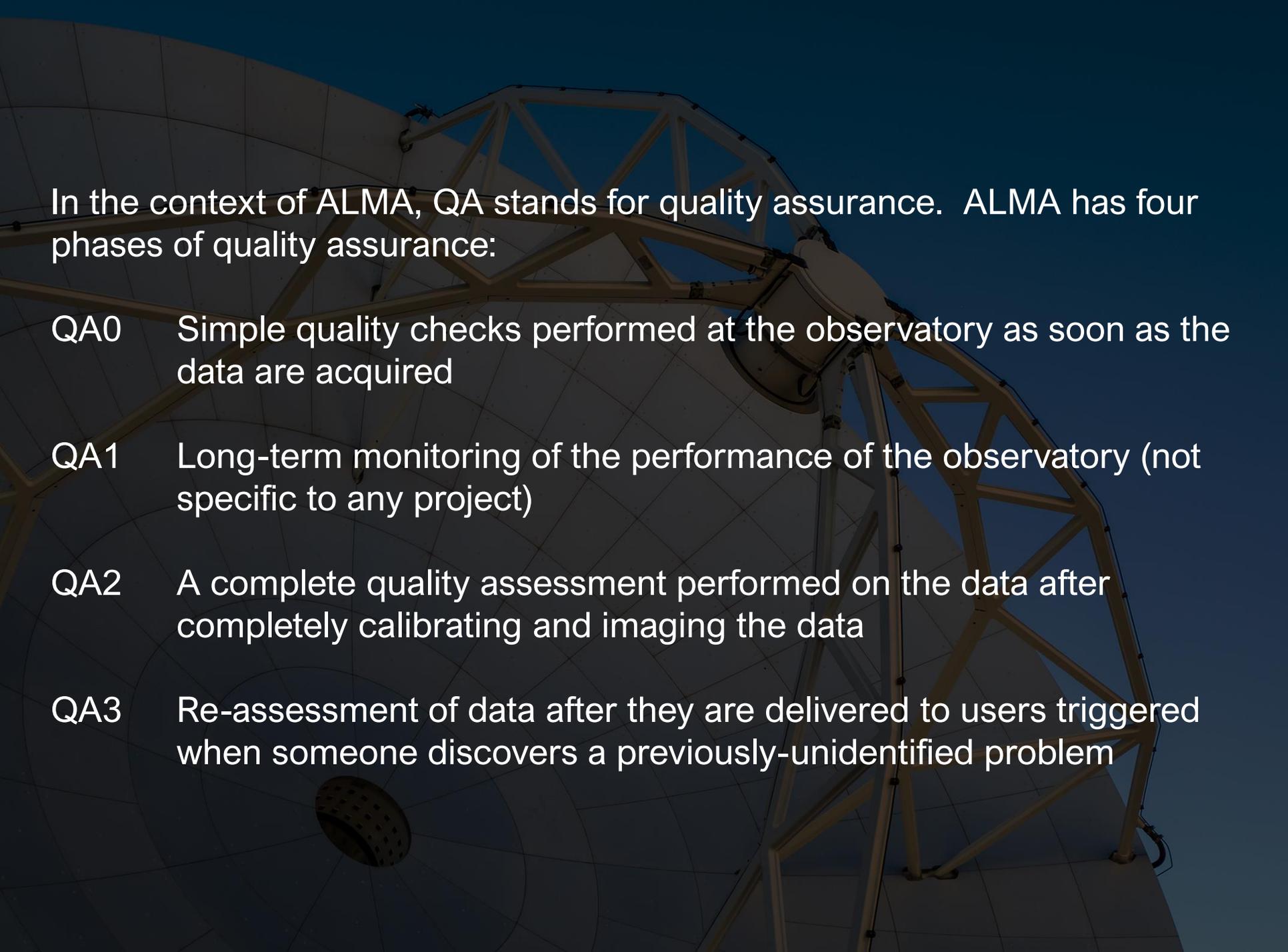


# ***ALMA WebLog Review***

**George Bendo**

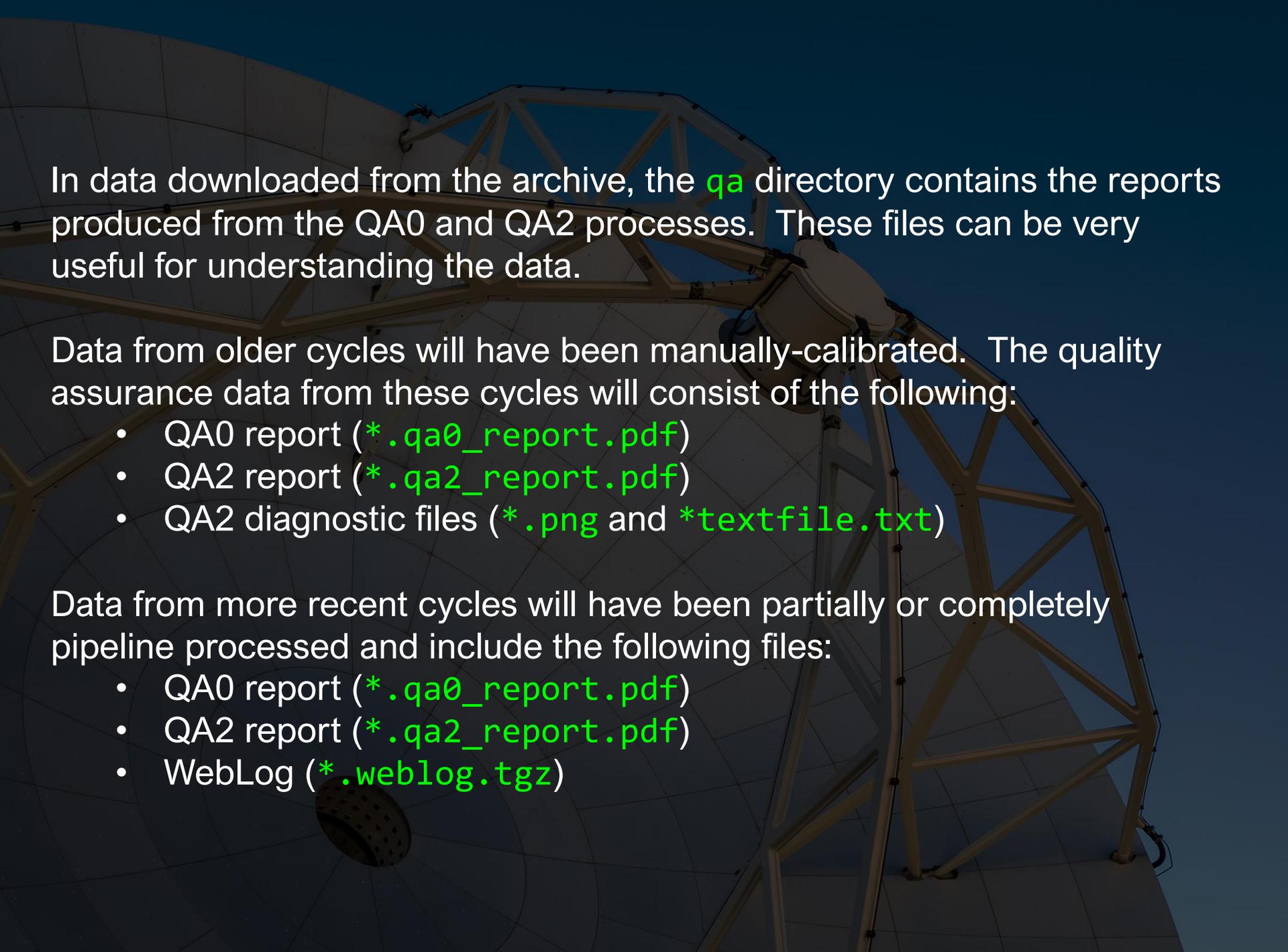
UK ALMA Regional Centre Node  
Jodrell Bank Centre for Astrophysics  
The University of Manchester





In the context of ALMA, QA stands for quality assurance. ALMA has four phases of quality assurance:

- QA0 Simple quality checks performed at the observatory as soon as the data are acquired
- QA1 Long-term monitoring of the performance of the observatory (not specific to any project)
- QA2 A complete quality assessment performed on the data after completely calibrating and imaging the data
- QA3 Re-assessment of data after they are delivered to users triggered when someone discovers a previously-unidentified problem



In data downloaded from the archive, the `qa` directory contains the reports produced from the QA0 and QA2 processes. These files can be very useful for understanding the data.

Data from older cycles will have been manually-calibrated. The quality assurance data from these cycles will consist of the following:

- QA0 report (`*.qa0_report.pdf`)
- QA2 report (`*.qa2_report.pdf`)
- QA2 diagnostic files (`*.png` and `*textfile.txt`)

Data from more recent cycles will have been partially or completely pipeline processed and include the following files:

- QA0 report (`*.qa0_report.pdf`)
- QA2 report (`*.qa2_report.pdf`)
- WebLog (`*.weblog.tgz`)

The QA0 PDF provides a summary of comments from the astronomer who acquired the data. Each Execution Block (EB) will have its own report.

Versions of this document from earlier cycles contain just some simple diagnostic plots.

Versions from recent cycles contain several new sets of diagnostic plots as well as preview images.

These documents are most useful for understanding whether any problems were encountered during the observations.

QA0 Report 

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**Execution Block Summary**

<b>Project Code</b>	2021.1.00499.S	<b>SchedBlock</b>	Pj113921_a_03_TM2
<b>ExecBlock</b>	uid://A002/Xf396d6/X45bb	<b>ExecBlock Status</b>	SUCCESS
<b>QA0 Status</b>	✓ Pass	<b>Exec. Fraction</b>	1.50
<b>Repr. frequency</b>	89.631 GHz (Sky)	<b>Band</b>	ALMA_RB_03
<b>Array</b>	12 [m]	<b>Baselines</b>	15m -- 2617m
<b>Antennas</b>	Antennas: 46 effective, 46 usable, 46 unflagged, 46 total. Expected for Cycle 9 : 43, minimum acceptable: 41 Band observed: 3. Highest recommended: 4-4		
<b>Weather</b>	PWV 4.15 mm; Wind 3.50 m/s; Humidity 21.51 %; Pressure 493.55 hPa; Phase rms: 193.366 microns		
<b>QA0 comment</b>	No issues found in the data, except high Trx/Tsys on DA52.		
<b>AOS Check comment</b>	2021-12-04T12:21:47 uid://A002/Xf396d6/X45bb Band 3 Freq 89.6314199553 GHz standard observation Mean Zenith PWV: 4.15 +/- 0.08 mm Representative Tsys: 65.4 K 46/46 antennas are working in band 3 on the BLC PHASECAL: Antenna-based phase rms on phaseCal: 20.8 degrees (193.4 microns) No antennas exceed rms limit BANDPASS: WVR-corrected baseline-based phase rms on bandpass: 11.8 degrees (109.4 microns) on 1000m baselines Mean improvement in phase rms using WVRs: 2.94 Baseline limit with good phase (80%): 1319m. L80 resolution: 0.523 arcsec Bandpass calibrator: J1058+0133 Flux: 4.110 +/- 0.112 Jy Possible channels with SNR>30: 3659 Phase calibrator: J1148+1840 Flux: 0.125 +/- 0.004 Jy Sky separation: 2.80 degrees Resolution slope : 0.00 SNR in calibrated phaseCal flux: Between antennas: 148.0 Between scans: 269.8 9 completed cycles of science/phaseCal. 1 bandpass scan Percentage of all cal data to be flagged: 50.00% Binary size: 4.77GB Band observed: 3 HIGHEST RECOMMENDED OBSERVING BAND: 4 - 4 QA0 PASS		
<b>QA0 warnings</b>	Percentage of calibration data flagged: 0.500 % Achieved angular resolution is outside the expected range. Observed: 0.38, requested: 0.57 - 0.85		

Page 1 of 18

The QA0+ section shows some very quick (but very rough) images produced from the data soon after the observations were performed as well as some measurements from those images.

While these images and data are useful for providing a preliminary view of the results, they may be inaccurate compared to what is in the WebLogs.

#### QA0+ EB

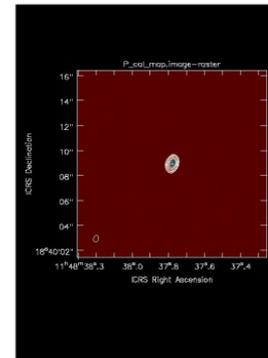
QA0+ results are only to be used as a guide to assess the data quality, and are not for scientific use. QA0+ image and fluxes are obtained from an online reduction of the combined wideband continuum spectral windows (using mfs TCLEAN in CASA), with no bandpass or Tsys calibration, nor removal of potential line contamination. Fluxes are only approximate. 'QA0+ EB' is the result from concatenating all EBs up to the current one.

Science target	PJ113921.7			
Peak	0.055	Integrated	0.05	RMS 0.003
Xoff	0.569	Yoff	0.218	(arcsec from phase centre)
Beam X	0.603"	Beam Y	0.382"	Beam PA -17.66°
Selfcal	true			
Peak	0.107 mJy	Integrated	0.192 mJy	RMS 0.004 mJy
Xoff	0.007	Yoff	0.004	(arcsec from phase centre)
Phase Cal	J1148+1840	Separation	2.80°	
Peak	28.255 mJy	Integrated	29.343 mJy	RMS 0.217 mJy
Beam X R=0.5	0.563"	Beam Y R=0.5	0.376"	
Beam PA R=0.5	-17.28°	RMS R=0.5	0.217 mJy	
Beam X R=2.0	0.805"	Beam Y R=2.0	0.56"	
Beam PA R=2.0	-27.01°	RMS R=2.0	0.316 mJy	
Beam X R=-0.5	0.428"	Beam Y R=-0.5	0.287"	
Beam PA R=-0.5	-13.38°	RMS R=-0.5	0.166 mJy	
WVR	Try remcloud	false	PhaseCal RMS	18.208
Bandpass			Bandpass RMS Top	10.598
Bandpass RMS	[5.53, 7.57, 10.8, 10.73]"	Bandpass Timescales	[20.0, 40.0, 80.0, 120.0] seconds	

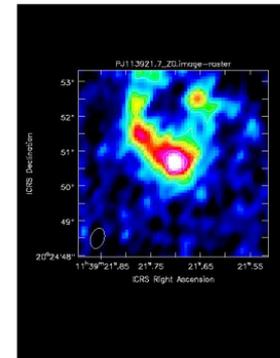
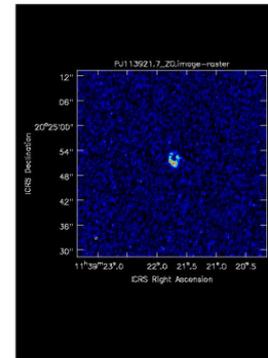
The QA0+ section shows some very quick (but very rough) images produced from the data soon after the observations were performed as well as some measurements from those images.

While these images and data are useful for providing a preliminary view of the results, they may be inaccurate compared to what is in the WebLogs.

Phase Cal (left).



Target images

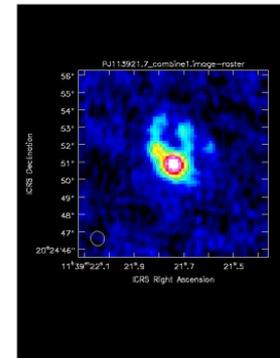
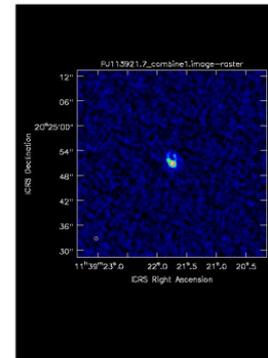


The QA0+ EB section contains the images created using just one Execution Block (EB).

The QA0+ concat section contains images based on combining the data from this EB with previously-executed EBs (if they exist).

QA0+ concat				
N EBs	1	ExecBlock UIDs	[]	
Beam X R=0.5	0.829"	Beam Y R=0.5	0.76"	
Beam PA R=0.5	16.24°	RMS R=0.5	0.003 mJy	
Beam X R=2.0	1.254"	Beam Y R=2.0	1.131"	
Beam PA R=2.0	-26.32°	RMS R=2.0	0.003 mJy	
Beam X R=0.5	0.593"	Beam Y R=0.5	0.407"	
Beam PA R=0.5	4.93°	RMS R=0.5	0.005 mJy	
Science target	PJ113921.7	RA	11:39:21.745	Dec +020:24:50.9136
Xoff	-0.044	Yoff	-0.014	Offset (fraction of beam) 0.058
Peak	0.117 mJy	Integrated	0.253 mJy	RMS 0.003 mJy

Concatenated target images



The QA2 PDF includes some comments on the data processing and summary information about the observations.

The last few pages of the document include standard instructions sent to all users.

The first part of the section under "Final QA2 comment" may be useful to read in case something went wrong with the observations.

ALMA

### QA2 Report

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#### Project Information

<b>Name</b>	Probing Gas, Dust, Stars, and Star Formation Activity down to 100-pc Scales using Strong Gravitational Lensing
<b>Code</b>	2021.1.00499.5
<b>PI</b>	Patrick Kamienieski
<b>Organization</b>	Department of Astronomy, Massachusetts at Amherst, University of
<b>Co-Is</b>	O. Cooper, B. Frye, K. Harrington, J. Lowenthal, A. Vishwas, Q. Wang, M. Yun

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#### ObsUnitSet Information

<b>Name</b>	Member OUS (PJ113921.7)
<b>QA2 Status</b>	✔ Pass
<b>Member OUS Status ID</b>	uid://A001/X158f/X7a1
<b>SchedBlock name</b>	PJ113921_a_03_TM2
<b>SchedBlock UID</b>	uid://A001/X158f/X782
<b>Array</b>	TM2
<b>Mode</b>	Standard
<b>Band</b>	ALMA_RB_03
<b>Repr.Freq. (sky)</b>	89.63 [GHz]
<b>Spectral setup</b>	Mixed
<b>Sources</b>	PJ113921.7
<b>Other SBs in this Group</b>	
<b>OUS (Member OUS)</b>	PJ113921_a_03_TM1 (uid://A001/X158f/X79f)
<b>Status ID in brackets):</b>	
<b>Execution count</b>	1.50 of 1 expected

---

#### Final QA2 comment

Comments from Reducer

CASA version: 6.2.1.7, Pipeline version 2021.2.0.128

Reduction mode: PL calibration and imaging

Calibration issues: None

Imaging issues: None

General info:

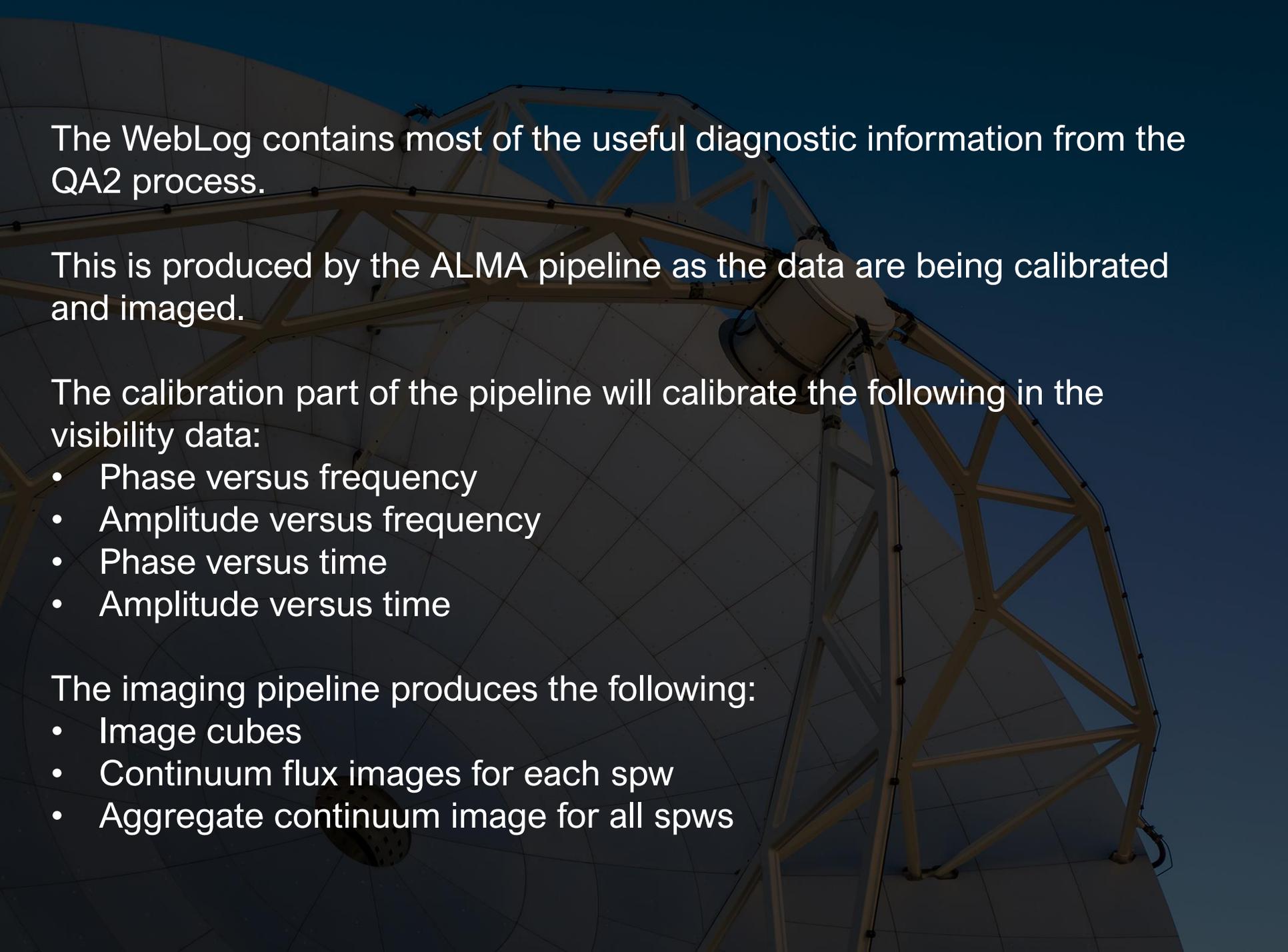
This dataset has been checked for the so-called "renormalization issue". A detailed description about this issue, and how the renormalization process is carried out, can be found at the following link:  
<https://help.almascience.org/kb/articles/what-are-the-amplitude-calibration-issues-caused-by-almas-normalization-strategy>

The requirement of rescaling due to any astronomical lines detected in this dataset has been evaluated and the largest peak rescaling value has been estimated to be 1.002, as displayed in the table in the hifa\_renorm task of the delivered weblog. The effect of rescaling is a channel-dependent increase of the line flux, which is largest in the brightest channels. This is not an increase in flux-scale uncertainty, but a flux offset correction. When comparing such an offset to the nominal absolute flux accuracy, which is 5% in Bands 3, 4 & 5 and increasing to 20% in Bands 9 & 10, it is concluded that offsets up to 2% are considered negligible. Since the rescaling factor is below this threshold, this dataset has not been corrected for the above issue.

It is recommended that the PI carefully assess the results on the hif\_findcont weblog page, and in the "line-free moment 0" images on the cube imaging weblog page. Self-calibration was not performed.

This is a line project, thus QA2 was performed on the Aggregate Continuum and the PI specified representative spectral window. The RMS and beam size meet the PI requested performance parameters, therefore, this scheduling block has been deemed a QA2 PASS.

Aggregate Continuum -  
Image name: uid\_\_\_A001\_X158f\_X7a1\_s36\_0\_PJ113921.7\_sci.spw17\_21\_23\_25.cont.l.iter1.image.tt0



The WebLog contains most of the useful diagnostic information from the QA2 process.

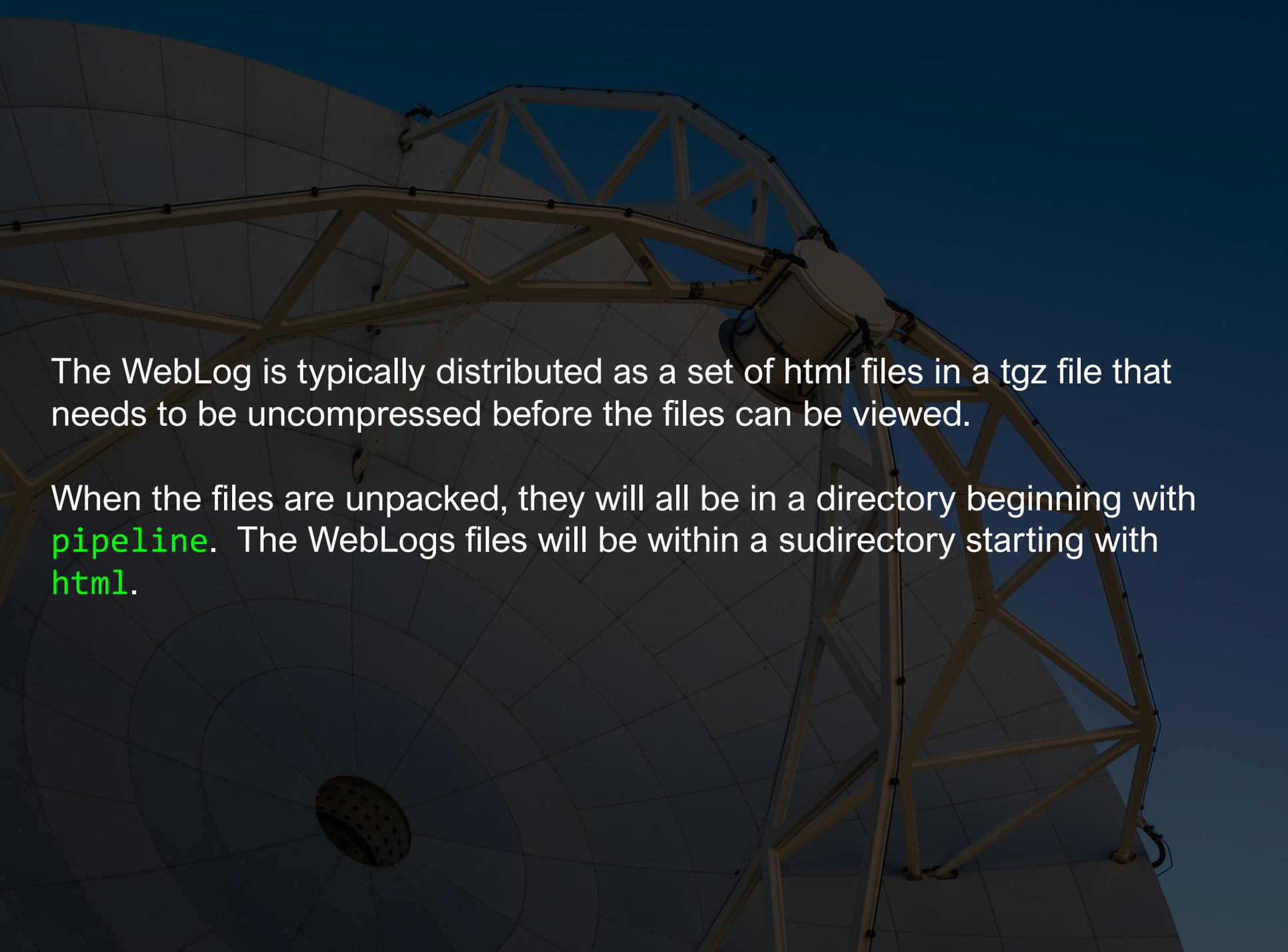
This is produced by the ALMA pipeline as the data are being calibrated and imaged.

The calibration part of the pipeline will calibrate the following in the visibility data:

- Phase versus frequency
- Amplitude versus frequency
- Phase versus time
- Amplitude versus time

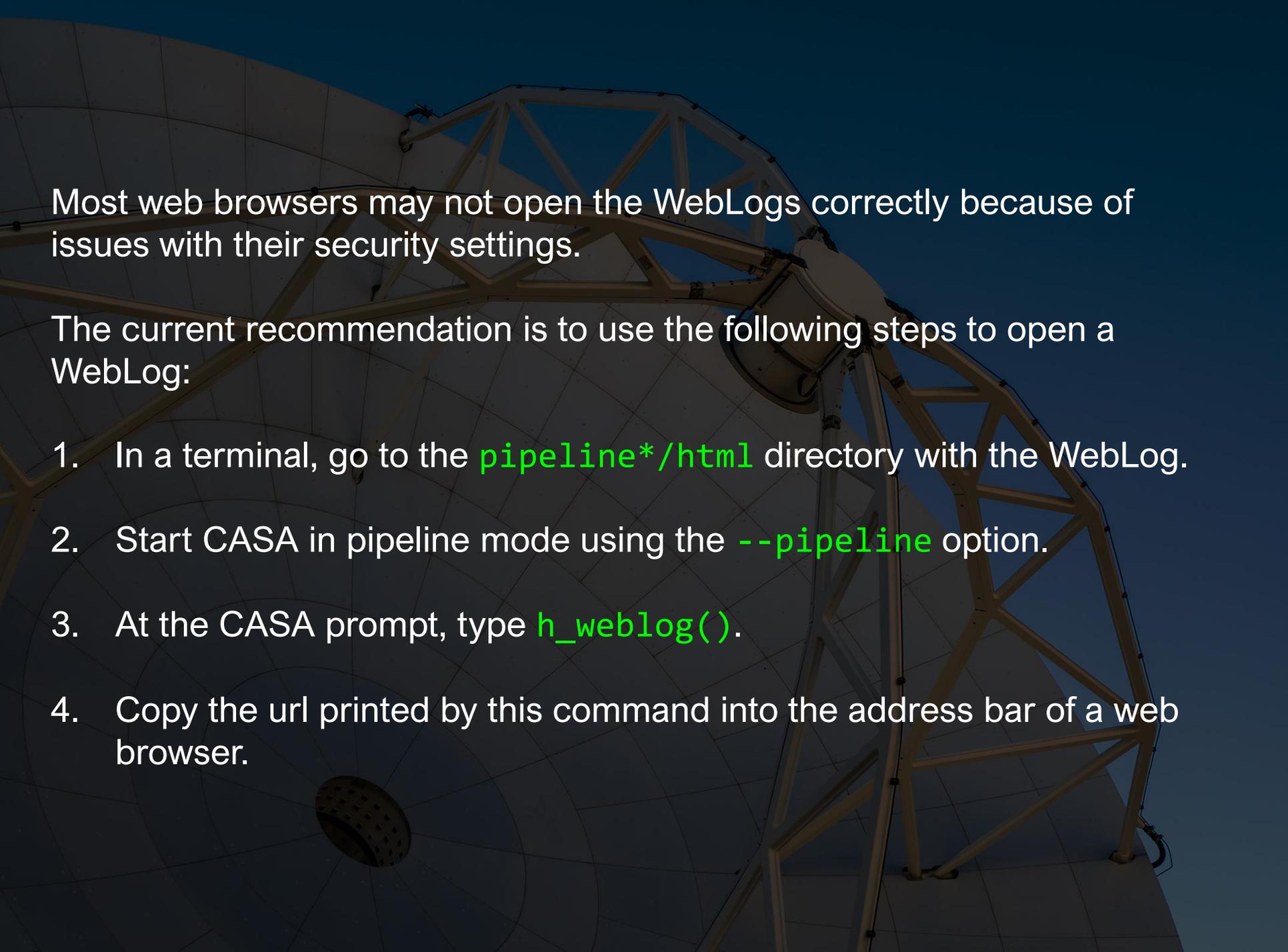
The imaging pipeline produces the following:

- Image cubes
- Continuum flux images for each spw
- Aggregate continuum image for all spws

A large satellite dish antenna structure is shown against a dark blue sky. The dish is composed of a complex metal lattice of beams and supports, with a large, perforated circular antenna element visible in the lower-left quadrant. The overall scene is dimly lit, suggesting dusk or dawn.

The WebLog is typically distributed as a set of html files in a tgz file that needs to be uncompressed before the files can be viewed.

When the files are unpacked, they will all be in a directory beginning with `pipeline`. The WebLogs files will be within a subdirectory starting with `html`.



Most web browsers may not open the WebLogs correctly because of issues with their security settings.

The current recommendation is to use the following steps to open a WebLog:

1. In a terminal, go to the `pipeline*/html` directory with the WebLog.
2. Start CASA in pipeline mode using the `--pipeline` option.
3. At the CASA prompt, type `h_weblog()`.
4. Copy the url printed by this command into the address bar of a web browser.

The main index (or Home) page provides an overview of the observations. The page has three tabs at the top. The Home tab is currently displayed. Clicking on a measurement set in the bottom table leads to a page with more detailed information about those data.

The screenshot shows a web browser window with the following content:

**Browser Tab:** 2021.1.00499.S - Home

**Address Bar:** file:///D:/pipeline/html/t1-1.html

**Navigation:** Home (selected), By Topic, By Task

**Page Header:** 2021.1.00499.S

### Observation Overview

Project	uid://A001/X1525/X705
Principal Investigator	pkamieneski
OUS Status Entity id	uid://A001/X158f/X7a1
Observation Start	2021-12-04 12:23:08 UTC
Observation End	2021-12-04 13:23:12 UTC

### Pipeline Summary

Pipeline Version	2021.2.0.128 ( <a href="#">documentation</a> )
CASA Version	6.2.1.7 ( <a href="#">environment</a> )
IERSeop2000 Version	0001.0153 (last date: 2021-10-10 00:00:00)
IERSpredict Version	0623.0662 (last date: 2022-03-04 00:00:00)
Pipeline Start	2021-12-06 15:32:10 UTC
Execution Duration	5:54:43

### Observation Summary

Measurement Set	Receivers	Num Antennas	Time (UTC)		On Target	Baseline Length			Size
			Start	End		Min	Max	RMS	
Observing Unit Set Status: uid://A001/X158f/X7a1 Scheduling Block ID: uid://A001/X158f/X782 Scheduling Block Name: PJ113921_a_03_TM2									
Session: session_1									
<a href="#">uid__A002_Xf396d6_X45bb.ms</a>	ALMA Band 3	46	2021-12-04 12:23:08	2021-12-04 13:23:12 MS dates not fully covered by IERSeop2000. CASA will use IERSpredict.	0:41:25	15.3 m	2.6 km	749.4 m	13.2 GB
<a href="#">uid__A002_Xf396d6_X45bb_target.ms</a>	ALMA Band 3	46	2021-12-04 12:32:20	2021-12-04 13:22:31 MS dates not fully covered by IERSeop2000. CASA will use IERSpredict.	0:41:20	15.3 m	2.6 km	749.4 m	6.5 GB

The overview page lists a lot of basic information about the observations themselves.

2021.1.00499.S - Session Data Details X +

file:///D:/pipeline/html/t2-1.html?sidebar=sidebar\_uid\_\_\_A002\_Xf396d6\_X45bb\_ms&subpage=t2-1\_details.html

ALMA Home By Topic By Task 2021.1.00499.S

Session: session\_1

uid\_\_\_A002\_Xf396d6\_X45bb.ms

uid\_\_\_A002\_Xf396d6\_X45bb\_target.ms

## Overview of 'uid\_\_\_A002\_Xf396d6\_X45bb.ms'

### Observation Execution Time

Start Time	2021-12-04 12:23:08
End Time	2021-12-04 13:23:12
Total Time on Source	0:55:15
Total Time on Science Target	0:41:25

[LISTOBS OUTPUT](#)

### Spatial Setup

Science Targets	'PJ113921.7'
Calibrators	'J1058+0133', 'J1148+1840' and 'J1150+2417'

### Antenna Setup

Min Baseline	15.3 m
Max Baseline	2.6 km
Number of Baselines	1035
Number of Antennas	46
Antenna Diameters	46 of 12 m

### Weather

uid\_\_\_A002\_Xf396d6\_X45bb.ms

### Spectral Setup

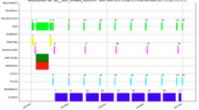
All Bands	'ALMA Band 3' and 'WVR'
Science Bands	'ALMA Band 3'

### Sky Setup

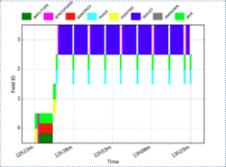
Min Elevation	36.99 degrees
Max Elevation	54.03 degrees

### PWV

uid\_\_\_A002\_Xf396d6\_X45bb.ms



Intent vs Time  
Track scan intent vs time



Field vs Time  
Track observed field vs time

The listobs output button displays a text file with summary information about the sequence of observations, the fields, the spectral windows, and the antennas. Versions of this file can also be created using the **listobs** command in CASA.

2021.1.00499.5 - Session Data Details X

file:///D:/pipeline/html/t2-1.html?sidebar=sidebar\_uid\_\_A002\_Xf396d6\_X45bb\_ms&subpage=listobs.txt

Home By Topic By Task 2021.1.00499.5

Session: session\_1

uid\_\_A002\_Xf396d6\_X45bb.ms

uid\_\_A002\_Xf396d6\_X45bb\_target.ms

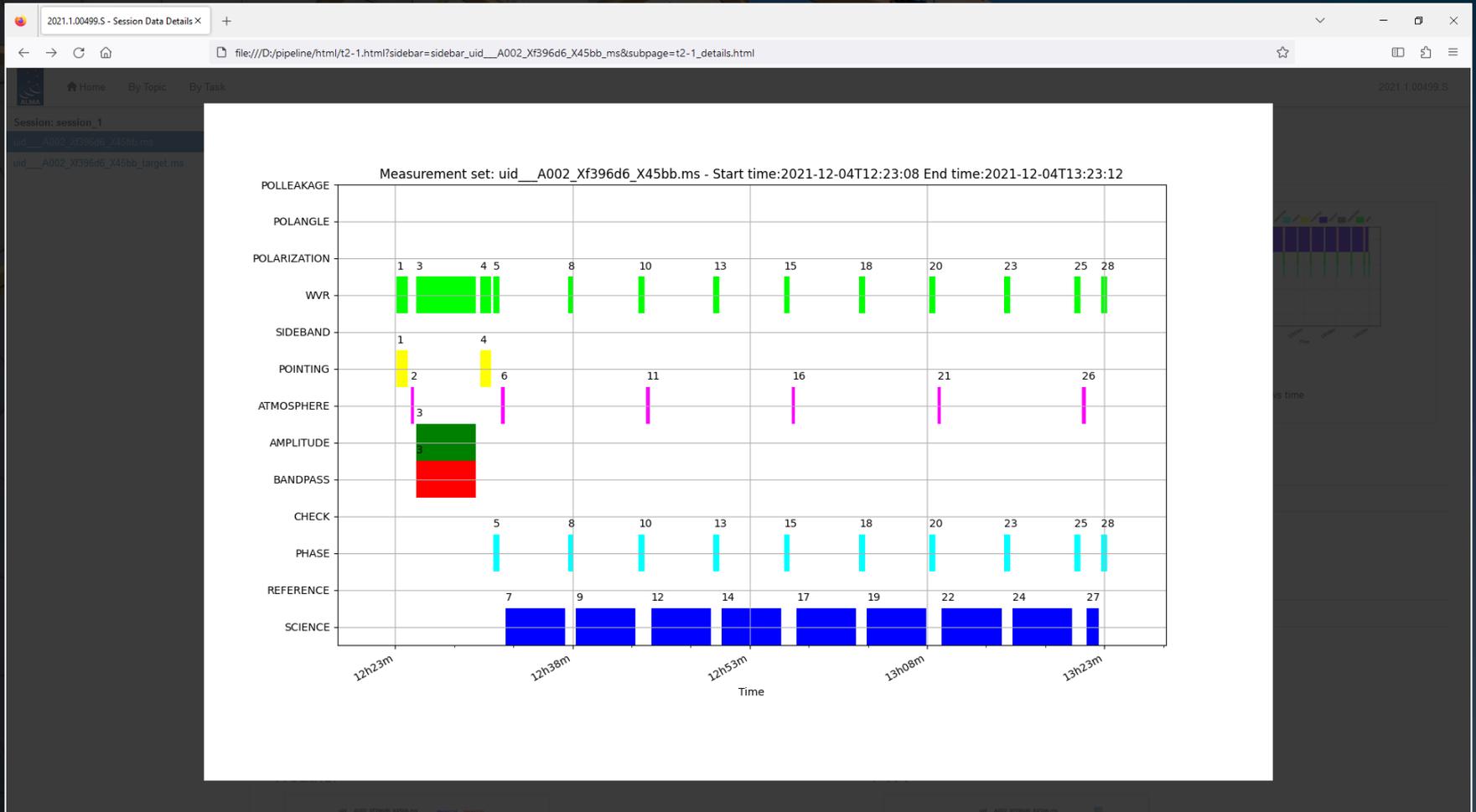
### listobs.txt

BACK

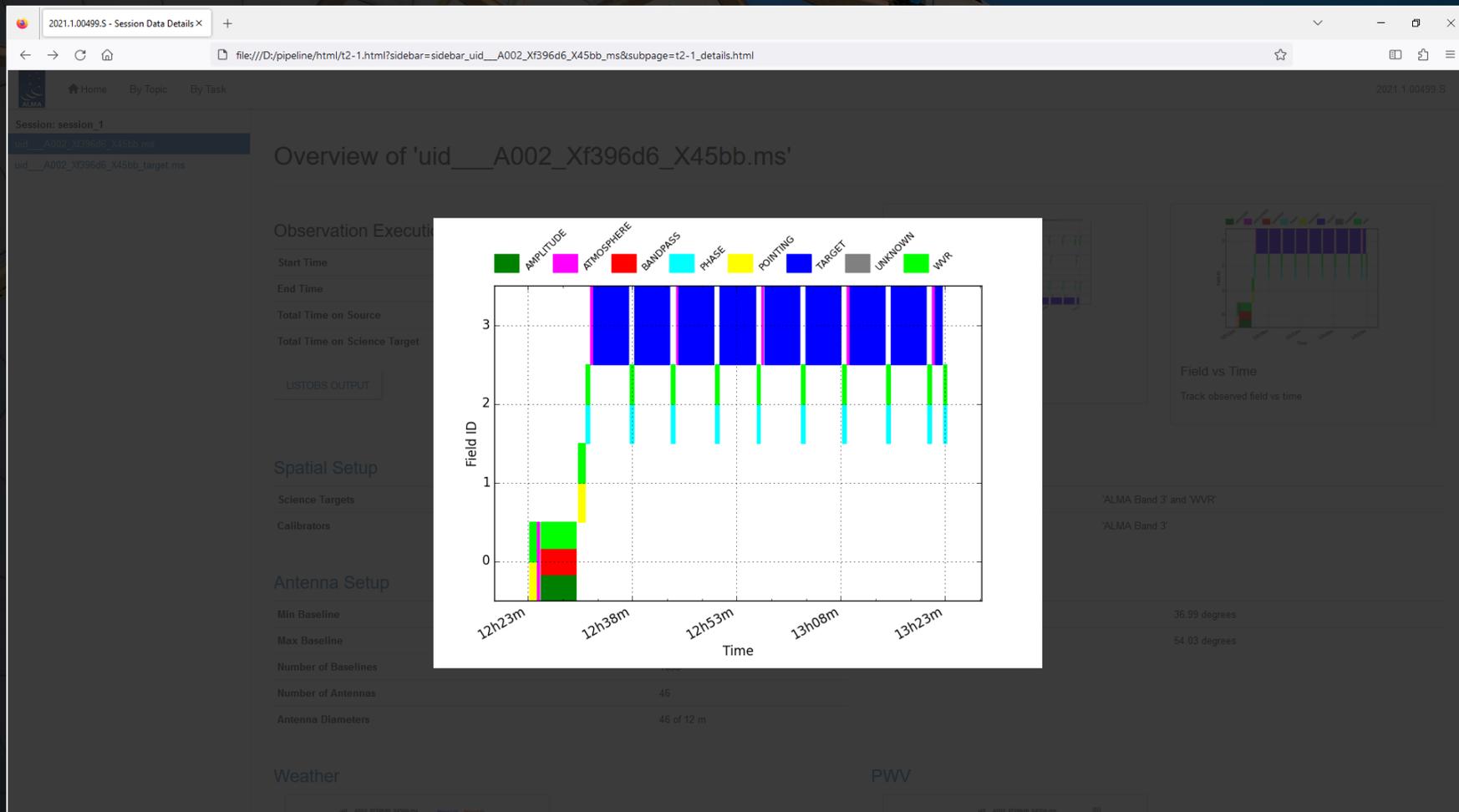
```
=====
MeasurementSet Name: /mnt/jaosco/data/pipeproc/dataproc/2021.1.00499.5_2021_12_06T14_48_15.733/SOUs_uid__A001_X158f_X79d/GOUS_uid__A001_X158f_X79e/MOUS_uid__A001_X158f_X781/working/uid__A002_Xf396d6_X45bb.ms  MS Version 2
=====
Observer: pkamieneski Project: uid://A001/X1525/X705
Observation: ALMA
Data records: 54407800 Total elapsed time = 3604.66 seconds
Observed from 04-Dec-2021/12:23:08.2 to 04-Dec-2021/13:23:12.8 (UTC)

ObservationID = 0 ArrayID = 0
Date Timerange (UTC) Scan FldId FieldName nRows SpwIds Average Interval(s) ScanIntent
04-Dec-2021/12:23:08.2 - 12:24:06.3 1 0 J1058+0133 724730 [0,1,2,3,4,5,6,7,8,9,10,11,12] [0.016, 0.016, 0.016, 0.016, 1.15, 2.02, 1.01, 2.02, 1.01, 2.02, 1.01, 2.02, 1.01, 2.02, 1.01] [CALIBRATE_POINTING#ON_SOURCE,CALIBRATE_JVR#ON_SOURCE]
12:24:18.4 - 12:24:34.9 2 0 J1058+0133 321210 [4,13,14,15,16,17,18,19,20,21,22,23,24] [1.15, 0.016, 0.016, 0.016, 0.016, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576] [CALIBRATE_ATMOSPHERE#AMBIENT,CALIBRA
TE_ATMOSPHERE#HOT,CALIBRATE_ATMOSPHERE#OFF_SOURCE,CALIBRATE_JVR#AMBIENT,CALIBRATE_JVR#HOT,CALIBRATE_JVR#OFF_SOURCE]
12:24:47.2 - 12:29:50.4 3 0 J1058+0133 5003098 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [CALIBRATE_BANDPASS#ON_SOURCE,CALIBRATE_FLUX#
ON_SOURCE,CALIBRATE_JVR#ON_SOURCE]
12:30:10.9 - 12:31:08.2 4 1 J1150+2417 724684 [0,1,2,3,4,5,6,7,8,9,10,11,12] [0.016, 0.016, 0.016, 0.016, 1.15, 2.02, 1.01, 2.02, 1.01, 2.02, 1.01, 2.02, 1.01, 2.02, 1.01] [CALIBRATE_POINTING#ON_SOURCE,CALIBRATE_JVR#ON_SOURCE]
12:31:17.8 - 12:31:49.0 5 2 J1148+1040 500342 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_JVR#ON_S
OURCE]
12:31:50.1 - 12:32:15.3 6 3 P3113921.7 321172 [4,13,14,15,16,17,18,19,20,21,22,23,24] [1.15, 0.016, 0.016, 0.016, 0.016, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576] [CALIBRATE_ATMOSPHERE#AMBIENT,CALIBRA
TE_ATMOSPHERE#HOT,CALIBRATE_ATMOSPHERE#OFF_SOURCE,CALIBRATE_JVR#AMBIENT,CALIBRATE_JVR#HOT,CALIBRATE_JVR#OFF_SOURCE]
12:32:20.0 - 12:37:23.1 7 3 P3113921.7 5003098 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [OBSERVE_TARGET#ON_SOURCE]
12:37:36.0 - 12:38:07.4 8 2 J1148+1040 500296 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_JVR#ON_S
OURCE]
12:38:17.1 - 12:43:19.9 9 3 P3113921.7 5003052 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [OBSERVE_TARGET#ON_SOURCE]
12:43:35.0 - 12:44:05.4 10 2 J1148+1040 500296 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_JVR#ON_S
OURCE]
12:44:15.4 - 12:44:34.1 11 3 P3113921.7 321172 [4,13,14,15,16,17,18,19,20,21,22,23,24] [1.15, 0.016, 0.016, 0.016, 0.016, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576] [CALIBRATE_ATMOSPHERE#AMBIENT,CALIBRA
TE_ATMOSPHERE#HOT,CALIBRATE_ATMOSPHERE#OFF_SOURCE,CALIBRATE_JVR#AMBIENT,CALIBRATE_JVR#HOT,CALIBRATE_JVR#OFF_SOURCE]
12:44:39.6 - 12:49:42.2 12 3 P3113921.7 5003052 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [OBSERVE_TARGET#ON_SOURCE]
12:49:55.2 - 12:50:26.5 13 2 J1148+1040 500342 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_JVR#ON_S
OURCE]
12:50:35.5 - 12:55:30.7 14 3 P3113921.7 5003098 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [OBSERVE_TARGET#ON_SOURCE]
12:55:53.5 - 12:56:23.8 15 2 J1148+1040 500296 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_JVR#ON_S
OURCE]
12:56:33.0 - 12:56:50.1 16 3 P3113921.7 321172 [4,13,14,15,16,17,18,19,20,21,22,23,24] [1.15, 0.016, 0.016, 0.016, 0.016, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576, 0.576] [CALIBRATE_ATMOSPHERE#AMBIENT,CALIBRA
TE_ATMOSPHERE#HOT,CALIBRATE_ATMOSPHERE#OFF_SOURCE,CALIBRATE_JVR#AMBIENT,CALIBRATE_JVR#HOT,CALIBRATE_JVR#OFF_SOURCE]
12:56:58.0 - 13:02:01.1 17 3 P3113921.7 5003098 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [OBSERVE_TARGET#ON_SOURCE]
13:02:14.8 - 13:02:45.5 18 2 J1148+1040 500296 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [CALIBRATE_PHASE#ON_SOURCE,CALIBRATE_JVR#ON_S
OURCE]
13:02:55.1 - 13:07:57.4 19 3 P3113921.7 6003052 [4,13,14,15,16,17,18,21,22,23,24,25,26] [1.15, 0.016, 0.016, 0.016, 0.016, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01, 6.05, 1.01] [OBSERVE_TARGET#ON_SOURCE]
```

The intent versus time plot shows the sequence of the observations as well as the purpose of those observations. Some observations have multiple purposes.



The field versus time plot is similar except that the y-axis indicates the field ID. In this case, 0 is field for the bandpass calibrator, 1 is the field for the phase calibrator, and 2 is the field for the science target (Z CMA).



The antenna setup page shows the location of the antennas and the resulting uv coverage (which is related to the final angular resolution and maximum recoverable scale of the data).

2021.1.00499.S - Session Data Details X +

file:///D:/pipeline/html/t2-1.html?sidebar=sidebar\_uid\_\_\_A002\_Xf396d6\_X45bb\_ms&subpage=t2-2-3.html

ALMA Home By Topic By Task 2021.1.00499.S

Session: session\_1

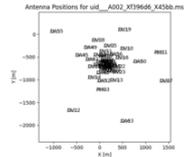
uid\_\_\_A002\_Xf396d6\_X45bb\_ms

uid\_\_\_A002\_Xf396d6\_X45bb\_target.ms

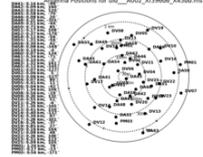
## Antenna Setup Details

Antennas Baselines

### Antenna Positions

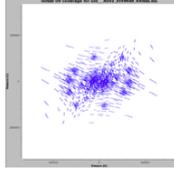


Antenna Position  
Plot antenna latitude vs antenna longitude



Antenna Position  
Polar-logarithmic plot of antenna positions.

### UV coverage

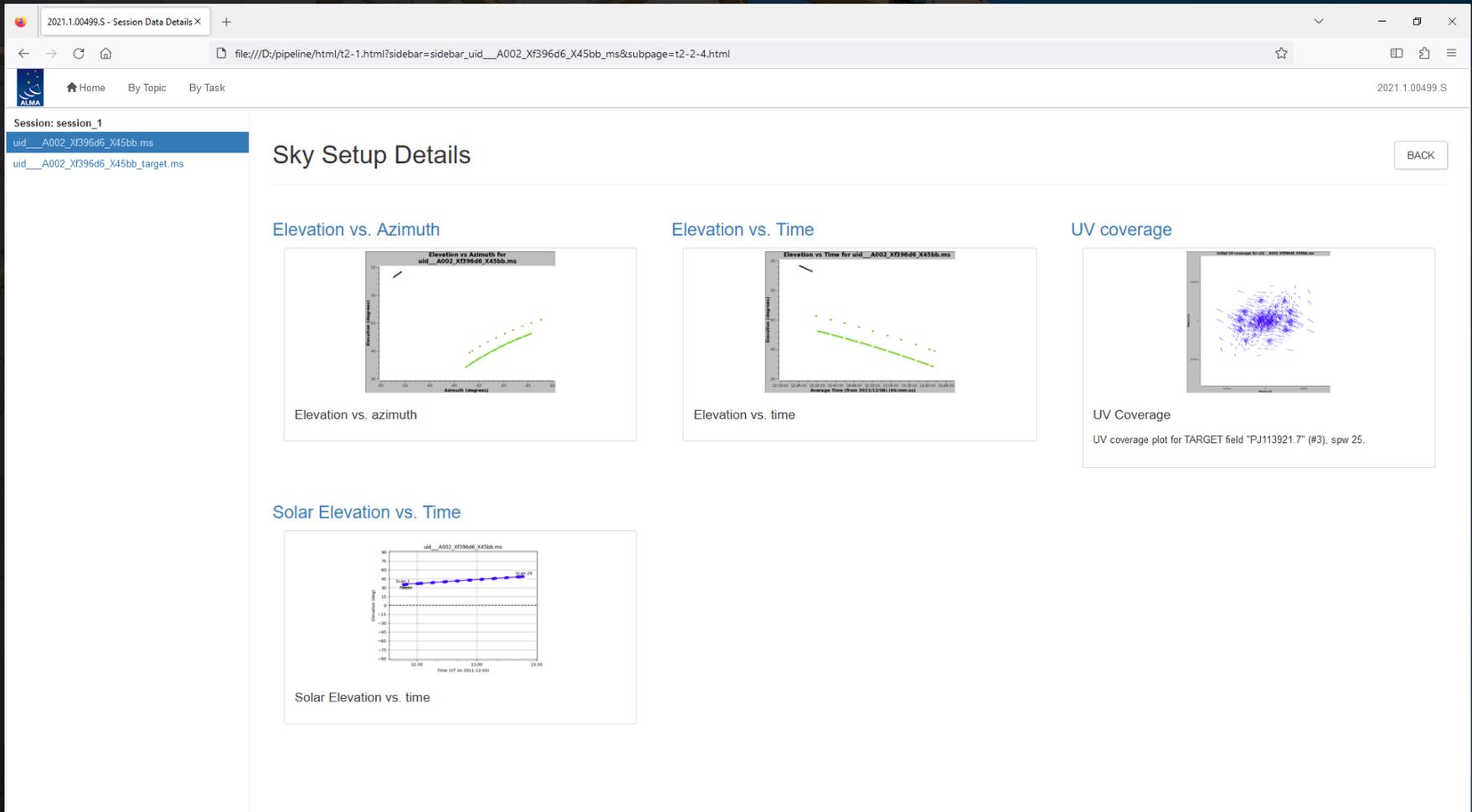


UV Coverage  
UV coverage plot for TARGET field "PUJ113921.7" (#3), spw 25.

### Antenna Details

ID	Name	Pad	Diameter	Offset from Array Centre	
				Longitude	Latitude
0	DA41	A073	12.0	-147.1 m	-705.3 m
1	DA42	A047	12.0	38.5 m	-775.2 m
2	DA43	A035	12.0	32.0 m	-706.8 m
3	DA45	A104	12.0	-530.9 m	-492.5 m
4	DA46	A016	12.0	37.5 m	-614.6 m
5	DA48	A076	12.0	-78.0 m	-882.7 m
6	DA49	A096	12.0	-347.1 m	-322.8 m
7	DA50	A100	12.0	725.0 m	632.0 m

The sky setup shows the elevation and azimuth of the fields during the observations. The beam for sources observed at low elevations ( $<45^\circ$ ) could appear elongated. Calibration problems may occur if the phase calibrator and science target are too far apart ( $>10^\circ$ ).





The By Task page lists each of the calibration and imaging steps that were applied in the pipeline. Not all of these steps need to be checked. Many of these have diagnostic information primarily used for quality assessment.

Task	QA Score	Duration
1. <code>hifa_importdata</code> : Register measurement sets with the pipeline	1.00	0:13:08
2. <code>hifa_flagdata</code> : ALMA deterministic flagging	1.00	0:42:48
3. <code>hifa_fluxcallflag</code> : Flag spectral features in solar system flux calibrators	1.00	0:00:03
4. <code>hif_rawflagchans</code> : Flag channels in raw data	1.00	0:04:18
5. <code>hif_refant</code> : Select reference antennas	1.00	0:00:12
6. <code>h_tsyscal</code> : Calculate Tsys calibration	1.00	0:07:38
7. <code>hifa_tsysflag</code> : Flag Tsys calibration	0.96	0:09:05
8. <code>hifa_antpos</code> : Correct for antenna position offsets	1.00	0:00:03
9. <code>hifa_wvrflag</code> : Calculate and flag WVR calibration	1.00	0:17:32
10. <code>hif_lowgainflag</code> : Flag antennas with low gain	1.00	0:05:35
11. <code>hif_setmodels</code> : Set calibrator model visibilities	1.00	0:05:50
12. <code>hifa_bandpassflag</code> : Phase-up bandpass calibration and flagging	0.96	0:20:04
13. <code>hifa_bandpass</code> : Phase-up bandpass calibration	0.95	0:15:21
14. <code>hifa_spwphaseup</code> : Spw phase offsets calibration	1.00	0:00:28
15. <code>hifa_gfluxscaleflag</code> : Phased-up flux scale calibration + flagging	1.00	0:08:55
16. <code>hifa_gfluxscale</code> : Transfer fluxscale from amplitude calibrator	1.00	0:10:11
17. <code>hifa_timegaincal</code> : Gain calibration	1.00	0:22:26
18. <code>hifa_targetflag</code> : Target outlier flagging	1.00	0:11:21
19. <code>hif_applycal</code> : Apply calibrations from context	1.00	0:35:17

**hifa\_tsysflag**: This step includes plots of the  $T_{\text{sys}}$  data (used to correct amplitudes) as a function of frequency. It is useful to check these plots to understand the atmospheric transmission. Spectral features in these data could potentially reappear in the final spectra of the science targets.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage7&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task 2021.1.00499.S

**Tasks in execution order**

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcalflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
- 7. hifa\_tsysflag**
8. hifa\_antpos
9. hifa\_wvrqcalflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renom
27. hifa\_exportdata
28. hif\_mstansform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontsub

## 7. Flag $T_{\text{sys}}$ calibration

BACK

**Task notifications**

Warning! uid\_\_A002\_Xf396d6\_X45bb.ms - for intent AMPLITUDE (field 0: J1058+0133) and spw 23, the following antennas are fully flagged: DA52

Warning! uid\_\_A002\_Xf396d6\_X45bb.ms - for intent BANDPASS (field 0: J1058+0133) and spw 23, the following antennas are fully flagged: DA52

Warning! uid\_\_A002\_Xf396d6\_X45bb.ms - the following antennas are moved to the end of the refant list because they are fully flagged for one or more Tsys spws, in one or more fields with intent "BANDPASS", "PHASE", and/or "AMPLITUDE": DA52

### Contents

- Reference antenna update
- $T_{\text{sys}}$  after flagging
- Flagged data summary
- Flag step details
  - manual
  - nmedian
  - derivative
  - edgechans
  - fieldshape
  - birdies
  - toomany

### Reference Antenna update

For the measurement set(s) listed below, the reference antenna list was updated due to significant flagging (antennas moved to end and/or removed). See warnings in task notifications for details. Shown below are the updated reference antenna lists, only for those measurement sets where it was modified.

Measurement Set	Reference Antennas (Highest to Lowest)
uid__A002_Xf396d6_X45bb.ms	DA43, DV06, DV03, DV02, DV04, DV01, DA60, DA58, DV21, DA46, DA42, DV25, DA62, DA54, DA65, DV20, DA41, DA51, PM02, DA59, DV09, DA48, DV18, DV22, DV17, DV11, DA56, DV23, DA61, DV16, DV14, DV13, DV05, DA49, DV10, DV08, PM03, DA45, DA50, DV19, PM01, DV12, DA55, DA63, DV07, DA52

Updated reference antenna selection per measurement set. Antennas are listed in order of highest to lowest priority.

### $T_{\text{sys}}$ vs frequency after flagging

**hifa\_tsysflag**: This step includes plots of the  $T_{\text{sys}}$  data (used to correct amplitudes) as a function of frequency. It is useful to check these plots to understand the atmospheric transmission. Spectral features in these data could potentially reappear in the final spectra of the science targets.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage7&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task 2021.1.00499.S

**Tasks in execution order**

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
- 7. hifa\_tsysflag**
8. hifa\_antpos
9. hifa\_wvrgcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renom
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvconftit

For the measurement set(s) listed below, the reference antenna list was updated due to significant flagging (antennas moved to end and/or removed). See warnings in task notifications for details. Shown below are the updated reference antenna lists, only for those measurement sets where it was modified.

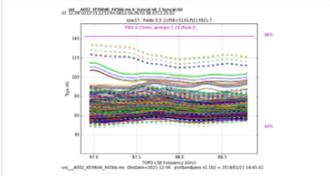
Measurement Set	Reference Antennas (Highest to Lowest)
uid__A002_Xf396d6_X45bb.ms	DA43, DV06, DV03, DV02, DV04, DV01, DA60, DA58, DV21, DA46, DA42, DV25, DA62, DA54, DA65, DV20, DA41, DA51, PM02, DA59, DV09, DA48, DV18, DV22, DV17, DV11, DA56, DV23, DA61, DV16, DV14, DV13, DV05, DA49, DV10, DV08, PM03, DA45, DA50, DV19, PM01, DV12, DA55, DA63, DV07, DA52

Updated reference antenna selection per measurement set. Antennas are listed in order of highest to lowest priority.

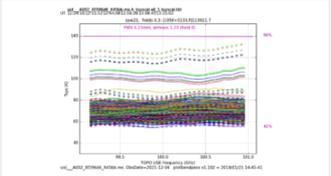
**$T_{\text{sys}}$  vs frequency after flagging**

Plots of time-averaged  $T_{\text{sys}}$  vs frequency, colored by antenna.

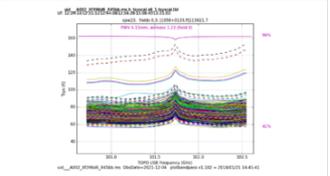
uid\_\_A002\_Xf396d6\_X45bb.ms



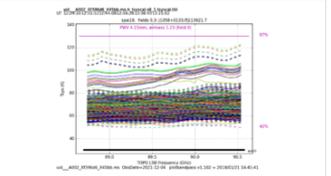
$T_{\text{sys}}$  SPW 17  
Science spw 17.



$T_{\text{sys}}$  SPW 21  
Science spw 21.



$T_{\text{sys}}$  SPW 23  
Science spw 23.



$T_{\text{sys}}$  SPW 19  
Science spw 25.

**Flagging steps**

Measurement Set	manual	nmedian	derivative	edgechans	fieldshape	birdies	toomany
uid__A002_Xf396d6_X45bb.ms.h_tsyscal.s6_1_tsyscal.tbl	✓	✓	✓	✓	✓	✓	✓

**Flagged data summary**

Table: uid\_\_A002\_Xf396d6\_X45bb.ms.h\_tsyscal.s6\_1\_tsyscal.tbl

Flagging Step	Count
manual	0
nmedian	0
derivative	0
edgechans	0
fieldshape	0
birdies	0
toomany	0



# hifa\_bandpass: Corrections for the phase and amplitude versus frequency are derived in this step.

The screenshot shows a web browser window with the URL `file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar_stage13&ms=all&subpage=t2-4m_details.html`. The page title is "2021.1.00499.S - Task Details". The left sidebar lists tasks in execution order, with "13. hifa\_bandpass" selected. The main content area is titled "13. Bandpass Calibration" and includes a "BACK" button. The text states: "This task creates bandpass solutions for each measurement set." The "Results" section is titled "Phase-up on bandpass calibrator" and contains a table of "Phase-up Solution Parameters". Below this is the text "Applied calibrations and parameters used for phase-up calibration". The "Bandpass calibration" section contains a table with columns for "Measurement Set", "Solution Parameters", "Applied To", and "Calibration Table". The "Parameters used for bandpass calibration" section is empty. The "Plots" section is titled "Plots" and contains text about the plots and a link to enlarge them.

## 13. Bandpass Calibration

BACK

This task creates bandpass solutions for each measurement set.

### Results

Phase-up on bandpass calibrator

Measurement Set	Phase-up Solution Parameters				
	Type	Interval	Min Baselines per Antenna	Min SNR	Phase-up Bandwidth
uid__A002_Xf396d6_X45bb.ms	Phase only	Per integration (6.05s)	4	3.0	

Applied calibrations and parameters used for phase-up calibration

### Bandpass calibration

Measurement Set	Solution Parameters		Applied To		Calibration Table
	Type	Interval	Scan Intent	Spectral Windows	
uid__A002_Xf396d6_X45bb.ms	Channel	inf,15.625000MHz(1.0ch)	ALL	17	uid__A002_Xf396d6_X45bb.ms.hifa_bandpass.s13_3.spw17_21_23_25.channel.solintinf.bcal.tbl
				21	
	23				
	25				
		inf,3.906250MHz(1.0ch)			

Parameters used for bandpass calibration

### Plots

Plots show the bandpass correction applied to the target source. The first two plots show amplitude vs frequency; one for the reference antenna and one for a typical antenna, identified the antenna with mode score. The third plot shows phase vs frequency for the typical antenna.

Click the summary plots to enlarge them, or the plot title to see detailed plots per spectral window and antenna.

uid\_\_A002\_Xf396d6\_X45bb.ms

The plots of these quantities versus frequency should be smooth. Any strong spikes or dips in the data could create false spectral lines in the final image cubes.

2021.1.00499.5 - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage13&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task

2021.1.00499.5

### Tasks in execution order

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
- 13. hifa\_bandpass**
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renom
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontcube

## Plots

Plots show the bandpass correction applied to the target source. The first two plots show amplitude vs frequency; one for the reference antenna and one for a typical antenna, identified the antenna with mode score. The third plot shows phase vs frequency for the typical antenna.

Click the summary plots to enlarge them, or the plot title to see detailed plots per spectral window and antenna.

uid\_\_\_A002\_Xf396d6\_X45bb.ms

### Amplitude vs frequency (show uid\_\_\_A002\_Xf396d6\_X45bb.ms)

The plots below show amplitude vs frequency for the bandpass correction, overlaid for all spectral windows and correlations. Click on the link above to show detailed plots for all antennas, or on the links below to show plots with specific antennas preselected.

Reference antenna (DA43) ( show DA43 )

Amplitude vs frequency for the reference antenna (DA43). Click the link above to show detailed plots for DA43.

Typical antenna (DA41) ( show DA41 )

Amplitude vs frequency for a typical antenna (DA41). Click the link above to show detailed plots for DA41.

NB: random antenna until scores are working

### Phase vs frequency (show uid\_\_\_A002\_Xf396d6\_X45bb.ms)

The plot below shows phase vs frequency for the bandpass correction, overlaid for all spectral windows and correlations. Click on the link above to show phase vs frequency plots for all antennas, or on the link for just the typical antenna.

Typical antenna (DA41) ( show DA41 )

Phase vs frequency for a typical antenna (DA41). Click the link above to show detailed plots for DA41.

Pipeline QA

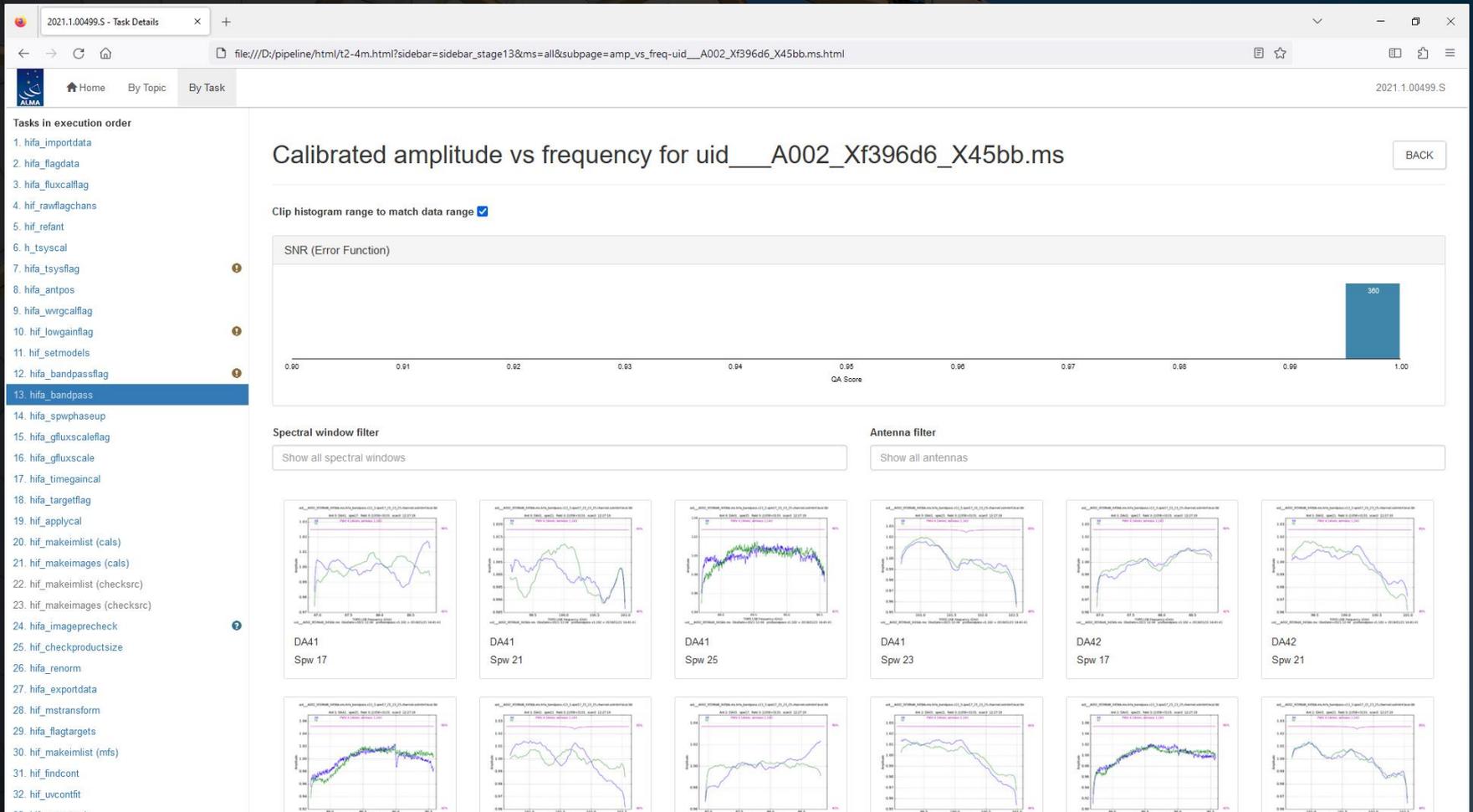
Input Parameters

Tasks Execution Statistics

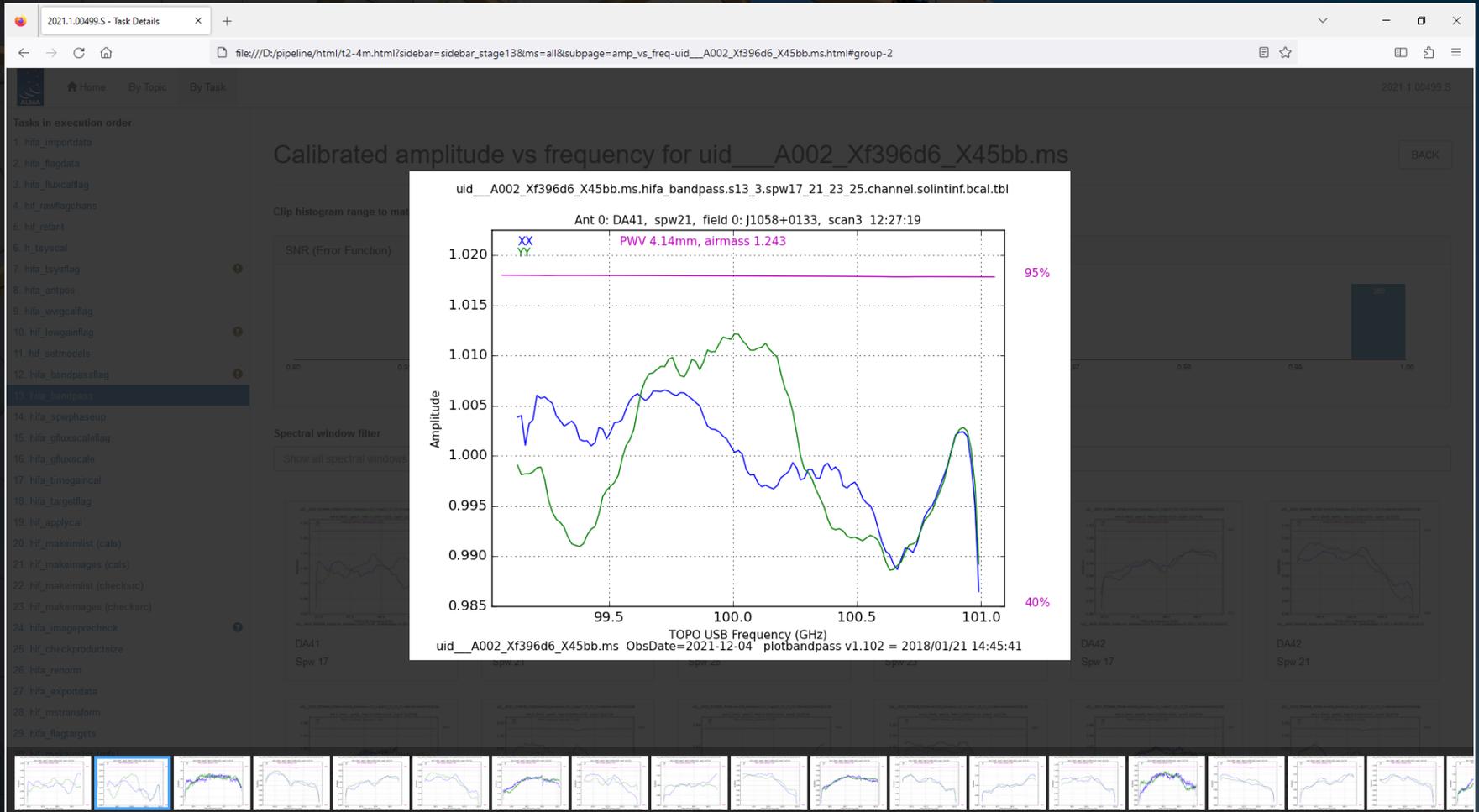
CASA logs for stage 13

- View or download stage13/casapy.log (152.1 KB)

The plots of these quantities versus frequency should be smooth. Any strong spikes or dips in the data could create false spectral lines in the final image cubes.



The plots of these quantities versus frequency should be smooth. Any strong spikes or dips in the data could create false spectral lines in the final image cubes.



**hifa\_timegaincal:** This module derives phase and amplitude corrections versus time. The output from this module only needs to be reviewed when problems arise with the data.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage17&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task

2021.1.00499.S

**Tasks in execution order**

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontsub

## 17. Gain Calibration

BACK

This task creates gain solutions for each measurement set.

- Plots
  - Phase vs time
  - Amplitude vs time
- Diagnostic plots
  - Phase vs time
  - Phase offsets vs time
  - Amplitude vs time

### Results

Measurement Set	Solution Parameters		Applied To			Calibration Table
	Type	Interval	Scan Intent	Spectral Windows	Gainfield	
uid__A002_Xf396d6_X45bb.ms	Phase only	Infinite	PHASE	17, 21, 23, 25	nearest	uid__A002_Xf396d6_X45bb.ms.hifa_timegaincal.s17_2.spw17_21_23_25.solintinf.gpcal.tbl
uid__A002_Xf396d6_X45bb.ms	Phase only	Infinite	TARGET, CHECK	17, 21, 23, 25		uid__A002_Xf396d6_X45bb.ms.hifa_timegaincal.s17_2.spw17_21_23_25.solintinf.gpcal.tbl
uid__A002_Xf396d6_X45bb.ms	Phase only	Per integration (6.05s)	AMPLITUDE, BANDPASS, POLARIZATION, POLANGLE, POLLEAKAGE	17, 21, 23, 25	nearest	uid__A002_Xf396d6_X45bb.ms.hifa_timegaincal.s17_3.spw17_21_23_25.solintinf.gpcal.tbl
uid__A002_Xf396d6_X45bb.ms	Amplitude only	Infinite	AMPLITUDE, BANDPASS, PHASE, POLARIZATION, POLANGLE, POLLEAKAGE	17, 21, 23, 25	nearest	uid__A002_Xf396d6_X45bb.ms.hifa_timegaincal.s17_7.spw17_21_23_25.solintinf.gacal.tbl
uid__A002_Xf396d6_X45bb.ms	Amplitude only	Infinite	TARGET, CHECK	17, 21, 23, 25		uid__A002_Xf396d6_X45bb.ms.hifa_timegaincal.s17_7.spw17_21_23_25.solintinf.gacal.tbl

Applied calibrations and parameters used for caltable generation

### Plots

#### Phase vs time

# hifa\_timegaincal: This module derives phase and amplitude corrections versus time. The output from this module only needs to be reviewed when problems arise with the data.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage17&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task 2021.1.00499.S

### Tasks in execution order

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
- 17. hifa\_timegaincal**
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renom
27. hifa\_exportdata
28. hif\_mstransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontcheck

## Plots

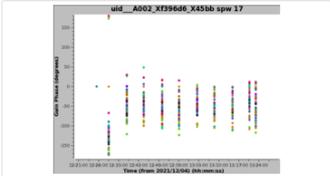
### Phase vs time

Plots show the phase correction to be applied to the target source. A plot is shown for each spectral window, with phase correction data points plotted per antenna and correlation as a function of time.

Click the summary plots to enlarge them, or the spectral window heading to see detailed plots per spectral window and antenna.

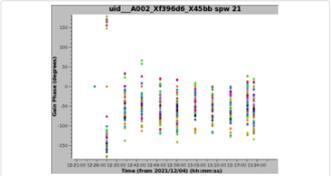
[uid\\_\\_A002\\_Xf396d6\\_X45bb.ms](#)

#### Spectral window 17



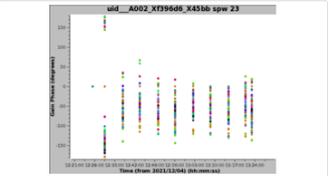
Phase vs time for spectral window 17, all antennas and correlations.

#### Spectral window 21



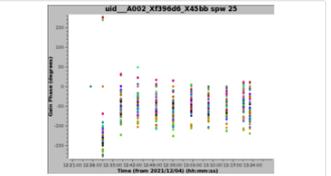
Phase vs time for spectral window 21, all antennas and correlations.

#### Spectral window 23



Phase vs time for spectral window 23, all antennas and correlations.

#### Spectral window 25



Phase vs time for spectral window 25, all antennas and correlations.

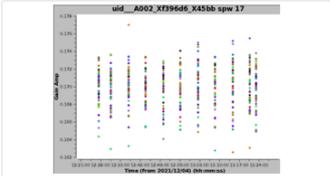
### Amplitude vs time

Plots show the amplitude calibration to be applied to the target source. A plot is shown for each spectral window and each set of antennas with the same antenna diameter, with amplitude correction data points per antenna and correlation as a function of time.

Click the summary plots to enlarge them, or the spectral window heading to see detailed plots per spectral window and antenna.

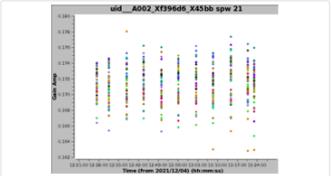
[uid\\_\\_A002\\_Xf396d6\\_X45bb.ms](#)

#### Spectral window 17



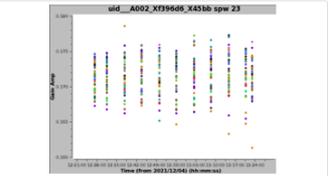
Amplitude vs time for spectral window 17, all antennas and correlations.

#### Spectral window 21



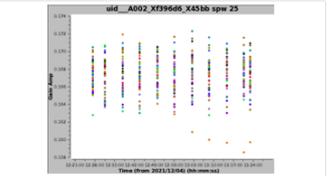
Amplitude vs time for spectral window 21, all antennas and correlations.

#### Spectral window 23



Amplitude vs time for spectral window 23, all antennas and correlations.

#### Spectral window 25



Amplitude vs time for spectral window 25, all antennas and correlations.

**hifa\_timegaincal:** This module derives phase and amplitude corrections versus time. The output from this module only needs to be reviewed when problems arise with the data.

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file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage17&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task 2021.1.00499.S

**Tasks in execution order**

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. **hifa\_timegaincal**
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontsub

### Diagnostic plots

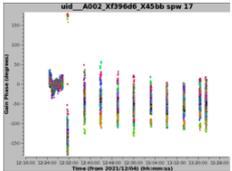
#### Phase vs time

These diagnostic plots show the phase solution for a calibration generated using a short solution interval. In case of very low SNR, solutions averaged in time for the phase calibrator are used with a solint = 1/4 the phasecal scan time. This calibration is not applied to the target. One plot is shown for each non-combined spectral window, with phase correction plotted per antenna and correlation as a function of time.

Click the summary plots to enlarge them, or the spectral window heading to see detailed plots per spectral window and antenna.

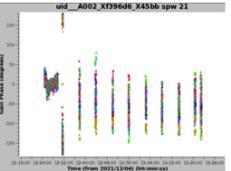
[uid\\_\\_A002\\_Xf396d6\\_X45bb.ms](#)

Plots show the diagnostic phase calibration for uid\_\_A002\_Xf396d6\_X45bb.ms.



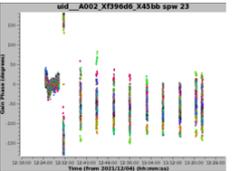
**Spectral window 17**

Phase vs time for spectral window 17, all antennas and correlations.



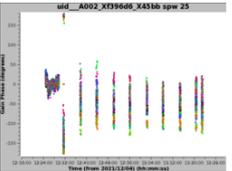
**Spectral window 21**

Phase vs time for spectral window 21, all antennas and correlations.



**Spectral window 23**

Phase vs time for spectral window 23, all antennas and correlations.



**Spectral window 25**

Phase vs time for spectral window 25, all antennas and correlations.

#### Phase offsets vs time

These diagnostic plots show the phase offsets as a function of time. The phase offsets are computed by preapplying the previous phase only solutions to the data and computing a new phase solution. The new phase solutions should scatter around zero. The new solutions are not applied to the target. One plot is shown for each spectral window, with phase offset plotted per antenna and correlation as a function of time.

Click the summary plots to enlarge them, or the spectral window heading to see detailed plots per spectral window and antenna.

[uid\\_\\_A002\\_Xf396d6\\_X45bb.ms](#)

Plots show the diagnostic phase offsets for uid\_\_A002\_Xf396d6\_X45bb.ms calculated using solint=inf.

**Note that no spectral windows have been combined or remapped**



**Spectral window 17**



**Spectral window 21**



**Spectral window 23**



**Spectral window 25**

**hifa\_applycal:** This step applies the calibration tables and created plots of the phases and amplitudes afterwards. Most of the output from this module only needs to be reviewed when problems arise with the data.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage19&ms=all&subpage=t2-4m\_details.html

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2021.1.00499.S

**Tasks in execution order**

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
- 19. hif\_applycal**
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mstransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontsub

## 19. Apply calibration tables

BACK

This task applies all calibrations registered with the pipeline to their target measurement sets.

### Contents

- Applied calibrations
- Flagged data after calibration application
- Plots
  - Calibrated amplitude vs frequency
  - Calibrated phase vs frequency
  - Calibrated amplitude vs UV distance
  - Calibrated amplitude vs time
  - Calibrated phase vs time
  - (Corrected amplitude / model) vs antenna
  - (Corrected amplitude / model) vs UV distance
  - Science target: calibrated amplitude vs frequency
  - Science target: calibrated amplitude vs UV distance
  - UV coverage

### Applied calibrations

The *Fields* column lists fields within the measurement set containing any of the intents listed in the *Intents* column. If a field name is ambiguous and does not uniquely identify a field, e.g., when a field is observed with multiple intents, then the unambiguous field ID is listed instead of the field name. The order of entries in the *Fields* and *Intents* columns has no significance.

Measurement Set		Target				Calibration					
Name	Final Size	Intent	Fields	Spw	Antenna	Type	spwmap	gainfield	interp	calwt	table
uid__A002_Xf396d6_X45bb.ms (callibrary: <a href="#">view</a> / <a href="#">download</a> )	32.8 GB	TARGET	"PJ113921.7"	17, 21, 23, 25	0~45	T <sub>sys</sub>	17, 1, 2, 3, 4, 17, 17, 7, 19, 9, 10, 11, 12, 17, 19, 21, 23, 17, 17, 19, 19, 21, 21, 23, 23, 19, 19	"PJ113921.7"	linear, linear	True	<a href="#">Filename</a>
						WVR		nearest	False	<a href="#">Filename</a>	
						Bandpass		linearperobs, linearflag	True	<a href="#">Filename</a>	
						Gain (phase only)		nearest	linear, linear	False	<a href="#">Filename</a>

**hifa\_applycal:** This step applies the calibration tables and created plots of the phases and amplitudes afterwards. Most of the output from this module only needs to be reviewed when problems arise with the data.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage19&ms=all&subpage=t2-4m\_details.html

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2021.1.00499.S

Tasks in execution order

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renom
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvconttbl

### Plots

#### Calibrated amplitude vs frequency

Plots of calibrated amplitude vs frequency for all antennas and correlations, coloured by antenna. The atmospheric transmission for each spectral window is overlaid on each plot in pink.

uid\_\_\_A002\_Xf396d6\_X45bb.ms

Spw 17  
ALMA Band 3  
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133

Spw 21  
ALMA Band 3  
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133

Spw 23  
ALMA Band 3  
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133

Spw 25  
ALMA Band 3  
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133

Spw 17  
ALMA Band 3  
Intents: PHASE  
Fields: J1148+1840

Spw 21  
ALMA Band 3  
Intents: PHASE  
Fields: J1148+1840

Spw 23  
ALMA Band 3  
Intents: PHASE  
Fields: J1148+1840

Spw 25  
ALMA Band 3  
Intents: PHASE  
Fields: J1148+1840

#### Calibrated phase vs frequency

**hifa\_applycal:** This step applies the calibration tables and created plots of the phases and amplitudes afterwards. Most of the output from this module only needs to be reviewed when problems arise with the data.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage19&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task 2021.1.00499.S

Tasks in execution order

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renom
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontcheck

### Calibrated phase vs frequency

Plots of calibrated phase vs frequency for all antennas and correlations, coloured by antenna.

uid\_\_A002\_Xf396d6\_X45bb.ms

Spectral Window	ALMA Band	Intents	Fields
Spectral Window 17	ALMA Band 3	BANDPASS	J1058+0133
Spectral Window 21	ALMA Band 3	BANDPASS	J1058+0133
Spectral Window 23	ALMA Band 3	BANDPASS	J1058+0133
Spectral Window 25	ALMA Band 3	BANDPASS	J1058+0133
Spectral Window 17	ALMA Band 3	PHASE	J1148+1840
Spectral Window 21	ALMA Band 3	PHASE	J1148+1840
Spectral Window 23	ALMA Band 3	PHASE	J1148+1840
Spectral Window 25	ALMA Band 3	PHASE	J1148+1840

### Calibrated amplitude vs UV distance

Plots of calibrated amplitude vs UV distance for the calibrators in each measurement set. Data are plotted for all antennas, coloured by correlation.

uid\_\_A002\_Xf396d6\_X45bb.ms

**hifa\_applycal:** This step applies the calibration tables and created plots of the phases and amplitudes afterwards. Most of the output from this module only needs to be reviewed when problems arise with the data.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage19&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task

2021.1.00499.S

Tasks in execution order

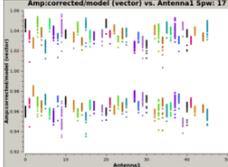
1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontplot

### (Corrected amplitude / model) vs antenna

Plots of the ratio of the corrected amplitude to the model column value versus antenna ID. Data are coloured by antenna and are shown for all antennas and correlations.

uid\_\_A002\_Xf396d6\_X45bb.ms

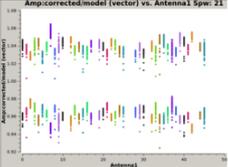
Plots for AMPLITUDE calibration intent were created with UV range set to capture the inner half of the data (UV max < 449.2 m). Plots for other intents have no UV range restriction.



Amp:corrected(model (vector) vs. Antenna1 Spw: 17

Spectral Window 17  
ALMA Band 3

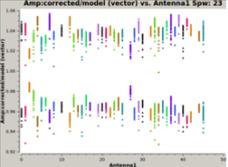
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133



Amp:corrected(model (vector) vs. Antenna1 Spw: 21

Spectral Window 21  
ALMA Band 3

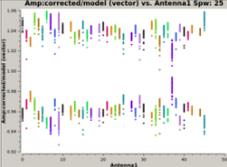
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133



Amp:corrected(model (vector) vs. Antenna1 Spw: 23

Spectral Window 23  
ALMA Band 3

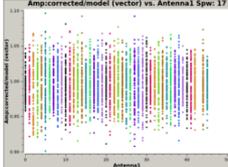
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133



Amp:corrected(model (vector) vs. Antenna1 Spw: 25

Spectral Window 25  
ALMA Band 3

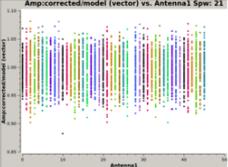
Intents: AMPLITUDE,BANDPASS  
Fields: J1058+0133



Amp:corrected(model (vector) vs. Antenna1 Spw: 17

Spectral Window 17  
ALMA Band 3

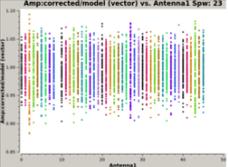
Intents: PHASE  
Fields: J1148+1840



Amp:corrected(model (vector) vs. Antenna1 Spw: 21

Spectral Window 21  
ALMA Band 3

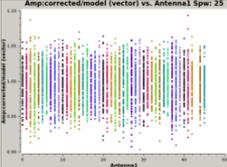
Intents: PHASE  
Fields: J1148+1840



Amp:corrected(model (vector) vs. Antenna1 Spw: 23

Spectral Window 23  
ALMA Band 3

Intents: PHASE  
Fields: J1148+1840



Amp:corrected(model (vector) vs. Antenna1 Spw: 25

Spectral Window 25  
ALMA Band 3

Intents: PHASE  
Fields: J1148+1840

### (Corrected amplitude / model) vs UV distance

Plots of the ratio of the corrected amplitude to the model column value versus UV distance. Data are coloured by antenna and are shown for all antennas and correlations.

uid\_\_A002\_Xf396d6\_X45bb.ms

**hif\_makeimages (cals):** When this is first called, it makes continuum images of each calibrator in each spw for quality assessment. The images of the phase calibrator (which is near the science targets) are useful to look at to understand the beam size and shape.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage21&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task 2021.1.00499.S

**Tasks in execution order**

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mstransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit
33. hif\_uvcontchk

## 21. Tclean/MakeImages

Make calibrator images

BACK

### Image Details

#### Fields

- J1058+0133 (BANDPASS)
- J1148+1840 (PHASE)

Field	Spw	Spw	Spw	Spw
J1058+0133 (BANDPASS)	17 / X1620027342#ALMA_RB_03#BB_1#SW-01	21 / X1620027342#ALMA_RB_03#BB_3#SW-01	23 / X1620027342#ALMA_RB_03#BB_4#SW-01	25 / X1620027342#ALMA_RB_03#BB_2#SW-01
<b>centre frequency of image</b>	87.8709GHz (LSRK)	100.0536GHz (LSRK)	101.6100GHz (LSRK)	89.6315GHz (LSRK)
<b>beam</b>	0.533 x 0.504 arcsec	0.480 x 0.402 arcsec	0.462 x 0.404 arcsec	0.542 x 0.490 arcsec
<b>beam p.a.</b>	-65.7deg	-23.5deg	-20.4deg	-63.7deg
<b>final theoretical sensitivity</b>	50 uJy/beam	50 uJy/beam	53 uJy/beam	52 uJy/beam
<b>cleaning threshold</b>	3.1 mJy/beam Dirty DR: 8.5e+04 DR correction: 31	2.9 mJy/beam Dirty DR: 7.9e+04 DR correction: 28	2.9 mJy/beam Dirty DR: 7.5e+04 DR correction: 27	3 mJy/beam Dirty DR: 8.2e+04 DR correction: 29
<b>clean residual peak / scaled</b>	10.62	14.39	13.49	11.71

**hif\_makeimages (cals):** When this is first called, it makes continuum images of each calibrator in each spw for quality assessment. The images of the phase calibrator (which is near the science targets) are useful to look at to understand the beam size and shape.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage21&ms=all&subpage=uid\_\_\_A001\_X158f\_X7a1-field/1058\_0133\_BANDPASS\_spw17-poll-cleanplots.html

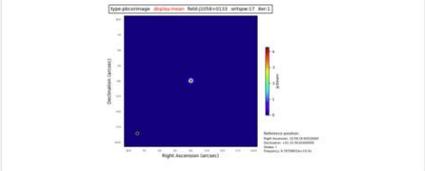
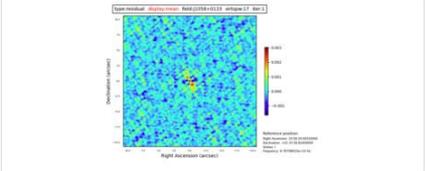
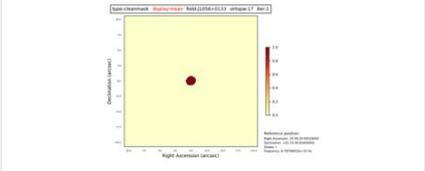
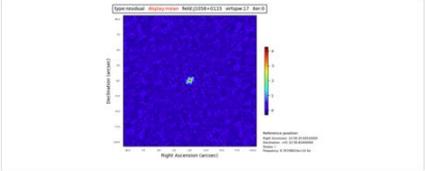
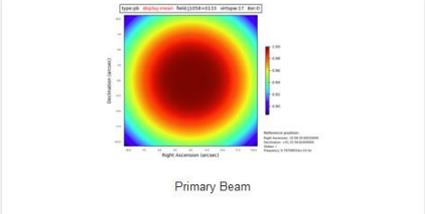
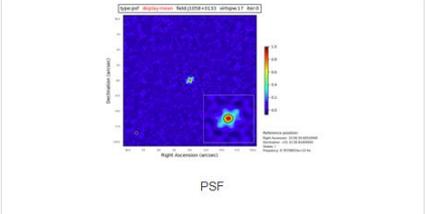
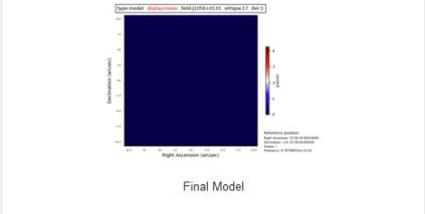
Home By Topic By Task 2021.1.00499.S

Tasks in execution order

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
- 21. hif\_makeimages (cals)**
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit

### Clean results for J1058+0133 (BANDPASS) SpW 17

Navigation: [Home] [Next] [Previous] [BACK]

Iteration	Image	Residual	Clean Mask
1			
0			
	 <p>Primary Beam</p>	 <p>PSF</p>	 <p>Final Model</p>

**hifa\_imageprecheck:** This module estimates beam sizes using different robust factors for imaging, which is useful to refer to when re-imaging the data. The row in green is selected for subsequent imaging steps.

2021.1.00499.5 - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage24&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task

2021.1.00499.5

Tasks in execution order

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit

## 24. Image Pre-Check

Goals From OT:

Representative Target: PJ113921.7  
 Representative Frequency: 89.6314 GHz (SPW 25)  
 Bandwidth for Sensitivity: 11.96 MHz (rounded to nearest integer #channels (3), repBW = 11.72 MHz)  
 Min / Max Acceptable Resolution: 0.566 arcsec / 0.850 arcsec  
 Maximum expected beam axial ratio (from OT): 2.5  
 Goal PI sensitivity: 0.405 mJy  
 Single Continuum: False

### Estimated Synthesized Beam and Sensitivities for the Representative Target/Frequency

Estimates are given for four possible values of the tclean robust weighting parameter: robust = 0.0, +0.5 (default), +1.0, and +2.0. If the "Min / Max Acceptable Resolution" is available ( $\geq$  Cycle 5 12-m Array data), the robust value closest to the default (+0.5) that predicts a beam area (defined as simply major x minor) that is in the range of the PI requested beam areas according to the table row for repBW (Bandwidth for Sensitivity) is chosen. If none of these robust values predict a beam area that is in range, robust=+2.0 is chosen if the predicted beam area is too small, and robust=0.0 is chosen if the predicted beam area is too large. The chosen robust value is highlighted in green and used for all science target imaging. In addition to an estimate for the repBW, an estimate for the aggregate continuum bandwidth (aggBW) is also given assuming NO line contamination but accounting for spw frequency overlap. If the Bandwidth for Sensitivity (repBW) is  $>$  the bandwidth of the spw containing the representative frequency (repSPW), then the beam is predicted using all spws, otherwise the beam is predicted for the repSPW alone. A message appears on the "By Task" view if a non-default value of robust (i.e., not +0.5) is chosen. Additionally, if the predicted beam is not within the PI requested range using one of the four robust values, Warning messages appear on this page.

**These estimates should always be considered as the BEST CASE SCENARIO.** These estimates account for Tsys, the observed uv-coverage, and prior flagging. The estimates DO NOT account for (1) subsequent science target flagging; (2) loss of continuum bandwidth due to the hif\_findcont process (i.e. removal of lines and other spectral features from the data used to image the continuum); (3) Issues that affect the image quality like (a) poor match of uv-coverage to image complexity; (b) dynamic range effects; (c) calibration deficiencies (poor phase transfer, residual baseline based effects, residual antenna position errors, etc.). It is also important to note that both the repBW and aggBW beam calculations are intrinsically multi-frequency synthesis continuum calculations, using the relevant spws as described above. The synthesized beam for a single channel in a cube will typically be larger and can be significantly larger depending on the details of uv-coverage and channel width.

robust	uvtaper	Synthesized Beam	Cell	Beam Ratio	Bandwidth	BW Mode	Effective Sensitivity
0.0	[]	0.489 x 0.380 arcsec @ -14.2 deg	0.076 x 0.076 arcsec	1.29	11.72 MHz	repBW	0.00033 Jy/beam
0.0	[]	0.457 x 0.306 arcsec @ -18.5 deg	0.061 x 0.061 arcsec	1.29	7255 MHz	aggBW	1.24e-05 Jy/beam
0.5	[]	0.616 x 0.463 arcsec @ -19.2 deg	0.093 x 0.093 arcsec	1.33	11.72 MHz	repBW	0.00025 Jy/beam
0.5	[]	0.581 x 0.387 arcsec @ -20.2 deg	0.077 x 0.077 arcsec	1.33	7255 MHz	aggBW	9.38e-06 Jy/beam
1.0	[]	0.889 x 0.590 arcsec @ -33.7 deg	0.12 x 0.12 arcsec	1.51	11.72 MHz	repBW	0.000222 Jy/beam
1.0	[]	0.809 x 0.508 arcsec @ -29.5 deg	0.1 x 0.1 arcsec	1.51	7255 MHz	aggBW	8.35e-06 Jy/beam
2.0	[]	1.03 x 0.665 arcsec @ -36.8 deg	0.13 x 0.13 arcsec	1.55	11.72 MHz	repBW	0.000219 Jy/beam

BACK

**hifa\_imageprecheck:** This module estimates beam sizes using different robust factors for imaging, which is useful to refer to when re-imaging the data. The row in green is selected for subsequent imaging steps.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage24&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task 2021.1.00499.S

**Tasks in execution order**

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. **hifa\_imageprecheck**
25. hif\_checkproductsizes
26. hifa\_renom
27. hifa\_exportdata
28. hif\_mtransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvcontfit

Estimates are given for four possible values of the tclean robust weighting parameter: robust = 0.0, +0.5 (default), +1.0, and +2.0. If the "Min / Max Acceptable Resolution" is available ( $\geq$  Cycle 5 12-m Array data), the robust value closest to the default (+0.5) that predicts a beam area (defined as simply major x minor) that is in the range of the PI requested beam areas according to the table row for repBW (Bandwidth for Sensitivity) is chosen. If none of these robust values predict a beam area that is in range, robust=+2.0 is chosen if the predicted beam area is too small, and robust=0.0 is chosen if the predicted beam area is too large. The chosen robust value is highlighted in green and used for all science target imaging. In addition to an estimate for the repBW, an estimate for the aggregate continuum bandwidth (aggBW) is also given assuming NO line contamination but accounting for spw frequency overlap. If the Bandwidth for Sensitivity (repBW) is  $>$  the bandwidth of the spw containing the representative frequency (repSPW), then the beam is predicted using all spws, otherwise the beam is predicted for the repSPW alone. A message appears on the "By Task" view if a non-default value of robust (i.e., not +0.5) is chosen. Additionally, if the predicted beam is not within the PI requested range using one of the four robust values, Warning messages appear on this page.

**These estimates should always be considered as the BEST CASE SCENARIO.** These estimates account for Tsys, the observed uv-coverage, and prior flagging. The estimates DO NOT account for (1) subsequent science target flagging; (2) loss of continuum bandwidth due to the hif\_findcont process (i.e. removal of lines and other spectral features from the data used to image the continuum); (3) Issues that affect the image quality like (a) poor match of uv-coverage to image complexity; (b) dynamic range effects; (c) calibration deficiencies (poor phase transfer, residual baseline based effects, residual antenna position errors, etc.). *It is also important to note that both the repBW and aggBW beam calculations are intrinsically multi-frequency synthesis continuum calculations, using the relevant spws as described above. The synthesized beam for a single channel in a cube will typically be larger and can be significantly larger depending on the details of uv-coverage and channel width.*

robust	uvtaper	Synthesized Beam	Cell	Beam Ratio	Bandwidth	BW Mode	Effective Sensitivity
0.0	[]	0.489 x 0.380 arcsec @ -14.2 deg	0.076 x 0.076 arcsec	1.29	11.72 MHz	repBW	0.00033 Jy/beam
0.0	[]	0.457 x 0.306 arcsec @ -18.5 deg	0.061 x 0.061 arcsec	1.29	7255 MHz	aggBW	1.24e-05 Jy/beam
0.5	[]	0.616 x 0.463 arcsec @ -19.2 deg	0.093 x 0.093 arcsec	1.33	11.72 MHz	repBW	0.00025 Jy/beam
0.5	[]	0.581 x 0.387 arcsec @ -20.2 deg	0.077 x 0.077 arcsec	1.33	7255 MHz	aggBW	9.38e-06 Jy/beam
1.0	[]	0.889 x 0.590 arcsec @ -33.7 deg	0.12 x 0.12 arcsec	1.51	11.72 MHz	repBW	0.000222 Jy/beam
1.0	[]	0.809 x 0.508 arcsec @ -29.5 deg	0.1 x 0.1 arcsec	1.51	7255 MHz	aggBW	8.35e-06 Jy/beam
2.0	[]	1.03 x 0.665 arcsec @ -36.8 deg	0.13 x 0.13 arcsec	1.55	11.72 MHz	repBW	0.000219 Jy/beam
2.0	[]	0.968 x 0.591 arcsec @ -33.9 deg	0.12 x 0.12 arcsec	1.55	7255 MHz	aggBW	8.21e-06 Jy/beam

Pipeline QA

Input Parameters

Tasks Execution Statistics

CASA logs for stage 24

- View or download stage24/casapy.log (463.2 KB)

**hif\_findcont:** This is where the pipeline creates initial image cubes and identifies continuum channels (although the identification is not always optimal). This is useful as a first look at the spectra, although re-imaging the data may be much more effective for identifying spectral lines.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage31&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task

2021.1.00499.S

Tasks in execution order

1. hifa\_importdata
2. hifa\_flagdata
3. hifa\_fluxcallflag
4. hif\_rawflagchans
5. hif\_refant
6. h\_tsyscal
7. hifa\_tsysflag
8. hifa\_antpos
9. hifa\_wvrqcallflag
10. hif\_lowgainflag
11. hif\_setmodels
12. hifa\_bandpassflag
13. hifa\_bandpass
14. hifa\_spwphaseup
15. hifa\_gfluxscaleflag
16. hifa\_gfluxscale
17. hifa\_timegaincal
18. hifa\_targetflag
19. hif\_applycal
20. hif\_makeimlist (cals)
21. hif\_makeimages (cals)
22. hif\_makeimlist (checksrc)
23. hif\_makeimages (checksrc)
24. hifa\_imageprecheck
25. hif\_checkproductsizes
26. hifa\_renorm
27. hifa\_exportdata
28. hif\_mstransform
29. hifa\_flagtargets
30. hif\_makeimlist (mfs)
31. hif\_findcont
32. hif\_uvconftit
33. hif\_uvconftit

## 31. Find Continuum

BACK

Field	Spw	Continuum Frequency Range		Frame	Status	Average spectrum	Joint mask
		Start	End				
PJ113921.7	17	86.99446 GHz	87.65065 GHz	LSRK	NEW		
		87.97874 GHz	88.02562 GHz				
		88.41621 GHz	88.66618 GHz				
	21	99.17694 GHz	100.91116 GHz		NEW , All cont.		
		100.73331 GHz	102.46753 GHz				
	25	88.71987 GHz	89.45028 GHz		NEW		

**hif\_makeimages:** Several steps near the end of the pipeline (for multiple different types of output images) have this name. These pages are useful for seeing an overview of the imaging results, particularly with regards to information like beam sizes and noise levels.

2021.1.00499.5 - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage34&ms=all&subpage=t2-4m\_details.html

Home By Topic By Task

2021.1.00499.5

8. hifa\_antpos

9. hifa\_wvrgcflag

10. hif\_lowgainflag

11. hif\_setmodels

12. hifa\_bandpassflag

13. hifa\_bandpass

14. hifa\_spwphaseup

15. hifa\_gfluxscaleflag

16. hifa\_gfluxscale

17. hifa\_timegaincal

18. hifa\_targetflag

19. hif\_applcal

20. hif\_makeimlist (cals)

21. hif\_makeimages (cals)

22. hif\_makeimlist (checksrc)

23. hif\_makeimages (checksrc)

24. hifa\_imageprecheck

25. hif\_checkproductsize

26. hifa\_renorm

27. hifa\_exportdata

28. hif\_mstransform

29. hifa\_flagtargets

30. hif\_makeimlist (mfs)

31. hif\_findcont

32. hif\_uvcontfit

33. hif\_uvcontsub

**34. hif\_makeimages (mfs)**

35. hif\_makeimlist (cont)

36. hif\_makeimages (cont)

37. hif\_makeimlist (cube)

38. hif\_makeimages (cube)

39. hif\_makeimlist (cube\_repBW)

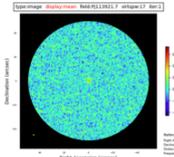
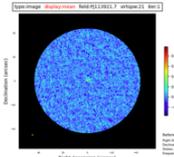
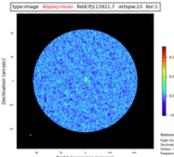
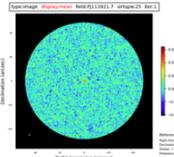
40. hif\_makeimages (cube\_repBW)

## 34. Tclean/MakeImages

Make target per-spw continuum images

BACK

### Image Details

Field	Spw			
PJ113921.7 (TARGET)	17 / X1620027342#ALMA_RB_03#BB_1#SW-01	21 / X1620027342#ALMA_RB_03#BB_3#SW-01	23 / X1620027342#ALMA_RB_03#BB_4#SW-01	25 / X1620027342#ALMA_RB_03#BB_2#SW-01
				
	<a href="#">View other QA images...</a>	<a href="#">View other QA images...</a>	<a href="#">View other QA images...</a>	<a href="#">View other QA images...</a>
<b>centre frequency of image</b>	87.8303GHz (LSRK)	100.0440GHz (LSRK)	101.6004GHz (LSRK)	89.6221GHz (LSRK)
<b>beam</b>	0.894 x 0.607 arcsec	0.781 x 0.456 arcsec	0.725 x 0.451 arcsec	0.897 x 0.588 arcsec
<b>beam p.a.</b>	-32.7deg	-26.7deg	-22.3deg	-34.7deg
<b>final theoretical sensitivity</b>	23 uJy/beam	18 uJy/beam	19 uJy/beam	21 uJy/beam
<b>cleaning threshold</b>	46 uJy/beam Dirty DR: 8.5 DR correction: 1	37 uJy/beam Dirty DR: 15 DR correction: 1	38 uJy/beam Dirty DR: 16 DR correction: 1	41 uJy/beam Dirty DR: 9.4 DR correction: 1
<b>clean residual peak / scaled MAD</b>	5.81	5.82	5.10	4.46
<b>non-pbcor image RMS</b>	26 uJy/beam	21 uJy/beam	21 uJy/beam	24 uJy/beam
<b>pbcor image max / min</b>	479 / -299 uJy/beam	297 / -265 uJy/beam	265 / -324 uJy/beam	319 / -294 uJy/beam

**hif\_makeimages:** Several steps near the end of the pipeline (for multiple different types of output images) have this name. These pages are useful for seeing an overview of the imaging results, particularly with regards to information like beam sizes and noise levels.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage36&ms=all&subpage=t2-4m\_details.html

ALMA Home By Topic By Task 2021.1.00499.S

- 8. hifa\_antpos
- 9. hifa\_vwgcalfag
- 10. hif\_lowgainflag
- 11. hif\_setmodels
- 12. hifa\_bandpassflag
- 13. hifa\_bandpass
- 14. hifa\_spwphaseup
- 15. hifa\_gfluxscaleflag
- 16. hifa\_gfluxscale
- 17. hifa\_timegaincal
- 18. hifa\_targetflag
- 19. hif\_applycal
- 20. hif\_makeimlist (cals)
- 21. hif\_makeimages (cals)
- 22. hif\_makeimlist (checksrc)
- 23. hif\_makeimages (checksrc)
- 24. hifa\_imageprecheck
- 25. hif\_checkproductsizes
- 26. hifa\_renorm
- 27. hifa\_exportdata
- 28. hif\_mstransform
- 29. hifa\_flagtargets
- 30. hif\_makeimlist (mfs)
- 31. hif\_findcont
- 32. hif\_uvcontfit
- 33. hif\_uvcontsub
- 34. hif\_makeimages (mfs)
- 35. hif\_makeimlist (cont)
- 36. hif\_makeimages (cont)**
- 37. hif\_makeimlist (cube)
- 38. hif\_makeimages (cube)
- 39. hif\_makeimlist (cube\_repBW)
- 40. hif\_makeimages (cube\_repBW)

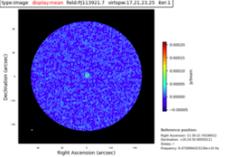
## 36. Tclean/MakeImages

Make target aggregate continuum images

[BACK](#)

### Image Details

Field	Spw
PJ113921.7 (TARGET)	17, 21, 23, 25 / X1620027342#ALMA_RB_03#BB_1#SW-01,



[View other QA images...](#)

<b>centre frequency of image</b>	94.7310GHz (LSRK)
<b>beam</b>	0.793 x 0.496 arcsec
<b>beam p.a.</b>	-28.5deg
<b>final theoretical sensitivity</b>	10 uJy/beam
<b>cleaning threshold</b>	30 uJy/beam Dirty DR: 25 DR correction: 1.5
<b>clean residual peak / scaled MAD</b>	4.86
<b>non-pbcor image RMS</b>	12 uJy/beam

**hif\_makeimages:** Several steps near the end of the pipeline (for multiple different types of output images) have this name. These pages are useful for seeing an overview of the imaging results, particularly with regards to information like beam sizes and noise levels.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage36&ms=all&subpage=uid\_\_\_A001\_X158f\_X7a1-fieldPJ113921.7\_\_TARGET\_spw17\_21\_23\_25-poll-cleanplots.html

ALMA Home By Topic By Task 2021.1.00499.S

8. hifa\_antpos  
9. hifa\_vwgcallag  
10. hif\_lowgainflag  
11. hif\_setmodels  
12. hifa\_bandpassflag  
13. hifa\_bandpass  
14. hifa\_spwphaseup  
15. hifa\_gfluxscaleflag  
16. hifa\_gfluxscale  
17. hifa\_timegaincal  
18. hifa\_targetflag  
19. hif\_applycal  
20. hif\_makeimlist (cals)  
21. hif\_makeimages (cals)  
22. hif\_makeimlist (checksrc)  
23. hif\_makeimages (checksrc)  
24. hifa\_imageprecheck  
25. hif\_checkproductsizes  
26. hifa\_renorm  
27. hifa\_exportdata  
28. hif\_mstransform  
29. hifa\_flagtargets  
30. hif\_makeimlist (mfs)  
31. hif\_findcont  
32. hif\_uvcontfit  
33. hif\_uvcontsub  
34. hif\_makeimages (mfs)  
35. hif\_makeimlist (cont)  
36. hif\_makeimages (cont)  
37. hif\_makeimlist (cube)  
38. hif\_makeimages (cube)  
39. hif\_makeimlist (cube\_repBW)  
40. hif\_makeimages (cube\_repBW)

### Clean results for PJ113921.7 (TARGET) SpW 17,21,23,25

BACK

Iteration	Image	Residual	Clean Mask
1			
0			

**hif\_makeimages:** Several steps near the end of the pipeline (for multiple different types of output images) have this name. These pages are useful for seeing an overview of the imaging results, particularly with regards to information like beam sizes and noise levels.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage38&ms=all&subpage=t2-4m\_details.html

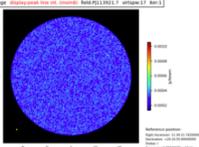
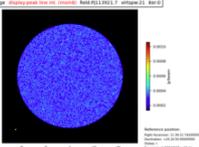
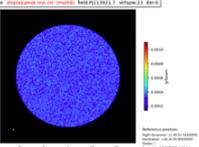
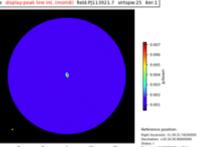
Home By Topic By Task 2021.1.00499.S

8. hifa\_antpos  
 9. hifa\_wvrgcflag  
 10. hif\_lowgainflag  
 11. hif\_setmodels  
 12. hifa\_bandpassflag  
 13. hifa\_bandpass  
 14. hifa\_spwphaseup  
 15. hifa\_gfluxscaleflag  
 16. hifa\_gfluxscale  
 17. hifa\_timegaincal  
 18. hifa\_targetflag  
 19. hif\_applycal  
 20. hif\_makeimlist (cals)  
 21. hif\_makeimages (cals)  
 22. hif\_makeimlist (checksrc)  
 23. hif\_makeimages (checksrc)  
 24. hifa\_imageprecheck  
 25. hif\_checkproductsize  
 26. hifa\_renorm  
 27. hifa\_exportdata  
 28. hif\_mstransform  
 29. hifa\_flagtargets  
 30. hif\_makeimlist (mfs)  
 31. hif\_findcont  
 32. hif\_uvcontfit  
 33. hif\_uvcontsub  
 34. hif\_makeimages (mfs)  
 35. hif\_makeimlist (cont)  
 36. hif\_makeimages (cont)  
 37. hif\_makeimlist (cube)  
 38. hif\_makeimages (cube)  
 39. hif\_makeimlist (cube\_repBW)  
 40. hif\_makeimages (cube\_repBW)

## 38. Tclean/MakeImages

Make target cubes BACK

### Image Details

Field	Spw		Spw	
PJ113921.7 (TARGET)	17 / X1620027342#ALMA_RB_03#BB_1#SW-01	21 / X1620027342#ALMA_RB_03#BB_3#SW-01	23 / X1620027342#ALMA_RB_03#BB_4#SW-01	25 / X1620027342#ALMA_RB_03#BB_2#SW-01
				
	<a href="#">View other QA images...</a>	<a href="#">View other QA images...</a>	<a href="#">View other QA images...</a>	<a href="#">View other QA images...</a>
<b>centre / rest frequency of cube</b>	87.8616GHz / 339.0000GHz (LSRK)		100.0440GHz / 396.0000GHz (LSRK)	
<b>beam</b>	0.915 x 0.617 arcsec		0.819 x 0.465 arcsec	
<b>beam p.a.</b>	-33.9deg		-29.0deg	
<b>final theoretical sensitivity</b>	0.12 mJy/beam		0.12 mJy/beam	
<b>cleaning threshold</b>	0.23 mJy/beam Dirty DR: 6.3 DR correction: 1		findCont=AllCont, no cleaning 0 Jy/beam Dirty DR: 6.2 DR correction: 1	
			findCont=AllCont, no cleaning 0 Jy/beam Dirty DR: 6.2 DR correction: 1	
<b>clean residual peak / scaled MAD</b>	5.58		-5.69	
			-5.67	
<b>non-pbcor image RMS / RMS<sub>min</sub> / RMS<sub>max</sub></b>	0.13 / 0.12 / 0.13 mJy/beam		0.13 / 0.12 / 0.14 mJy/beam	
			0.14 / 0.13 / 0.16 mJy/beam	
			0.42 / 0.4 / 0.45 mJy/beam	

**hif\_makeimages:** Several steps near the end of the pipeline (for multiple different types of output images) have this name. These pages are useful for seeing an overview of the imaging results, particularly with regards to information like beam sizes and noise levels.

2021.1.00499.S - Task Details

file:///D:/pipeline/html/t2-4m.html?sidebar=sidebar\_stage38&ms=all&subpage=uid\_\_A001\_X158f\_X7a1-fieldPJ113921.7\_\_TARGET\_spw17-poll-cleanplots.html

ALMA Home By Topic By Task 2021.1.00499.S

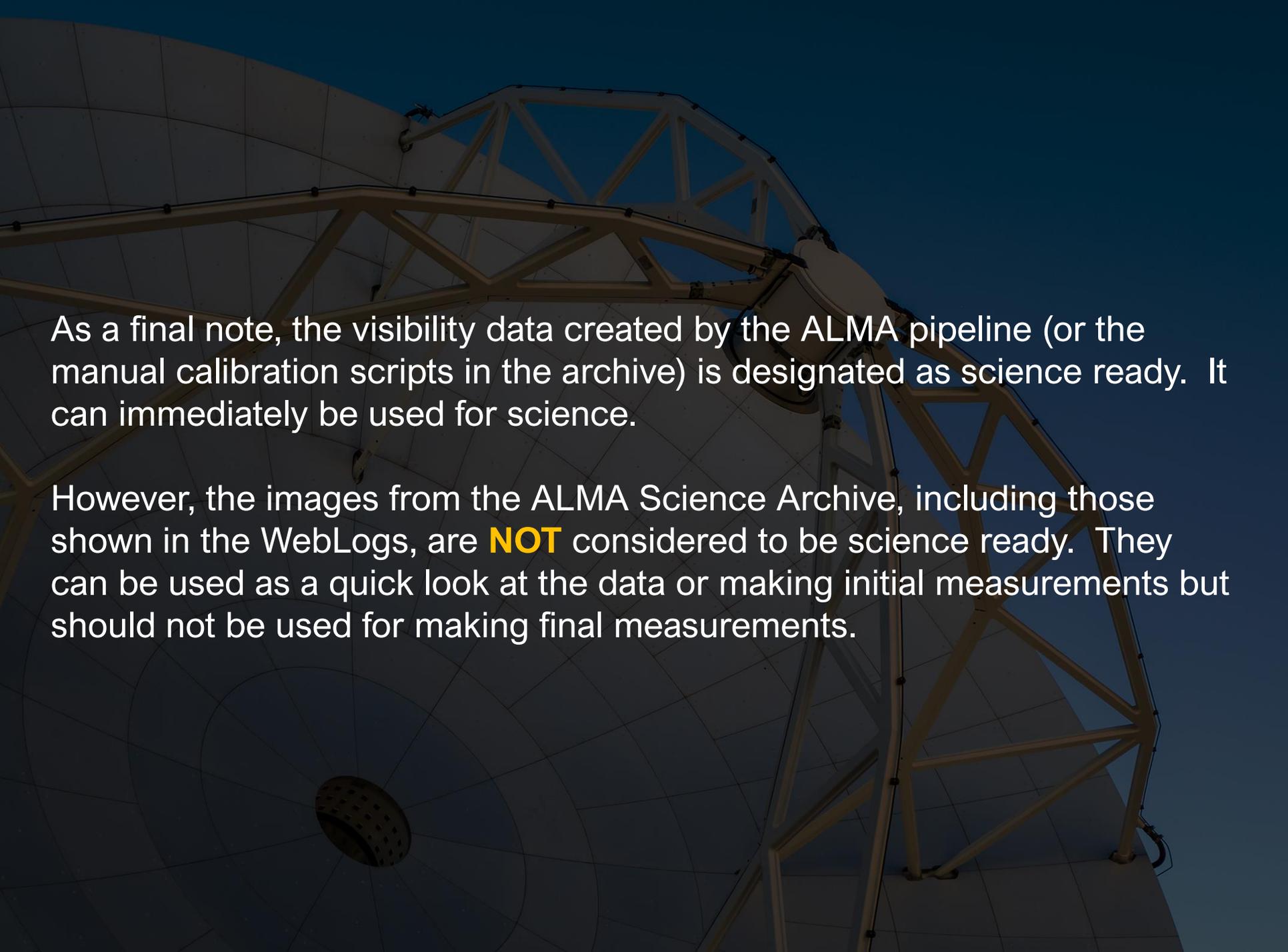
8. hifa\_antpos  
9. hifa\_wvgc:allflag  
10. hif\_lowgainflag  
11. hif\_setmodels  
12. hifa\_bandpassflag  
13. hifa\_bandpass  
14. hifa\_spwphaseup  
15. hifa\_gfluxscaleflag  
16. hifa\_gfluxscale  
17. hifa\_timegaincal  
18. hifa\_targetflag  
19. hif\_applycal  
20. hif\_makeimlist (cals)  
21. hif\_makeimages (cals)  
22. hif\_makeimlist (checksrc)  
23. hif\_makeimages (checksrc)  
24. hifa\_imageprecheck  
25. hif\_checkproductsizes  
26. hifa\_renorm  
27. hifa\_exportdata  
28. hif\_mstransform  
29. hifa\_flagtargets  
30. hif\_makeimlist (mfs)  
31. hif\_findcont  
32. hif\_uvcontfit  
33. hif\_uvcontsub  
34. hif\_makeimages (mfs)  
35. hif\_makeimlist (cont)  
36. hif\_makeimages (cont)  
37. hif\_makeimlist (cube)  
38. hif\_makeimages (cube) **39. hif\_makeimlist (cube\_repBW)**  
40. hif\_makeimages (cube\_repBW)

### Clean results for PJ113921.7 (TARGET) SpW 17

Navigation: [Home] [Next] [Previous] [BACK]

Iteration	Image	Residual	Clean Mask	Line-free Moment 0	Line-free Moment 8	Spectra
1						
0						

The inset in the PSF image (when present) corresponds to the central 41 pixels of the PSF. When the beam shape is significantly non-Gaussian, the dotted contour of the 50% level of the PSF image will become distinctly visible apart from the fitted synthesized beam, which is shown as the solid contour.



As a final note, the visibility data created by the ALMA pipeline (or the manual calibration scripts in the archive) is designated as science ready. It can immediately be used for science.

However, the images from the ALMA Science Archive, including those shown in the WebLogs, are **NOT** considered to be science ready. They can be used as a quick look at the data or making initial measurements but should not be used for making final measurements.