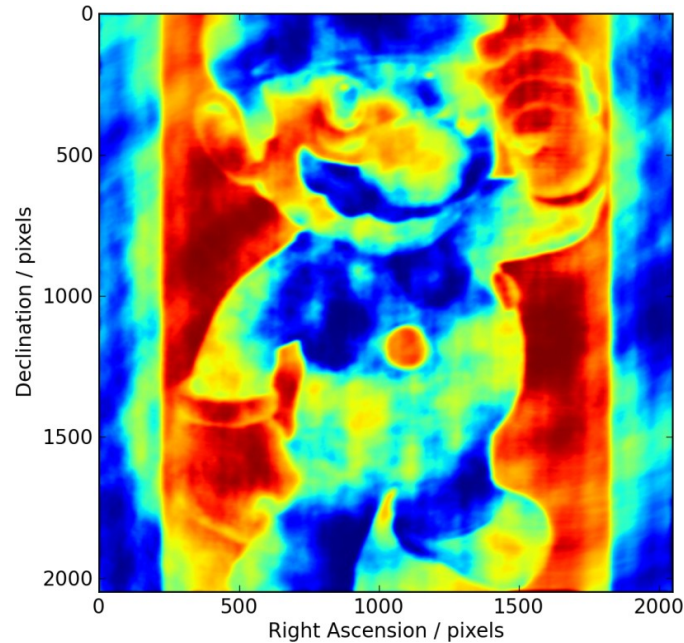


# The ALMA Observation Support Tool

(or how to know what ALMA will “see”)



OST Simulation of the  
'Super' M-4R10 Galaxy



EUROPEAN ARC  
ALMA Regional Centre || UK

Ana Karla Díaz-Rodríguez

MANCHESTER  
1824

# What is the OST?

- Online ALMA simulator aimed at the non-interferometry expert
- You can set up a simulated observation by entering simple parameters into the **OST webform**
- You will need a model to simulate (check your fits [here!](#))
- The current version (v8.5) uses CASA 5.6.2-2 (**sm tool kit**)

The screenshot displays the ALMA Observation Support Tool (OST) webform interface. At the top, there is a header with the ALMA logo, the text "EUROPEAN ARC ALMA Regional Centre || UK", and a banner image of ALMA antennas with the text "ALMA Observation Support Tool". Below the header, the version "Version 8.5" is indicated. A navigation bar contains links for "OST", "NEWS", "HELP", "QUEUE", "LIBRARY", "ACKNOWLEDGE", and "ALMA HELPDESK".

The main content area is divided into several sections:

- Array Setup:** Includes a dropdown menu for "Instrument" set to "ALMA" and a button "Select the desired ALMA antenna configuration."
- Sky Setup:** Includes a dropdown for "Source model" set to "OST Library: Central point source", a "Choose a library source model or supply your own." button, an "Upload" section with a "Choose File" button and "No file chosen" text, and a "You may upload your own model here (max 10MB)." button. It also has input fields for "Declination" (-35d00m00.0s) and "Image peak / point flux in" (mJy) (0.0), with instructions to "Ensure correct formatting of this string (+/-00d00m00.0s)." and "Rescale the image data with respect to new peak value. Set to 0.0 for no rescaling of source model."
- Observation Setup:** Includes radio buttons for "Observing mode" (Spectral, Continuum), a "Central frequency in GHz" input (93.7), a "Bandwidth in MHz" dropdown (32), radio buttons for "Use full Stokes parameters" (Yes, No), a "Number of polarizations" dropdown (2), a "Required resolution in arcseconds" input (1.0), a "Pointing strategy" dropdown (Mosaic), and an "On-source time in hours" dropdown (3). It also includes instructions: "Spectral or continuum observations? The value entered must be within an ALMA band. Select the total bandwidth for continuum observations. Enter 7.5 GHz to select ALMA recommend full continuum setup. If your input image contains more than one Stokes plane use them all (Yes), or just Stokes I (no/default). This affects the noise in the final map. Ignored in continuum mode if 'Use full Stokes parameters' is set to yes. OST will choose array config based on this value if instrument is set to ALMA. Selecting single will apply primary beam attenuation. Per pointing for Pointing Strategy = 'mosaic'. Total time over all pointings Pointing Strategy = 'single' and 'user pointing'."

# Why use the OST?

## 1. Proposal preparation:

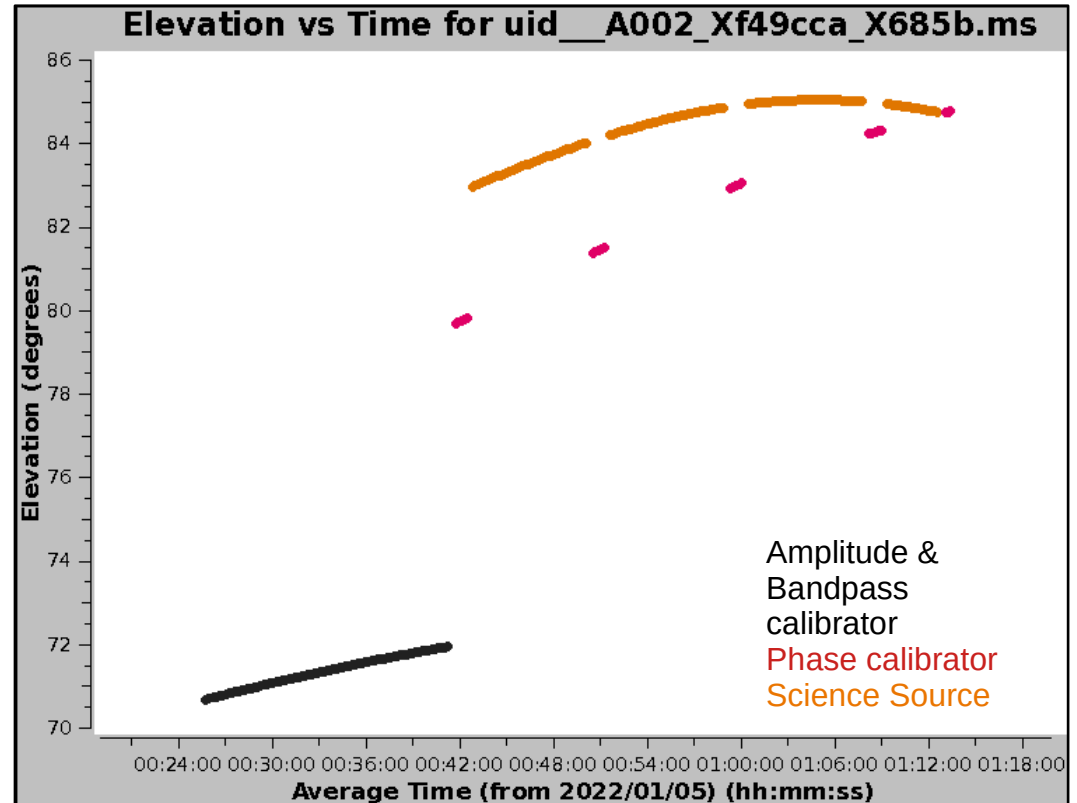
- To test your proposed set-up: Can you actually detect the source? Do you recover all the structures at the desired scales?
- To make your case stronger: Use the simulation as “evidence” to argue for your requested set-up

## 2. Comparing models to data:

- How your ideal source (model) will be seen by ALMA, corrupted by observing effects (simulated observations).

# Difference with real observations?

- The scan spacing will be different (though it is possible to mitigate this)
- The elevation will likely be different. All OST simulations take place on the same “day”
- During a real observation the PWV (and other weather effects) will change during an observation

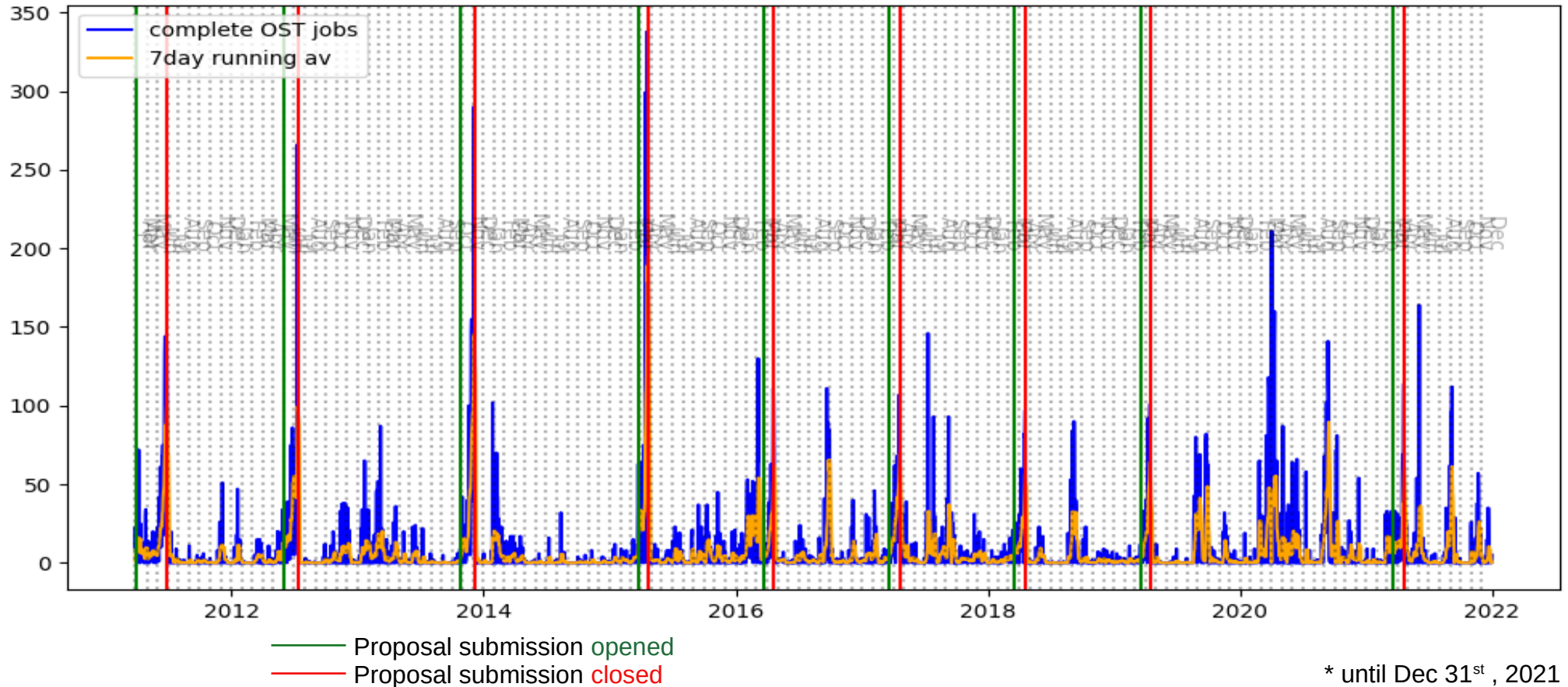


# Brief history of the OST

- Became available to the public on 28-Mar-2011 (Cycle 0)
- Original version by Ian Heywood (2010), upgraded and maintained by Adam Avison\* (2011-2021), and me (2021-now)
- It has processed 28 701 simulations for users in at least 42 different countries up to 31-Dec-2021
- A new version is released each year, increasing the OST capabilities. E.g. v3 -> Data Cubes, v5 -> Stokes Cubes, v7 -> user antenna configuration files.

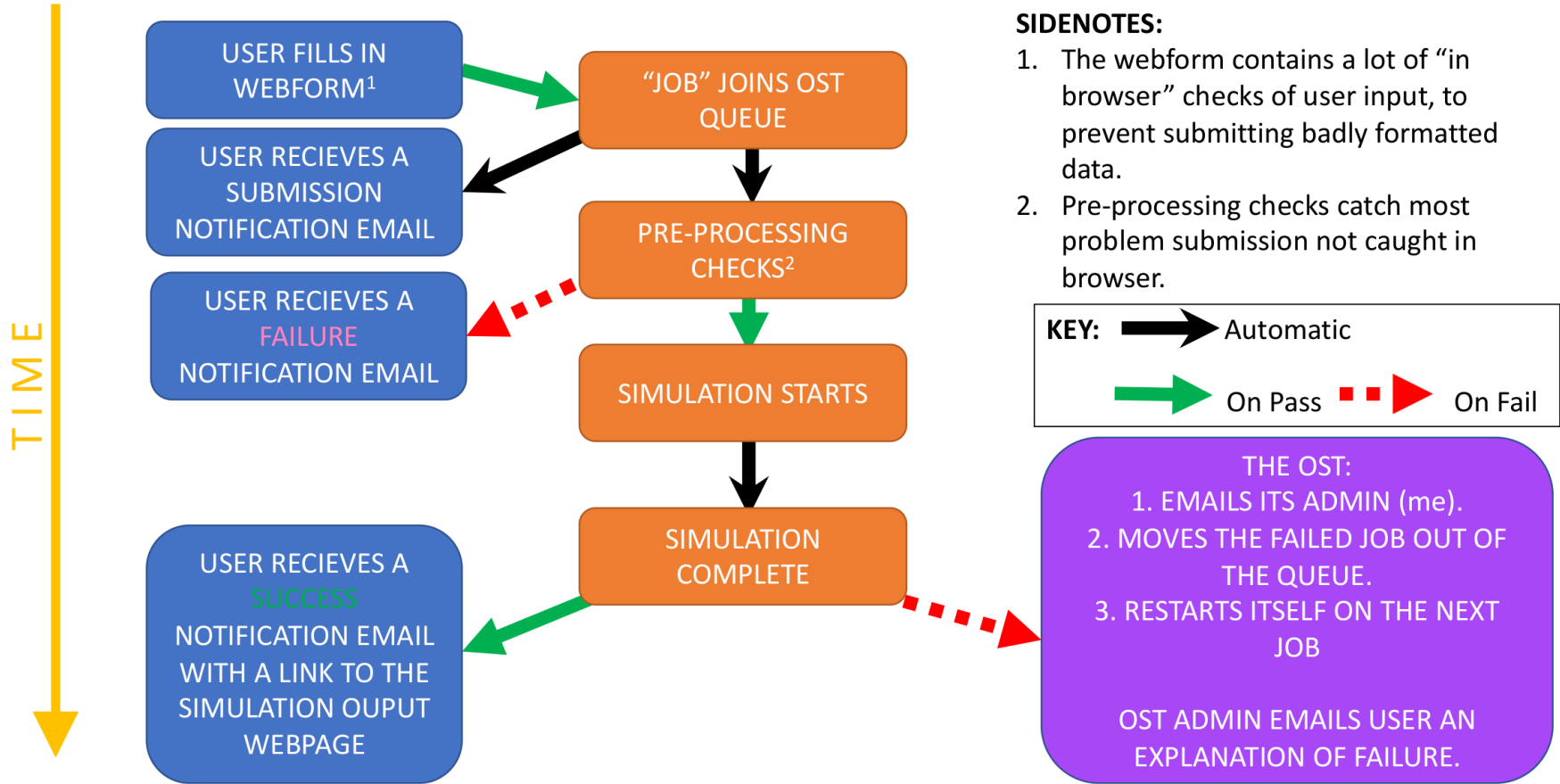
\* watch Adam's [I-TRAIN video](#)

# OST all time\* usage



\* until Dec 31<sup>st</sup>, 2021

# OST Workflow



## SIDENOTES:

1. The webform contains a lot of "in browser" checks of user input, to prevent submitting badly formatted data.
2. Pre-processing checks catch most problem submission not caught in browser.

# Let's use the OST!!

<http://almaost.jb.man.ac.uk/>



# OST Demo

1. A simple continuum mode observation of a point source
2. A slightly more complex continuum
3. A spectral line/cube demonstration

OST PARAMETER	DEMO 1: Point Source Continuum	DEMO 2: Full BW Model Image Continuum	DEMO 3: Spectral Cube
INSTRUMENT	ALMA	ALMA Cycle 8 C43-42	ALMA Cycle 8 C43-6
SOURCE MODEL	OST Library: Central Point Source	OST Library: Protostellar Cluster	OST Library: Test Cube 64x64x16
DECLINATION	-40d00m00.0s	-25d30m00.0s	-35d00m00.0s
IMAGE PEAK/POINT FLUX	0.5mJy	0.0mJy	0.0mJy
OBSERVING MODE	Continuum	Continuum	Spectral
CENTRAL FREQ. IN GHZ	230	333.0	90
BANDWIDTH	0.5GHz	2.2GHz [SPW 0: 328.0 / BW 0: 1.1] [SPW 1: 338.0 / BW 1: 1.1]	144.8kHz
USE FULL STOKES PARAMETER?	No	No	No
NUMBER OF POLS.	2	2	2
REQUIRED RES. IN ARCSEC	0.2	1.0*	1.0*
POINTING STRATEGY	Single	Mosaic	Mosaic
ON-SOURCE TIME	2hours	4hours	2hours
START HOUR ANGLE	-1.0	+1.0	0.0
NUMBER OF VISITS	1	2	1
CYCLE TO PHASE CALIBRATOR?	No	Yes [Phase Cycle: 300s / On Phase: 30]	No
ATMOSPHERIC CONDITIONS	0.913mm (3 <sup>rd</sup> Octile)	0.472mm (1 <sup>st</sup> Octile)	5.186mm (7 <sup>th</sup> Octile)
IMAGING WEIGHTS	NATURAL	BRIGGS	UNIFORM
PERFORM DECONVOLUTION	YES	YES	YES
OUTPUT IMG FORMAT	FITS	FITS	FITS
EMAIL	<YOUR EMAIL>	<YOUR EMAIL>	<YOUR EMAIL>

OST PARAMETER	DEMO 1: Point Source Continuum	DEMO 2: Full BW Model Image Continuum	DEMO 3: Spectral Cube
INSTRUMENT	ALMA	ALMA Cycle 8 C43-42	ALMA Cycle 8 C43-6
SOURCE MODEL	OST Library: Central Point Source	OST Library: Protostellar Cluster	OST Library: Test Cube 64x64x16
DECLINATION	-40d00m00.0s	-25d30m00.0s	-35d00m00.0s
IMAGE PEAK/POINT FLUX	0.5mJy	0.0mJy	0.0mJy
OBSERVING MODE	Continuum	Continuum	Spectral
CENTRAL FREQ. IN GHZ	230	333.0	90
BANDWIDTH	0.5GHz	2.2GHz [SPW 0: 328.0 / BW 0: 1.1] [SPW 1: 338.0 / BW 1: 1.1]	144.8kHz
USE FULL STOKES PARAMETER?	No	No	No
NUMBER OF POLS.	2	2	2
REQUIRED RES. IN ARCSEC	0.2	1.0*	1.0*
POINTING STRATEGY	Single	Mosaic	Mosaic
ON-SOURCE TIME	2hours	4hours	2hours
START HOUR ANGLE	-1.0	+1.0	0.0
NUMBER OF VISITS	1	2	1
CYCLE TO PHASE CALIBRATOR?	No	Yes [Phase Cycle: 300s / On Phase: 30]	No
ATMOSPHERIC CONDITIONS	0.913mm (3 <sup>rd</sup> Octile)	0.472mm (1 <sup>st</sup> Octile)	5.186mm (7 <sup>th</sup> Octile)
IMAGING WEIGHTS	NATURAL	BRIGGS	UNIFORM
PERFORM DECONVOLUTION	YES	YES	YES
OUTPUT IMG FORMAT	FITS	FITS	FITS
EMAIL	<YOUR EMAIL>	<YOUR EMAIL>	<YOUR EMAIL>

OST PARAMETER	DEMO 1: Point Source Continuum	DEMO 2: Full BW Model Image Continuum	DEMO 3: Spectral Cube
INSTRUMENT	ALMA	ALMA Cycle 8 C43-42	ALMA Cycle 8 C43-6
SOURCE MODEL	OST Library: Central Point Source	OST Library: Protostellar Cluster	OST Library: Test Cube 64x64x16
DECLINATION	-40d00m00.0s	-25d30m00.0s	-35d00m00.0s
IMAGE PEAK/POINT FLUX	0.5mJy	0.0mJy	0.0mJy
OBSERVING MODE	Continuum	Continuum	Spectral
CENTRAL FREQ. IN GHZ	230	333.0	90
BANDWIDTH	0.5GHz	2.2GHz [SPW 0: 328.0 / BW 0: 1.1] [SPW 1: 338.0 / BW 1: 1.1]	144.8kHz
USE FULL STOKES PARAMETER?	No	No	No
NUMBER OF POLS.	2	2	2
REQUIRED RES. IN ARCSEC	0.2	1.0*	1.0*
POINTING STRATEGY	Single	Mosaic	Mosaic
ON-SOURCE TIME	2hours	4hours	2hours
START HOUR ANGLE	-1.0	+1.0	0.0
NUMBER OF VISITS	1	2	1
CYCLE TO PHASE CALIBRATOR?	No	Yes [Phase Cycle: 300s / On Phase: 30]	No
ATMOSPHERIC CONDITIONS	0.913mm (3 <sup>rd</sup> Octile)	0.472mm (1 <sup>st</sup> Octile)	5.186mm (7 <sup>th</sup> Octile)
IMAGING WEIGHTS	NATURAL	BRIGGS	UNIFORM
PERFORM DECONVOLUTION	YES	YES	YES
OUTPUT IMG FORMAT	FITS	FITS	FITS
EMAIL	<YOUR EMAIL>	<YOUR EMAIL>	<YOUR EMAIL>