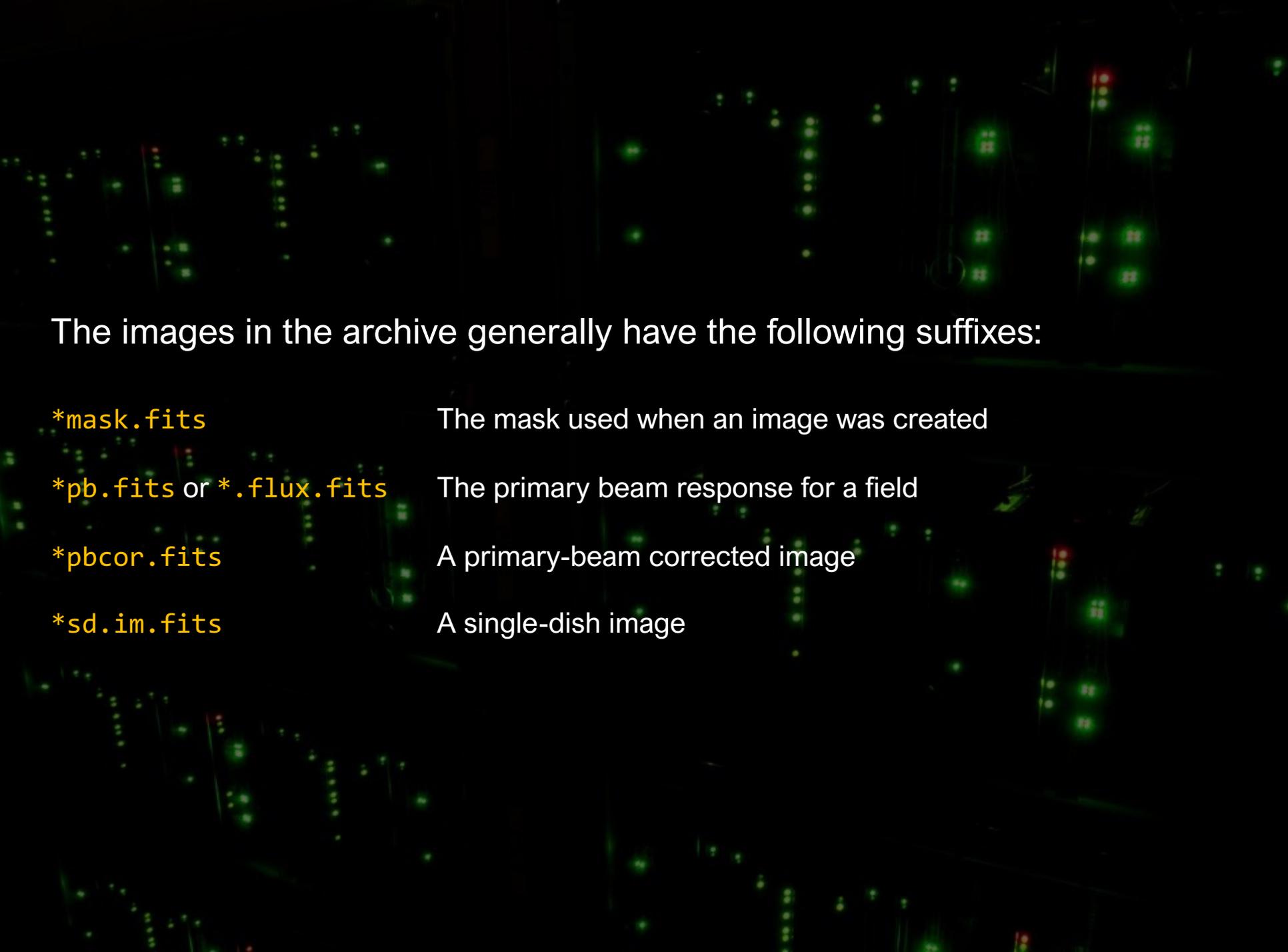
QA0 Semi-pass – The observations were not used to create the final images (because, for example, the observations are missing calibration observations, or the science target observations were not completed).

QA2 Semi-pass – The observations are complete but did not meet the science requirements in the proposal (e.g., the sensitivity goals or beam size requirements).

These data are still potentially usable for science, albeit with some limitations.

Data from different ALMA cycles were produced differently and therefore may have different characteristics.

- **Cycle 0 (2011)** data are in a different format from other data, and the directory structure is different from other cycles.
- Data from **Cycles 1-2 (2012, 2013)** are in an older format that is missing some keywords and where the visibility weighting may be different, which will cause problems if the data are combined with data from later cycles.
- Data from **Cycles 0-4 (2011-2016)** were generally processed manually before being uploaded to the archive, while data from **Cycles 5 and later (2017 and later)** were pipeline processed.



The images in the archive generally have the following suffixes:

`*mask.fits` The mask used when an image was created

`*pb.fits` or `*.flux.fits` The primary beam response for a field

`*pbcor.fits` A primary-beam corrected image

`*sd.im.fits` A single-dish image

Additional parts of the filenames indicate the following:

- `*mfs.A.*` or `*mfs.POLA*` A polarization angle map
- `*.mfs.P.*` or `*mfs.POLI*` A linear polarization intensity map
- `*spw##.cube.I.*` A spectral image cube of a single spectral window
- `*spw##.mfs.I.*` A continuum image for a single spectral window
- `*spw##_##_##_#.cont.I.*` An aggregate bandwidth or continuum image
- `*spw##_##_##_#.cont.I.alpha.*` A spectral index image
- `*spw##_##_##_#.cont.I.tt0.*` An image containing the zeroth Taylor term for a continuum image
- `*spw##_##_##_#.cont.I.tt1.*` An image containing the first Taylor term for a continuum image
- `*spw##_##_##_#.cont.IQUV.*` An aggregate bandwidth or continuum full Stokes cube

After selecting data, click on the download button at the top right of the screen to initiate a download.

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=observations&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 field of view (FOV). The right panel shows a spectral plot with frequency on the x-axis (100 GHz to 250 GHz) and intensity on the y-axis. Several spectral lines are labeled with their corresponding molecules and transitions, such as HCO+ v=0-0, H13CS(3,2), CO v=0-0, CH3OH v=0-0, N2H+ v=0-0, and HCN v=0-0. A yellow arrow points to the "Explore and download" button in the top right corner. Below the spectral plot, there 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, Mosaic, Max. reco. scale, FOV, and Scientist. The table contains 11 rows of data, with the 8th 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	Scientist
		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	215.87-232.628 GHz	2018-02-04	3	0.181	0.159	12m	1.785	25.966	Dist
<input type="checkbox"/>	2016.2.00168.S	z_cma	07:03:43.159	-11:33:06.185	6	0.2337	215.806-232.689 GHz	2018-10-09	1	5.006	0.159	7m	30.375	44.514	Dist
<input type="checkbox"/>	2016.1.00110.S	Z_CMa	07:03:43.159	-11:33:06.185	6	0.0200	215.87-232.624 GHz	2018-11-10	3	0.050	0.159	12m	1.142	25.967	Dist
<input type="checkbox"/>	2018.1.01191.S	Z_CMa	07:03:43.159	-11:33:06.184	6	0.8332	217.107-233.537 GHz	2020-01-04	2	5.238	0.183	7m	33.011	44.302	ISM
<input type="checkbox"/>	2018.1.01191.S	Z_CMa	07:03:43.159	-11:33:06.183	6	0.9149	250.907-268.098 GHz	2020-02-21	2	4.418	0.634	7m	25.770	38.467	ISM
<input checked="" type="checkbox"/>	2018.1.01191.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.0732	217.109-233.471 GHz	2020-08-24	2	0.996	0.183	12m	9.571	25.846	ISM
<input type="checkbox"/>	2018.1.01191.S	Z_CMa	07:03:43.158	-11:33:06.183	6	0.3774	250.907-268.098 GHz	2020-08-24	2	20.255	0.634	TP	359.023	22.439	ISM
<input type="checkbox"/>	2018.1.01191.S	Z_CMa	07:03:43.158	-11:33:06.182	6	0.0738	250.969-268.067 GHz	2020-08-26	2	0.399	0.634	12m	5.273	22.438	ISM
<input type="checkbox"/>	2018.1.00814.S	ZCMA	07:03:43.200	-11:33:06.700	6	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m	1.853	25.822	Dist

The updated version of the download interface will appear as an inset window containing solely files related to the selected dataset. (Note that the download interface has recently undergone significant changes.)

The screenshot displays the ALMA Science Archive website. A central white download window is overlaid on the main interface. The background shows a table of observations and a spectral plot on the right.

Download Window Content:

- Buttons:** Download, Explore and download in legacy system
- Selected Sources:** MOUS (156), GOUS (312)
- File name:** [input field]
- Sort by:** File Name
- Display only:** [dropdown]
- Quick select:** [dropdown]
- Item 1:**
 - Project: 2018.1.01131.S Science Goal: uid://A001/X135b/X60 Group OUS: uid://A001/X135b/X68 Member OUS: uid://A001/X135b/X6b
 - member.uid: A001_X135b_X6b_Z_CMa_sci.spw45.mfs.l.pbcor.fits 253 KB
 - Band: 6
 - Frequency range: 231.6..233.471
 - Frequency resolution: 3,904.297 kHz
 - Continuum sensitivity: 1.846
 - Line sensitivity 10km/s (estimate): 1.31 mJy/beam@10km/s
 - Line sensitivity native (estimate): 0.084 uJy/beam@native
 - Polarizations: XX YY
 - Array: 12m
- Item 2:**
 - Project: 2018.1.01131.S Science Goal: uid://A001/X135b/X60 Group OUS: uid://A001/X135b/X68 Member OUS: uid://A001/X135b/X6b
 - member.uid: A001_X135b_X6b_Z_CMa_sci.spw45.cube.l.pbcor.fits 114 MB
 - Band: 6
 - Frequency range: 231.6..233.471
 - Frequency resolution: 3,904.297 kHz
 - Continuum sensitivity: 1.846
 - Line sensitivity 10km/s (estimate): 1.31 mJy/beam@10km/s
 - Line sensitivity native (estimate): 0.084 uJy/beam@native
 - Polarizations: XX YY
 - Array: 12m
- Item 3:**
 - Project: 2018.1.01131.S Science Goal: uid://A001/X135b/X60 Group OUS: uid://A001/X135b/X68 Member OUS: uid://A001/X135b/X6b
 - member.uid: A001_X135b_X6b_Z_CMa_sci.spw43.mfs.l.pbcor.fits 253 KB
 - Band: 6
 - Frequency range: 231.197..231.314
 - Frequency resolution: 141.113 kHz
 - Continuum sensitivity: 11.204

Background Table (Observations):

Project code	ALMA source name	Start time	Stop time	Frequency	Array	FOV	Scientist					
2016.1.00110.S	Z_CMa	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2016.2.00168.S	z_cma	07:03:43.164	-11:33:06.222	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2016.1.00110.S	Z_CMa	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2018.1.01131.S	Z_CMa	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2018.1.01131.S	Z_CMa	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2018.1.01131.S	Z_CMa	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2018.1.01131.S	Z_CMa	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2018.1.01131.S	Z_CMa	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		
2018.1.00814.S	ZCMA	07:03:43.200	-11:33:06.700	0.0371	216.576-234.437 GHz	2020-12-27	3	0.115	0.159	12m		

Spectral Plot (Right):

- Redshift: 0 (estimated)
- Frequency range: 175 GHz to 250 GHz
- Line labels: NH₂ v=0-1(2-1), CH_{3OH} v=0-0(8-4)-30(31)+, H₂CO v=0-0(3-2), CH_{3OH} v=0-0(3-2)-1(-5)-2(2-1)-2(2-1)2, SO S(4-3), CH_{3OH} v=0-0(8-4)-30(31)+, H₂CO v=0-0(3-2), NH₂ v=0-1(2-1), H₂CO v=0-0(3-2)
- Continuum levels: 9, 10

The default view will show the Selected Sources tab, which lists the images in the archive.

The screenshot displays the ALMA Science Archive web interface. A modal window is open, showing details for three selected sources. The background interface includes a search bar, a list of observations, and a spectral plot on the right.

Download **Explore and download in legacy system**

Selected Sources (23) MOUS (156) GOUS (312)

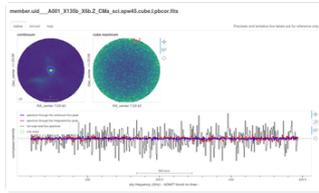
File name: Sort by: File Name Display only: Quick select:

Project: 2018.1.01131.S **Science Goal:** uid://A001/X135b/x60 **Group OUS:** uid://A001/X135b/x68 **Member OUS:** uid://A001/X135b/x6b

[member.uid_A001_X135b_X6b_Z_CMa_sci.spw45.mfs.l.pbcor.fits](#) 253 KB

Band: 6
Frequency range: 231.6..233.471
Frequency resolution: 3,904.297 kHz
Continuum sensitivity: 1.846
Line sensitivity 10km/s (estimate): 1.31 mJy/beam@10km/s
Line sensitivity native (estimate): 0.084 uJy/beam@native
Polarizations: XX YY
Array: 12m

Project: 2018.1.01131.S **Science Goal:** uid://A001/X135b/x60 **Group OUS:** uid://A001/X135b/x68 **Member OUS:** uid://A001/X135b/x6b

 [member.uid_A001_X135b_X6b_Z_CMa_sci.spw45.cube.l.pbcor.fits](#) 114 MB

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Line sensitivity native (estimate): 0.084 uJy/beam@native
Polarizations: XX YY
Array: 12m

Project: 2018.1.01131.S **Science Goal:** uid://A001/X135b/x60 **Group OUS:** uid://A001/X135b/x68 **Member OUS:** uid://A001/X135b/x6b

[member.uid_A001_X135b_X6b_Z_CMa_sci.spw45.mfs.l.pbcor.fits](#) 253 KB

Band: 6
Frequency range: 231.197..231.314
Frequency resolution: 141.113 kHz
Continuum sensitivity: 11.204

Background interface elements:
- Search bar: Source name: Z_CMa
- Observations table: Project code, ALMA source name, observation ID, status icons.
- Spectral plot: Redshift 0, estimated. Frequency range 175 GHz to 230 GHz. Labels for various lines: NH₂ v=0-0 (1,2-1), NH₂ v=0-0 (2,1-1), NH₂ v=0-0 (3,0-2,0), NH₂ v=0-0 (4,0-3,0), NH₂ v=0-0 (5,0-4,0), NH₂ v=0-0 (6,0-5,0), NH₂ v=0-0 (7,0-6,0), NH₂ v=0-0 (8,0-7,0), NH₂ v=0-0 (9,0-8,0), NH₂ v=0-0 (10,0-9,0), NH₂ v=0-0 (11,0-10,0), NH₂ v=0-0 (12,0-11,0), NH₂ v=0-0 (13,0-12,0), NH₂ v=0-0 (14,0-13,0), NH₂ v=0-0 (15,0-14,0), NH₂ v=0-0 (16,0-15,0), NH₂ v=0-0 (17,0-16,0), NH₂ v=0-0 (18,0-17,0), NH₂ v=0-0 (19,0-18,0), NH₂ v=0-0 (20,0-19,0), NH₂ v=0-0 (21,0-20,0), NH₂ v=0-0 (22,0-21,0), NH₂ v=0-0 (23,0-22,0), NH₂ v=0-0 (24,0-23,0), NH₂ v=0-0 (25,0-24,0), NH₂ v=0-0 (26,0-25,0), NH₂ v=0-0 (27,0-26,0), NH₂ v=0-0 (28,0-27,0), NH₂ v=0-0 (29,0-28,0), NH₂ v=0-0 (30,0-29,0), NH₂ v=0-0 (31,0-30,0), NH₂ v=0-0 (32,0-31,0), NH₂ v=0-0 (33,0-32,0), NH₂ v=0-0 (34,0-33,0), NH₂ v=0-0 (35,0-34,0), NH₂ v=0-0 (36,0-35,0), NH₂ v=0-0 (37,0-36,0), NH₂ v=0-0 (38,0-37,0), NH₂ v=0-0 (39,0-38,0), NH₂ v=0-0 (40,0-39,0), NH₂ v=0-0 (41,0-40,0), NH₂ v=0-0 (42,0-41,0), NH₂ v=0-0 (43,0-42,0), NH₂ v=0-0 (44,0-43,0), NH₂ v=0-0 (45,0-44,0), NH₂ v=0-0 (46,0-45,0), NH₂ v=0-0 (47,0-46,0), NH₂ v=0-0 (48,0-47,0), NH₂ v=0-0 (49,0-48,0), NH₂ v=0-0 (50,0-49,0), NH₂ v=0-0 (51,0-50,0), NH₂ v=0-0 (52,0-51,0), NH₂ v=0-0 (53,0-52,0), NH₂ v=0-0 (54,0-53,0), NH₂ v=0-0 (55,0-54,0), NH₂ v=0-0 (56,0-55,0), NH₂ v=0-0 (57,0-56,0), NH₂ v=0-0 (58,0-57,0), NH₂ v=0-0 (59,0-58,0), NH₂ v=0-0 (60,0-59,0), NH₂ v=0-0 (61,0-60,0), NH₂ v=0-0 (62,0-61,0), NH₂ v=0-0 (63,0-62,0), NH₂ v=0-0 (64,0-63,0), NH₂ v=0-0 (65,0-64,0), NH₂ v=0-0 (66,0-65,0), NH₂ v=0-0 (67,0-66,0), NH₂ v=0-0 (68,0-67,0), NH₂ v=0-0 (69,0-68,0), NH₂ v=0-0 (70,0-69,0), NH₂ v=0-0 (71,0-70,0), NH₂ v=0-0 (72,0-71,0), NH₂ v=0-0 (73,0-72,0), NH₂ v=0-0 (74,0-73,0), NH₂ v=0-0 (75,0-74,0), NH₂ v=0-0 (76,0-75,0), NH₂ v=0-0 (77,0-76,0), NH₂ v=0-0 (78,0-77,0), NH₂ v=0-0 (79,0-78,0), NH₂ v=0-0 (80,0-79,0), NH₂ v=0-0 (81,0-80,0), NH₂ v=0-0 (82,0-81,0), NH₂ v=0-0 (83,0-82,0), NH₂ v=0-0 (84,0-83,0), NH₂ v=0-0 (85,0-84,0), NH₂ v=0-0 (86,0-85,0), NH₂ v=0-0 (87,0-86,0), NH₂ v=0-0 (88,0-87,0), NH₂ v=0-0 (89,0-88,0), NH₂ v=0-0 (90,0-89,0), NH₂ v=0-0 (91,0-90,0), NH₂ v=0-0 (92,0-91,0), NH₂ v=0-0 (93,0-92,0), NH₂ v=0-0 (94,0-93,0), NH₂ v=0-0 (95,0-94,0), NH₂ v=0-0 (96,0-95,0), NH₂ v=0-0 (97,0-96,0), NH₂ v=0-0 (98,0-97,0), NH₂ v=0-0 (99,0-98,0), NH₂ v=0-0 (100,0-99,0), NH₂ v=0-0 (101,0-100,0), NH₂ v=0-0 (102,0-101,0), NH₂ v=0-0 (103,0-102,0), NH₂ v=0-0 (104,0-103,0), NH₂ v=0-0 (105,0-104,0), NH₂ v=0-0 (106,0-105,0), NH₂ v=0-0 (107,0-106,0), NH₂ v=0-0 (108,0-107,0), NH₂ v=0-0 (109,0-108,0), NH₂ v=0-0 (110,0-109,0), NH₂ v=0-0 (111,0-110,0), NH₂ v=0-0 (112,0-111,0), NH₂ v=0-0 (113,0-112,0), NH₂ v=0-0 (114,0-113,0), NH₂ v=0-0 (115,0-114,0), NH₂ v=0-0 (116,0-115,0), NH₂ v=0-0 (117,0-116,0), NH₂ v=0-0 (118,0-117,0), NH₂ v=0-0 (119,0-118,0), NH₂ v=0-0 (120,0-119,0), NH₂ v=0-0 (121,0-120,0), NH₂ v=0-0 (122,0-121,0), NH₂ v=0-0 (123,0-122,0), NH₂ v=0-0 (124,0-123,0), NH₂ v=0-0 (125,0-124,0), NH₂ v=0-0 (126,0-125,0), NH₂ v=0-0 (127,0-126,0), NH₂ v=0-0 (128,0-127,0), NH₂ v=0-0 (129,0-128,0), NH₂ v=0-0 (130,0-129,0), NH₂ v=0-0 (131,0-130,0), NH₂ v=0-0 (132,0-131,0), NH₂ v=0-0 (133,0-132,0), NH₂ v=0-0 (134,0-133,0), NH₂ v=0-0 (135,0-134,0), NH₂ v=0-0 (136,0-135,0), NH₂ v=0-0 (137,0-136,0), NH₂ v=0-0 (138,0-137,0), NH₂ v=0-0 (139,0-138,0), NH₂ v=0-0 (140,0-139,0), NH₂ v=0-0 (141,0-140,0), NH₂ v=0-0 (142,0-141,0), NH₂ v=0-0 (143,0-142,0), NH₂ v=0-0 (144,0-143,0), NH₂ v=0-0 (145,0-144,0), NH₂ v=0-0 (146,0-145,0), NH₂ v=0-0 (147,0-146,0), NH₂ v=0-0 (148,0-147,0), NH₂ v=0-0 (149,0-148,0), NH₂ v=0-0 (150,0-149,0), NH₂ v=0-0 (151,0-150,0), NH₂ v=0-0 (152,0-151,0), NH₂ v=0-0 (153,0-152,0), NH₂ v=0-0 (154,0-153,0), NH₂ v=0-0 (155,0-154,0), NH₂ v=0-0 (156,0-155,0), NH₂ v=0-0 (157,0-156,0), NH₂ v=0-0 (158,0-157,0), NH₂ v=0-0 (159,0-158,0), NH₂ v=0-0 (160,0-159,0), NH₂ v=0-0 (161,0-160,0), NH₂ v=0-0 (162,0-161,0), NH₂ v=0-0 (163,0-162,0), NH₂ v=0-0 (164,0-163,0), NH₂ v=0-0 (165,0-164,0), NH₂ v=0-0 (166,0-165,0), NH₂ v=0-0 (167,0-166,0), NH₂ v=0-0 (168,0-167,0), NH₂ v=0-0 (169,0-168,0), NH₂ v=0-0 (170,0-169,0), NH₂ v=0-0 (171,0-170,0), NH₂ v=0-0 (172,0-171,0), NH₂ v=0-0 (173,0-172,0), NH₂ v=0-0 (174,0-173,0), NH₂ v=0-0 (175,0-174,0), NH₂ v=0-0 (176,0-175,0), NH₂ v=0-0 (177,0-176,0), NH₂ v=0-0 (178,0-177,0), NH₂ v=0-0 (179,0-178,0), NH₂ v=0-0 (180,0-179,0), NH₂ v=0-0 (181,0-180,0), NH₂ v=0-0 (182,0-181,0), NH₂ v=0-0 (183,0-182,0), NH₂ v=0-0 (184,0-183,0), NH₂ v=0-0 (185,0-184,0), NH₂ v=0-0 (186,0-185,0), NH₂ v=0-0 (187,0-186,0), NH₂ v=0-0 (188,0-187,0), NH₂ v=0-0 (189,0-188,0), NH₂ v=0-0 (190,0-189,0), NH₂ v=0-0 (191,0-190,0), NH₂ v=0-0 (192,0-191,0), NH₂ v=0-0 (193,0-192,0), NH₂ v=0-0 (194,0-193,0), NH₂ v=0-0 (195,0-194,0), NH₂ v=0-0 (196,0-195,0), NH₂ v=0-0 (197,0-196,0), NH₂ v=0-0 (198,0-197,0), NH₂ v=0-0 (199,0-198,0), NH₂ v=0-0 (200,0-199,0), NH₂ v=0-0 (201,0-200,0), NH₂ v=0-0 (202,0-201,0), NH₂ v=0-0 (203,0-202,0), NH₂ v=0-0 (204,0-203,0), NH₂ v=0-0 (205,0-204,0), NH₂ v=0-0 (206,0-205,0), NH₂ v=0-0 (207,0-206,0), NH₂ v=0-0 (208,0-207,0), NH₂ v=0-0 (209,0-208,0), NH₂ v=0-0 (210,0-209,0), NH₂ v=0-0 (211,0-210,0), NH₂ v=0-0 (212,0-211,0), NH₂ v=0-0 (213,0-212,0), NH₂ v=0-0 (214,0-213,0), NH₂ v=0-0 (215,0-214,0), NH₂ v=0-0 (216,0-215,0), NH₂ v=0-0 (217,0-216,0), NH₂ v=0-0 (218,0-217,0), NH₂ v=0-0 (219,0-218,0), NH₂ v=0-0 (220,0-219,0), NH₂ v=0-0 (221,0-220,0), NH₂ v=0-0 (222,0-221,0), NH₂ v=0-0 (223,0-222,0), NH₂ v=0-0 (224,0-223,0), NH₂ v=0-0 (225,0-224,0), NH₂ v=0-0 (226,0-225,0), NH₂ v=0-0 (227,0-226,0), NH₂ v=0-0 (228,0-227,0), NH₂ v=0-0 (229,0-228,0), NH₂ v=0-0 (230,0-229,0), NH₂ v=0-0 (231,0-230,0), NH₂ v=0-0 (232,0-231,0), NH₂ v=0-0 (233,0-232,0), NH₂ v=0-0 (234,0-233,0), NH₂ v=0-0 (235,0-234,0), NH₂ v=0-0 (236,0-235,0), NH₂ v=0-0 (237,0-236,0), NH₂ v=0-0 (238,0-237,0), NH₂ v=0-0 (239,0-238,0), NH₂ v=0-0 (240,0-239,0), NH₂ v=0-0 (241,0-240,0), NH₂ v=0-0 (242,0-241,0), NH₂ v=0-0 (243,0-242,0), NH₂ v=0-0 (244,0-243,0), NH₂ v=0-0 (245,0-244,0), NH₂ v=0-0 (246,0-245,0), NH₂ v=0-0 (247,0-246,0), NH₂ v=0-0 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(288,0-287,0), NH₂ v=0-0 (289,0-288,0), NH₂ v=0-0 (290,0-289,0), NH₂ v=0-0 (291,0-290,0), NH₂ v=0-0 (292,0-291,0), NH₂ v=0-0 (293,0-292,0), NH₂ v=0-0 (294,0-293,0), NH₂ v=0-0 (295,0-294,0), NH₂ v=0-0 (296,0-295,0), NH₂ v=0-0 (297,0-296,0), NH₂ v=0-0 (298,0-297,0), NH₂ v=0-0 (299,0-298,0), NH₂ v=0-0 (300,0-299,0), NH₂ v=0-0 (301,0-300,0), NH₂ v=0-0 (302,0-301,0), NH₂ v=0-0 (303,0-302,0), NH₂ v=0-0 (304,0-303,0), NH₂ v=0-0 (305,0-304,0), NH₂ v=0-0 (306,0-305,0), NH₂ v=0-0 (307,0-306,0), NH₂ v=0-0 (308,0-307,0), NH₂ v=0-0 (309,0-308,0), NH₂ v=0-0 (310,0-309,0), NH₂ v=0-0 (311,0-310,0), NH₂ v=0-0 (312,0-311,0), NH₂ v=0-0 (313,0-312,0), NH₂ v=0-0 (314,0-313,0), NH₂ v=0-0 (315,0-314,0), NH₂ v=0-0 (316,0-315,0), NH₂ v=0-0 (317,0-316,0), NH₂ v=0-0 (318,0-317,0), NH₂ v=0-0 (319,0-318,0), NH₂ v=0-0 (320,0-319,0), NH₂ v=0-0 (321,0-320,0), NH₂ v=0-0 (322,0-321,0), NH₂ v=0-0 (323,0-322,0), NH₂ v=0-0 (324,0-323,0), NH₂ v=0-0 (325,0-324,0), NH₂ v=0-0 (326,0-325,0), NH₂ v=0-0 (327,0-326,0), NH₂ v=0-0 (328,0-327,0), NH₂ v=0-0 (329,0-328,0), NH₂ v=0-0 (330,0-329,0), NH₂ v=0-0 (331,0-330,0), NH₂ v=0-0 (332,0-331,0), NH₂ v=0-0 (333,0-332,0), NH₂ v=0-0 (334,0-333,0), NH₂ v=0-0 (335,0-334,0), NH₂ v=0-0 (336,0-335,0), NH₂ v=0-0 (337,0-336,0), NH₂ v=0-0 (338,0-337,0), NH₂ v=0-0 (339,0-338,0), NH₂ v=0-0 (340,0-339,0), NH₂ v=0-0 (341,0-340,0), NH₂ v=0-0 (342,0-341,0), NH₂ v=0-0 (343,0-342,0), NH₂ v=0-0 (344,0-343,0), NH₂ v=0-0 (345,0-344,0), NH₂ v=0-0 (346,0-345,0), NH₂ v=0-0 (347,0-346,0), NH₂ v=0-0 (348,0-347,0), NH₂ v=0-0 (349,0-348,0), NH₂ v=0-0 (350,0-349,0), NH₂ v=0-0 (351,0-350,0), NH₂ v=0-0 (352,0-351,0), NH₂ v=0-0 (353,0-352,0), NH₂ v=0-0 (354,0-353,0), NH₂ v=0-0 (355,0-354,0), NH₂ v=0-0 (356,0-355,0), NH₂ v=0-0 (357,0-356,0), NH₂ v=0-0 (358,0-357,0), NH₂ v=0-0 (359,0-358,0), NH₂ v=0-0 (360,0-359,0), NH₂ v=0-0 (361,0-360,0), NH₂ v=0-0 (362,0-361,0), NH₂ v=0-0 (363,0-362,0), NH₂ v=0-0 (364,0-363,0), NH₂ v=0-0 (365,0-364,0), NH₂ v=0-0 (366,0-365,0), NH₂ v=0-0 (367,0-366,0), NH₂ v=0-0 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Clicking on the MOUS tab will show the data within the individual Member OUS (or Scheduling Block). Clicking on the GOUS tab will show all files within a Group OUS.

The screenshot displays the ALMA Science Archive web interface. A modal window is open, allowing users to download files. The modal has a 'Download' button at the top left and an 'Explore and download in legacy system' button at the top right. Below these buttons, there are tabs for 'Selected Sources (23)', 'MOUS (156)', and 'GOUS (312)'. The 'MOUS' tab is currently selected. The modal contains a search bar, a 'Sort by' dropdown menu (set to 'File Name'), a 'Display only' dropdown menu, and a 'Quick select' dropdown menu. Below these controls is a list of files with checkboxes for selection. Each file entry includes the following information: Project: 2018.1.01131.S, Science Goal: uid://A001/X135b/x60, Group OUS: uid://A001/X135b/x68, and Member OUS: uid://A001/X135b/x6b. The files listed are:

- uid_A002_Xd98580_X354_target.ms.auxcalapply.txt
- uid_A002_Xd98580_X354.qa0_report.pdf
- uid_A002_Xd98580_X354.ms.flagversions1.gz

In the background, the main interface shows a spectral plot on the right and a table of observations on the left. The spectral plot displays redshift (0 to 2) and frequency (175 GHz to 230 GHz) with various spectral lines labeled. The table on the left shows a list of observations with columns for Project code, ALMA source name, and other parameters.

It is possible to filter the search results to show only specific file types, which is most useful when viewing the results from the MOUS and GOUS tabs.

The screenshot displays the ALMA Science Archive website. The browser address bar shows the URL: https://almascience.eso.org/daq/?result_view=observations&sourceNameResolver=Z%20Cma. The search bar contains "Source name: Z_CMa". The page shows "Selected Sources (23)" with tabs for "MOUS (1)" and "GOUS (312)". A modal window is open, showing a list of sources with a dropdown menu for "Display only" set to "Asdm". The modal also includes a "Download" button and a link to "Explore and download in legacy system".

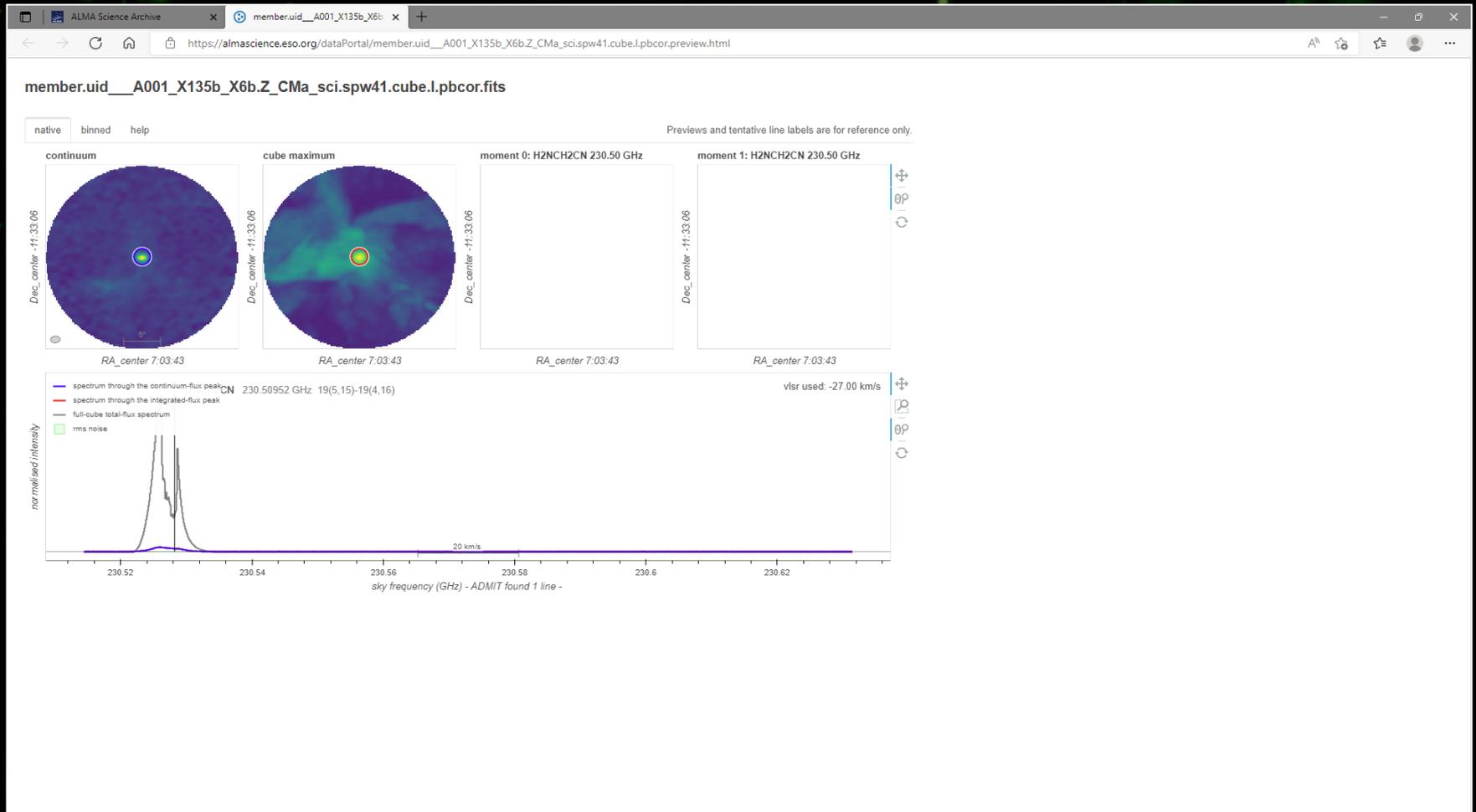
Project: 2018.1.01131.S Science Goal: uid://A001/X135b/X60 Group OUS: uid://A001/2018.1.01131.S_uid_A002_Xd98580_X354.asdm.sdm.tar uid://A001/X135b/X60

- External
- External tar file
- Auxiliary
- Auxiliary tar file
- Product
- Product tar file
- ✓ Asdm
- Asdm semipass

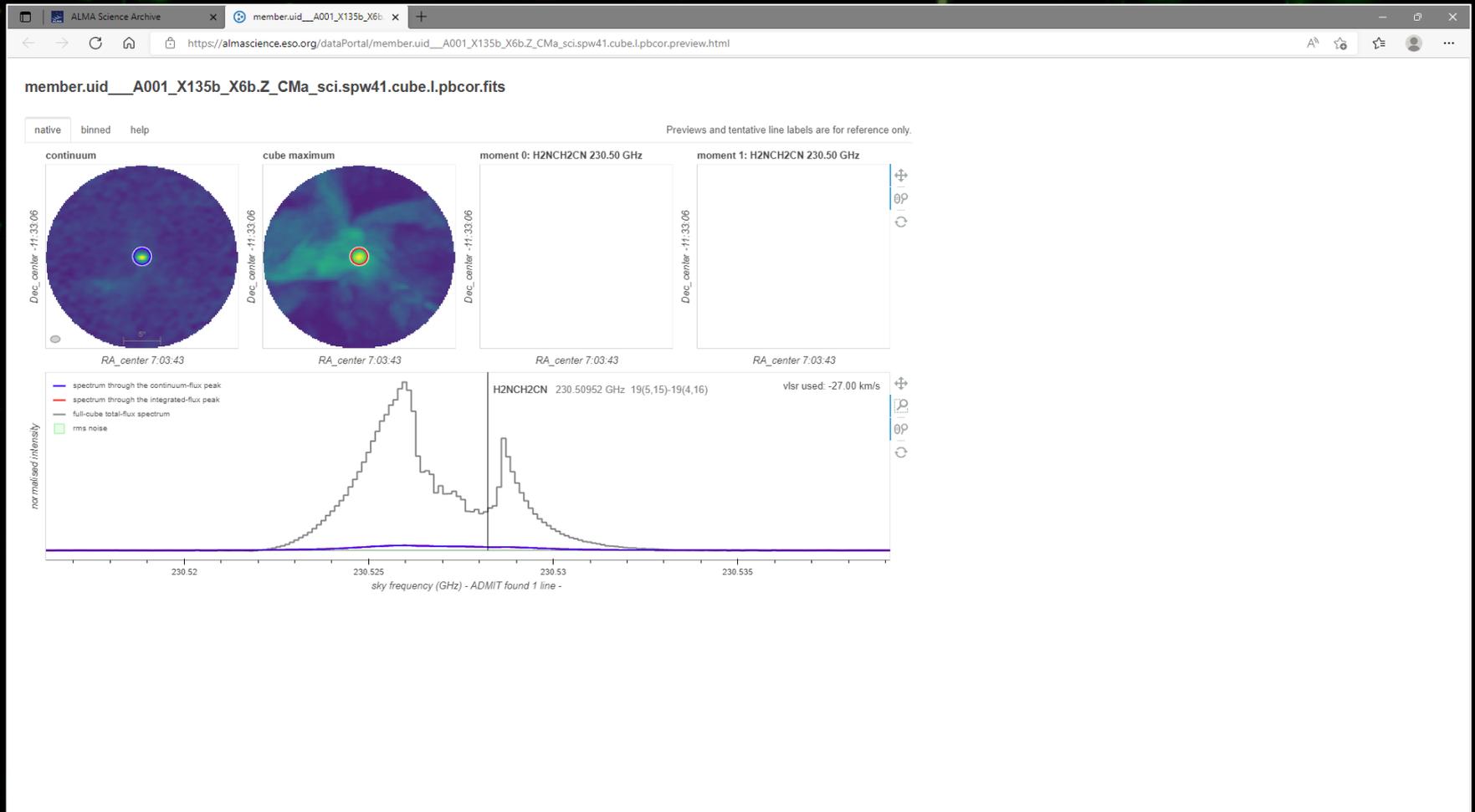
Project code	ALMA source name
2016.1.00110.S	Z_CMa
2016.2.00168.S	z_cma
2016.1.00110.S	Z_CMa
2018.1.01131.S	Z_CMa
2018.1.00814.S	ZCMA

Mosaic	Max. reco. scale	FOV	Scient
	arcsec	arcsec	
	1.785	25.966	Dist
	30.375	44.514	Dist
	1.142	25.967	Dist
	33.011	44.302	ISM
	25.770	38.467	ISM
	9.571	25.846	ISM
	359.023	22.439	ISM
	5.273	22.438	ISM
	1.853	25.822	Dist

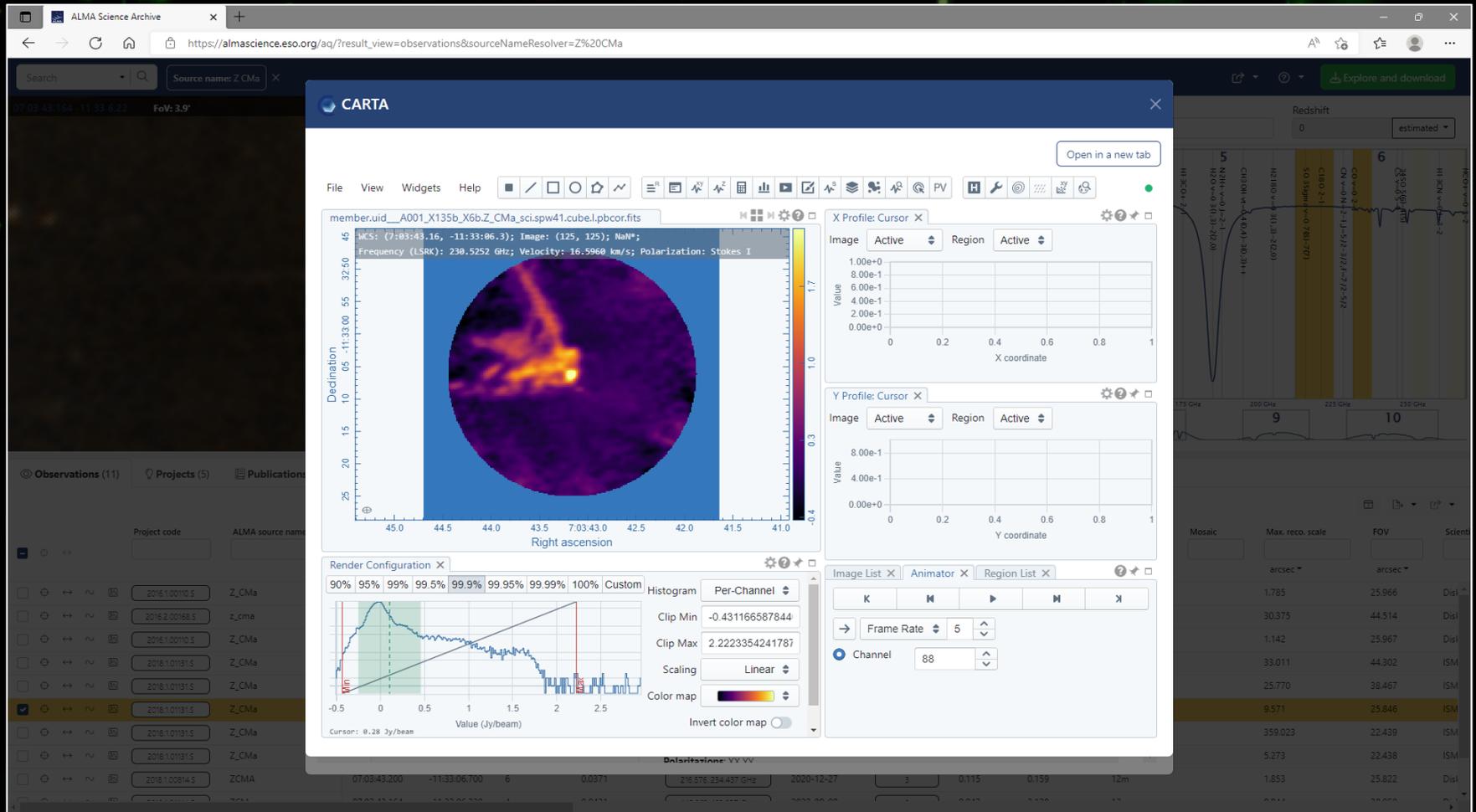
The new interface also provides a number of preview options, including displaying various interactive displays of images and extracted spectra as well as options to display images in CARTA.



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The old download interface is currently still accessible by clicking on the button at the top right of the current download interface.

The screenshot displays the ALMA Science Archive website. A modal window titled "Download" is open, showing a list of sources. A yellow arrow points to a green button labeled "Explore and download in legacy system" in the top right corner of the modal. The modal also contains a "Download" button in the top left, a search bar, and a list of source details including project information, member IDs, and technical specifications like frequency range and resolution.

Download Explore and download in legacy system

Selected Sources (23) MOUS (156) GOUS (312)

File name Sort by File Name Display only Quick select

Project: 2018.1.01131.S **Science Goal:** uid://A001/X135b/x60 **Group OUS:** uid://A001/X135b/x68 **Member OUS:** uid://A001/X135b/x6b

[member.uid_A001_X135b_X6b_Z_CMa_sci.spw45.mfs.l.pbcor.fits](#) 253 KB

Band: 6
Frequency range: 231.6..233.471
Frequency resolution: 3,904.297 kHz
Continuum sensitivity: 1.846
Line sensitivity 10km/s (estimate): 1.31 mJy/beam@10km/s
Line sensitivity native (estimate): 0.084 uJy/beam@native
Polarizations: XX YY
Array: 12m

Project: 2018.1.01131.S **Science Goal:** uid://A001/X135b/x60 **Group OUS:** uid://A001/X135b/x68 **Member OUS:** uid://A001/X135b/x6b

[member.uid_A001_X135b_X6b_Z_CMa_sci.spw45.cube.l.pbcor.fits](#) 114 MB

Band: 6
Frequency range: 231.6..233.471
Frequency resolution: 3,904.297 kHz
Continuum sensitivity: 1.846
Line sensitivity 10km/s (estimate): 1.31 mJy/beam@10km/s
Line sensitivity native (estimate): 0.084 uJy/beam@native
Polarizations: XX YY
Array: 12m

Project: 2018.1.01131.S **Science Goal:** uid://A001/X135b/x60 **Group OUS:** uid://A001/X135b/x68 **Member OUS:** uid://A001/X135b/x6b

[member.uid_A001_X135b_X6b_Z_CMa_sci.spw43.mfs.l.pbcor.fits](#) 253 KB

Band: 6
Frequency range: 231.197..231.314
Frequency resolution: 141.113 kHz
Continuum sensitivity: 11.204

The old interface will show all of the data from the projects associated with the selected datasets. The list is hierarchical, which is good for understanding the data organization. However, for programs with multiple Scheduling Blocks, it can be hard to pick out a single dataset of interest.

The screenshot shows the ALMA Request Handler interface. At the top, it displays the user as 'Anonymous User: Request #2162200740546' and the request title. Below this, there are filters for file types: readme, product, auxiliary, raw, raw (semipass), and external. The main content is a table with columns: Project / OUSet / Executionblock, Updated, File, Size, Accessible, and Actions. The table is organized into a hierarchical tree structure.

Project / OUSet / Executionblock	Updated	File	Size	Accessible	Actions
Request 2162200740546			6 GB		
Project 2018.1.01131.S					
Science Goal OUS uid://A001/X135b/X60					
Group OUS uid://A001/X135b/X81					
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	✓	
product		2018.1.01131.S.uid_A001_X135b_X6d_001_of_001.tar	219 MB	✓	
auxiliary		2018.1.01131.S.uid_A001_X135b_X6d_auxiliary.tar	154 MB	✓	
raw		2018.1.01131.S.uid_A002_Xd3c7c2_X5388.asdm.sdm.tar	711 MB	✓	

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 displaying the Alma Science Archive submission page. The URL is <https://almascience.eso.org/rh/submission>. The page shows a list of submissions, including a group OUS uid://A001X135bX68. The submission details are as follows:

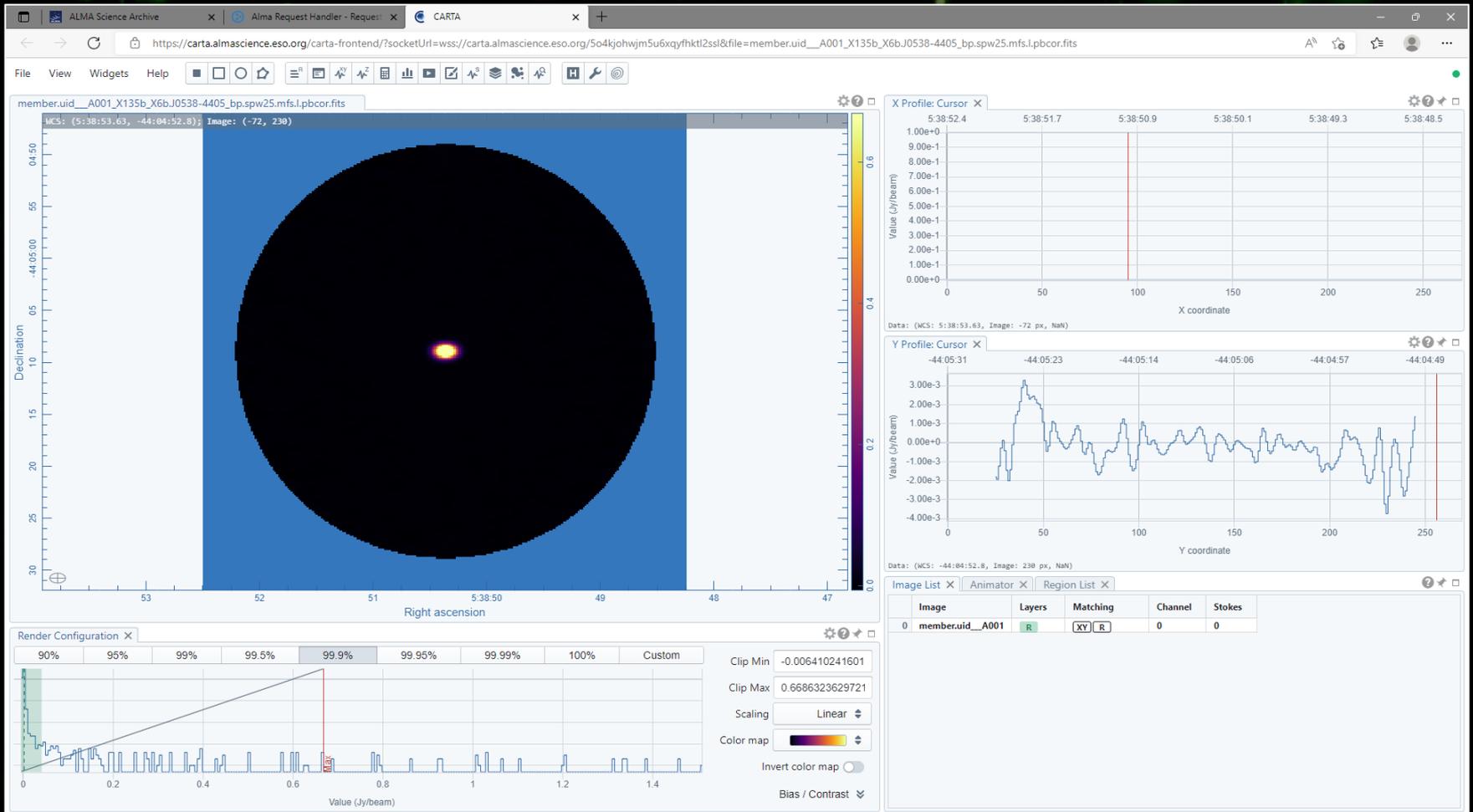
Submission	Member OUS uid	Date	File Name	Size	Status
SB V1647_Or_a_06_TM	06		readme	4 kB	✓
			product	232 MB	✓
			auxiliary	186 MB	✓
			raw	615 MB	✓
Group OUS uid://A001X135bX68					
Member OUS uid://A001X135bX6b	2019-05-22		readme	4 kB	✓
			product	2 GB	✓
			product	2 kB	✓
			product	97 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	96 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	96 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	95 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	97 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	98 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	97 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	87 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	87 kB	✓
			product	302 kB	✓
			product	2 kB	✓
			product	86 kB	✓
			product	302 kB	✓
			product	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.

The screenshot shows a web browser window displaying the ALMA Science Archive submission page. The URL is <https://almascience.eso.org/rh/submission>. The page lists submission details for two groups: SB V1647_Or_a_06_TM2 and SB Z_CMa_a_06_TM2. Each group contains a 'product' folder with multiple files. The files are listed in a table with columns for file name, size, and status. A yellow arrow points to a small icon with the letter 'C' in a circle, located in the right margin of the table, indicating that clicking this icon will open a new page displaying the image using the CARTA interface.

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	615 MB	✓	
member_uid_A001_X135b_X66_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_bo.spw25.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw25.mfs.l.pb.fits.gz	97 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw25.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw27.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw27.mfs.l.pb.fits.gz	96 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw27.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw29.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw29.mfs.l.pb.fits.gz	96 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw29.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw31.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw31.mfs.l.pb.fits.gz	95 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw31.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw33.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw33.mfs.l.pb.fits.gz	97 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw33.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw35.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw35.mfs.l.pb.fits.gz	98 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw35.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw37.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw37.mfs.l.pb.fits.gz	98 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw37.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw39.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw39.mfs.l.pb.fits.gz	97 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw39.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw41.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw41.mfs.l.pb.fits.gz	87 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw41.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw43.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw43.mfs.l.pb.fits.gz	87 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw43.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw45.mfs.l.mask.fits.gz	2 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw45.mfs.l.pb.fits.gz	86 kB	✓	
member_uid_A001_X135b_X6b_J0538-4405_bo.spw45.mfs.l.pbcor.fits	302 kB	✓	
member_uid_A001_X135b_X6b_J0730-1141_ph.spw25.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.



Clicking on the download option in the current download interface will provide a download script.

The old download interface offers the options to download multiple files using a download script or a file list.

The individual results in either download interface page include links that can also be clicked on to download the individual files.

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 (in the form of tar files) 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.
- When the download is complete, the data can be optionally be unpacked.

Data can also be downloaded in Python.

Here is an example using pyVO:

```
>>> datalink = pyvo.dal.adhoc.DatalinkResults.from_result_url(
    f"https://almascience.eso.org/datalink/sync?ID={'uid__A001_X135b_X6b'}")
>>> for dl in datalink:
    dl.cachedataset(filename=os.path.basename(dl['access_url']))
```

Here is an example using astroquery:

```
>>> mous=almaQuery['member_ous_uid'][0]
>>> linkList=get_data_info(mous,expand_tarfiles=True)
>>> downloadAlma=Alma()
>>> downloadAlma.login('username')
>>> downloadAlma.cache_location='/directory/'
>>> downloadAlma.retrieve_data_from_uid(mous)
```

One of the Jupyter notebooks at <https://almascience.eso.org/alma-data/archive/archive-notebooks> provides additional instructions and examples on using these tools.

When archival data are downloaded and unpacked, the files will be sorted into a directory structure that looks like the following:

2018.1.01131.S

- science_goal.uid___A001_X135b_X60
- group.uid___A001_X135b_X68
- member.uid___A001_X135b_X6b
- calibration
- log
- product
- qa
- raw
- script

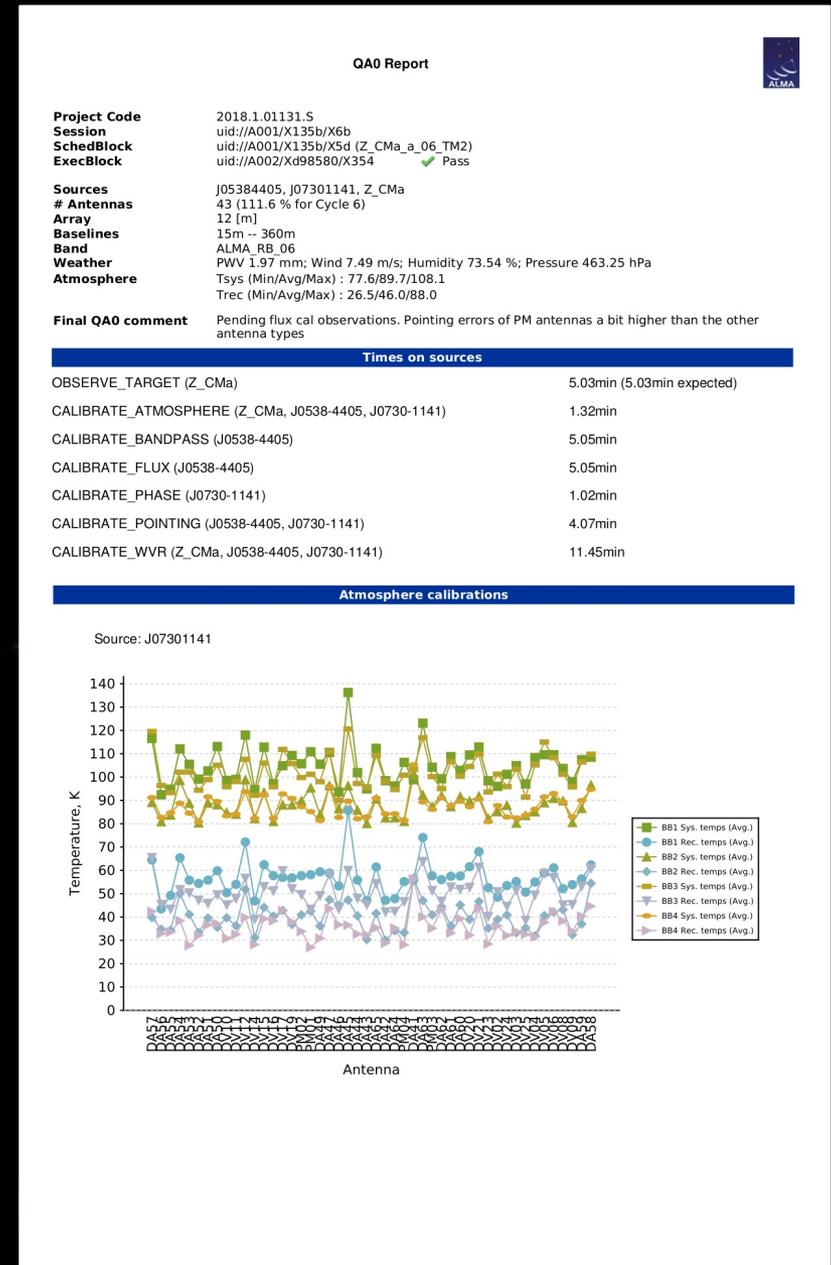
The directories contain the following files:

calibration	Calibration plots and tables
log	Log files
product	Fully processed images
qa	Quality assurance data
raw	Raw data (ASDM format)
README	A text file with information from calibration and imaging as well as general file information
script	Data processing scripts

The quality assurance directory contains information on the quality of the data. This may include:

- **QA0 report** (pdf file)
- **QA2 report** (pdf file)
- **QA2 png files** (labelled qa2_part#.png)
- **QA2 text files** (labelled *textfile.txt)
- **WebLogs** (within a .tgz file)

Other specialized files are created for single dish and polarization data.



The quality assurance directory contains information on the quality of the data. This may include:

- **QA0 report** (pdf file)
- **QA2 report** (pdf file)
- **QA2 png files** (labelled qa2_part#.png)
- **QA2 text files** (labelled *textfile.txt)
- **WebLogs** (within a .tgz file)

Other specialized files are created for single dish and polarization data.



QA2 Report

Project information

Name	A molecular line survey of FU Ori Outflows
Code	2018.1.01131.5
PI	Dary Ruiz-Rodríguez
Organization	Chester F. Carlson Center for Imaging, Rochester Institute of Te
Co-Is	L. Cieza, U. Gorti, J. Kastner, D. Principe, J. Williams

ObsUnitSet information

Name	Member OUS (Z_CMa)
QA2 Status	✓Pass
Member OUS Status ID	uid://A001/X135b/X6b
SchedBlock name	Z_CMa_a_06_TM2
SchedBlock UID	uid://A001/X135b/X5d
Array	TM2
Mode	Standard
Band	ALMA_RB_06
Repr.Freq. (sky)	218.48 [GHz]
Spectral setup	FDM
Sources	Z_CMa
Other SBs in this Group	
OUS (Member OUS Status ID in brackets):	Z_CMa_b_06_7M (uid://A001/X135b/X6d), Z_CMa_b_06_TM1 (uid://A001/X135b/X69)
Execution count	1.00 of 1 expected

Final QA2 comment

CASA version: 5.4.0-70

Reduction mode: Pipeline calibration and imaging, pipeline version 42254M (CASA54-P1-B)

Calibration issues: Antenna DV06 was shadowed during the bandpass scan and was therefore flagged for part of that scan. Antenna DA57 showed low gain and showed high scatter in the amplitude versus frequency plots in stage 17, hif_applycal, therefore it was manually flagged. The pipeline issued lots of flagging in stage 12, hifa_bandpassflag, for baselines and timestamps that had outlier amplitudes in spectral window 45. Similarly, the pipeline issued many flags for baselines in all spectral windows because of outlier amplitudes in stage 14, hifa_fluxscaleflag. The bandpass scan shows high scatter in amplitude versus time plots in stage 17, hif_applycal, likely due to the low elevation of the calibrator and weather conditions, however the solutions appear adequate for good calibration. Additionally, the bandpass calibrator appears slightly resolved in the residual images of stage 19, hif_makeimages, however the larger scale emission does not appear to effect calibration. Overall, the data appear well calibrated and the overall flagging rate is quite low.

Imaging issues: The PI may wish to manually identify the continuum and re-image since the pipeline identified continuum appears to have been conservative for some spectral windows.

General info: The continuum was identified by the pipeline although it is recommended that the PI do a more careful identification of the continuum. The continuum was subtracted from all the spectral windows. Self-calibration was not performed. All pipeline products only have a shallow clean, the PI may want to do a deeper clean to improve the images.

This is a continuum project, thus QA2 was performed on the Aggregate Continuum. Both the beam size and the RMS meet the PI requested performance parameters. Therefore, this scheduling block has been deemed a QA2 PASS.

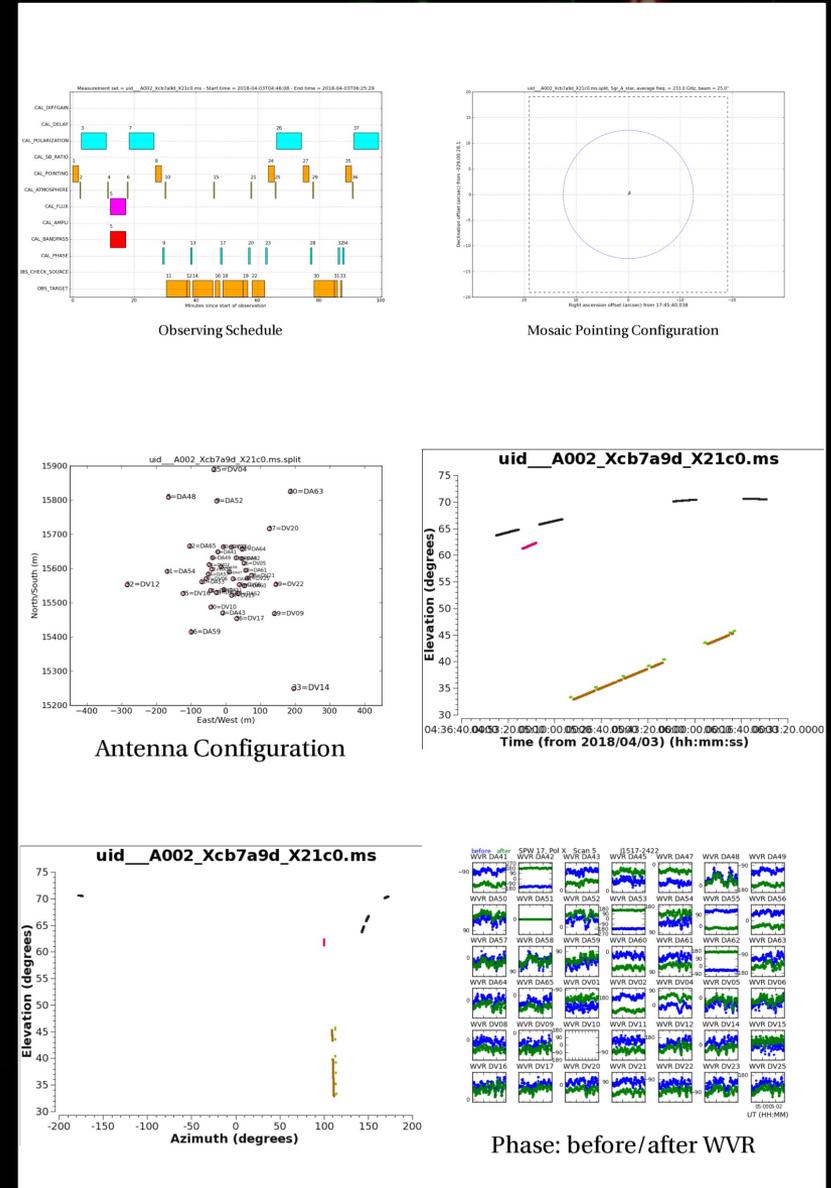
Aggregate Continuum -
 Image name: uid__A001_X135b_X6b.s33_0.Z_CMa_sci.spw25_27_29_31_33_35_37_39_41_43_45.cont.l.iter1.image
 Robust = 0.5
 Beam size = 1.26 x 0.858 arcsec
 RMS = 0.17 mJy/beam over 2.42 GHz

For additional information on the calibration and imaging pipeline products please see the Knowledgebase article:
<https://help.almascience.org/index.php?Knowledgebase/Article/View/375/>

The quality assurance directory contains information on the quality of the data. This may include:

- **QA0 report** (pdf file)
- **QA2 report** (pdf file)
- **QA2 png files** (labelled qa2_part#.png)
- **QA2 text files** (labelled *textfile.txt)
- **WebLogs** (within a .tgz file)

Other specialized files are created for single dish and polarization data.



The quality assurance directory contains information on the quality of the data. This may include:

- **QA0 report** (pdf file)
- **QA2 report** (pdf file)
- **QA2 png files** (labelled qa2_part#.png)
- **QA2 text files** (labelled *textfile.txt)
- **WebLogs** (within a .tgz file)

Other specialized files are created for single dish and polarization data.

```

*****
SUMMARY INFORMATION FOR uid__A002_Xaf4574_X4c3e.ms.split
Experiment Duration: 2016/01/25/11:24:24 to
                    2016/01/25/12:05:00

Processed from ms: uid__A002_Xaf4574_X4c3e.ms.split
Written to file:   NewListobs.txt

SCAN LISTING

Scan FdId srcId FieldName      StartTime   StopTime   Int(s) Elev ScanIntent
  2   0   0   J1550+0527    11:24:24.3 - 11:24:40.4 0.58  59.9 Cal atmos=Tsyst
  3   0   0   J1550+0527    11:24:54.0 - 11:29:56.4 2.02  60.1 Cal Bandpass
  5   2   2   Titan         11:33:36.1 - 11:33:52.2 0.58  69.1 Cal atmos=Tsyst
  6   2   2   Titan         11:34:03.1 - 11:36:34.3 2.02  69.4
  8   3   3   J1549+0237    11:40:01.2 - 11:40:17.3 0.58  63.7 Cal atmos=Tsyst
  9   3   3   J1549+0237    11:40:31.6 - 11:41:01.9 2.02  63.8 Cal Phase
 10   4   4   Huya          11:41:20.4 - 11:41:36.6 0.58  70.7 Cal atmos=Tsyst
 11   4   4   Huya          11:41:46.8 - 11:48:21.5 2.02  71.1 Obs Target
 12   3   3   J1549+0237    11:48:41.2 - 11:49:11.5 2.02  64.1 Cal Phase
 13   4   4   Huya          11:49:31.0 - 11:56:05.6 2.02  71.9 Obs Target
 14   3   3   J1549+0237    11:56:26.2 - 11:56:42.3 0.58  64.3 Cal atmos=Tsyst
 15   3   3   J1549+0237    11:57:22.5 - 11:57:52.7 2.02  64.3 Cal Phase
 16   4   4   Huya          11:58:12.3 - 11:58:28.4 0.58  72.4 Cal atmos=Tsyst
 17   4   4   Huya          11:58:39.2 - 12:04:13.3 2.02  72.6 Obs Target
 18   3   3   J1549+0237    12:04:31.0 - 12:05:01.2 2.02  64.4 Cal Phase

FIELD INFORMATION

Fid  Srd  Field              RA (J2000)    DEC          Fld Time #Scans
      (min)
  0   0   J1550+0527        15:50:35.26900 +05:27:10.4480 5.31  2
  1   1   J1733-1304        17:33:02.70579 -13:04:49.5482 0.00  0
  2   2   Titan             00:00:00.00000 +00:00:00.0000 2.79  2
  3   3   J1549+0237        15:49:29.43684 +02:37:01.1633 2.55  6
  4   4   Huya              00:00:00.00000 +00:00:00.0000 19.26  5

FREQUENCY INFORMATION

spw  nchan  -----Frequencies (GHz)-----  --Channel Width--
      First Last Bandwidth      MHz km/s      POLN
  0   128  224.992188 223.007812 2.000  -15.625 -20.81 ['XX', 'YY']
  1   128  226.992188 225.007812 2.000  -15.625 -20.63 ['XX', 'YY']
  2   128  239.007813 240.992188 2.000  15.625  19.59 ['XX', 'YY']
  3   128  241.007813 242.992188 2.000  15.625  19.43 ['XX', 'YY']

```

The quality assurance directory contains information on the quality of the data. This may include:

- **QA0 report** (pdf file)
- **QA2 report** (pdf file)
- **QA2 png files** (labelled qa2_part#.png)
- **QA2 text files** (labelled *textfile.txt)
- **WebLogs** (within a .tgz file)

Other specialized files are created for single dish and polarization data.

The screenshot shows a web browser window with the URL `file:///home/gpendo/gpplines/html/12-4n.html?rolebar=sidebar_size16&ms=all&subpage=12-4n_details.html`. The page title is "16. Gain Calibration". Below the title, there is a list of tasks in execution order, with "16. Mf_calibration" selected. The main content area displays the "Gain Calibration" task details, including a table of "Results" with columns for "Measurement Set", "Solution Parameters", "Applied To", and "Calibration Table".

Measurement Set	Type	Interval	Scan Intent	Spectral Windows	Calibration Table
uid__A002_Xd98580_X354.ms	Phase-only	Integrate	PHASE-CLOCK-TARGET	25.27, 26.31, 26.35, 27.36, 41.45	uid__A002_Xd98580_X354.ms.ms_calibration-116.3-approx_27_26_31_26_35_27_36_41_45-sidrefined_gain04
uid__A002_Xd98580_X354.ms	Phase-only	Phase Integration (8.05s)	AMPLITUDE-BANDPASS	25.27, 26.31, 26.35, 27.36, 41.45	uid__A002_Xd98580_X354.ms.ms_calibration-116.4-approx_27_26_31_26_35_27_36_41_45-sidrefined_gain04
uid__A002_Xd98580_X354.ms	Amplitude-only	Integrate	CLOCK-TARGET	25.27, 26.31, 26.35, 27.36, 41.45	uid__A002_Xd98580_X354.ms.ms_calibration-116.8-approx_27_26_31_26_35_27_36_41_45-sidrefined_gain04
uid__A002_Xd98580_X354.ms	Amplitude-only	Integrate	AMPLITUDE-BANDPASS-PHASE	25.27, 26.31, 26.35, 27.36, 41.45	uid__A002_Xd98580_X354.ms.ms_calibration-116.8-approx_27_26_31_26_35_27_36_41_45-sidrefined_gain04

The screenshot shows a web browser window with the URL `file:///home/gpendo/gpplines/html/12-1.html?rolebar=sidebar_uid__A002_Xd98580_X354.ms&subpage=12-1_details.html`. The page title is "Overview of 'uid__A002_Xd98580_X354.ms'". The page displays "Session Execution Time" information, including Start Time (2019-03-14 01:01:10), End Time (2019-03-14 01:18:52), Total Time on Source (0:18:06), and Total Time on Science Target (0:00:00). There are also two charts: "Intent vs Time" and "Field vs Time". Below the charts, there are sections for "Spatial Setup", "Spectral Setup", "Antenna Setup", and "Sky Setup".

Parameter	Value
Start Time	2019-03-14 01:01:10
End Time	2019-03-14 01:18:52
Total Time on Source	0:18:06
Total Time on Science Target	0:00:00

Parameter	Value
Science Targets	2_CMY
Calibration	2019-03-14 01:01:10

Parameter	Value
Min Baseline	15.0 m
Max Baseline	360.0 m
Number of Baselines	1128
Number of Antennas	40

Parameter	Value
Min Elevation	53.77 degrees
Max Elevation	73.88 degrees

To produce calibrated visibility data, which can be used to create new images, do the following in a terminal:

1. Go to the `script` directory.
2. Start CASA. For pipeline-calibrated data, start CASA in pipeline mode using the `--pipeline` option in the terminal. (When starting CASA from the app on a Mac, quitting CASA in the terminal and then restarting it with this option works.)
3. Execute the script using the command `execfile('scriptForPI.py')`.

Restoring may take a while, especially for large dataset or on machines with lower specifications.

The calibrated visibility data will be placed in a new directory called **calibrated**. These data can be used to create new images.