

ALMA OST: Cycle 3 Call for Proposals period report

Adam Avison

1 Introduction:

The ALMA Observation Support Tool (OST) is an online ALMA simulator available to the international community at URL <http://almaost.jb.man.ac.uk>. Users interact with the OST by entering simulation parameters in an online form and are then notified by email when their simulation is complete. It is aimed at non-interferometry experts and those not wishing to familiarise themselves with ALMA simulation software available in data reduction packages e.g. CASA.

The ALMA OST has been available for use by the astronomical community since it was added to the ALMA Science Portal on the 28th of March 2011, it was originally created by Ian Heywood (then Oxford, now CSIRO) and is now maintained and upgraded by Adam Avison (hereafter AA) of the UK ARC Node. This report concerns its usage during the Cycle 3 call for proposal (CfP) period March 24th 2015 to the deadline on the 23rd of April 2015 (at 1500UT). Submissions to the OST are commonly referred to as ‘jobs’ within this document.

2 New to the OST for Cycle 3

Three new features were added to the OST for the ALMA Cycle 3 call for proposals. They are:

- *A new interactive web interface.* This feature was included to retain the OST’s simplicity, whilst allowing for more complex simulations to be produced. It worked by ‘hiding’ options users did not need until they selected parameters which relied upon the hidden options (at which point they would be revealed). The most obvious example of this can be seen by changing the the Bandwidth from 1.0GHz to 5.0GHz and then to 7.5GHz, with each change how the bandwidth is dealt with changes and the user is presented different options.
- *Image cube handling.* For the first time the OST now processes FITS image cubes, returning simulated cubes of the same length to the user. Previously only the central channel of an uploaded cube was simulated as a single image. How the OST handles FITS cubes can be found at <http://almaost.jb.man.ac.uk/help>. This was a significant change from previous versions of the OST.
- *Automated OST overflow.* The OST is queue based, processing one job after another. Toward the end of a CfP the queues tend to get quite long and in previous cycles some manual intervention at the UK ARC Node was used to shift part of the queue onto a different processing machine to reduce the queue times. For the Cycle 3 CfP and automated overflow response was activated. This response triggered when the queue exceeded 10 jobs¹, all requisite files for completing a job from the 11th+ job were moved and processed on a separate machine which behaved in the same manor as the main OST machine (i.e. email users when jobs were complete, displaying the results webpages etc.). The overflow was activated on 14/04/2015 and processed 7.4% of all Cycle 3 CfP OST jobs.

3 Usage

3.1 Daily usage:

The daily total of successfully completed OST submissions² was monitored throughout the Cycle 3 CfP period. Figure 1 shows this daily OST usage.

¹Initially the limit was 20 jobs but on the encouragement of OST users was drop to 10 later in the CfP.

²Successfully completed submissions include only jobs which produced simulated output i.e. does not include submissions which didnt not match the server side LiveValidation criteria or processing side internal checks or submissions which caused the OST to fail.

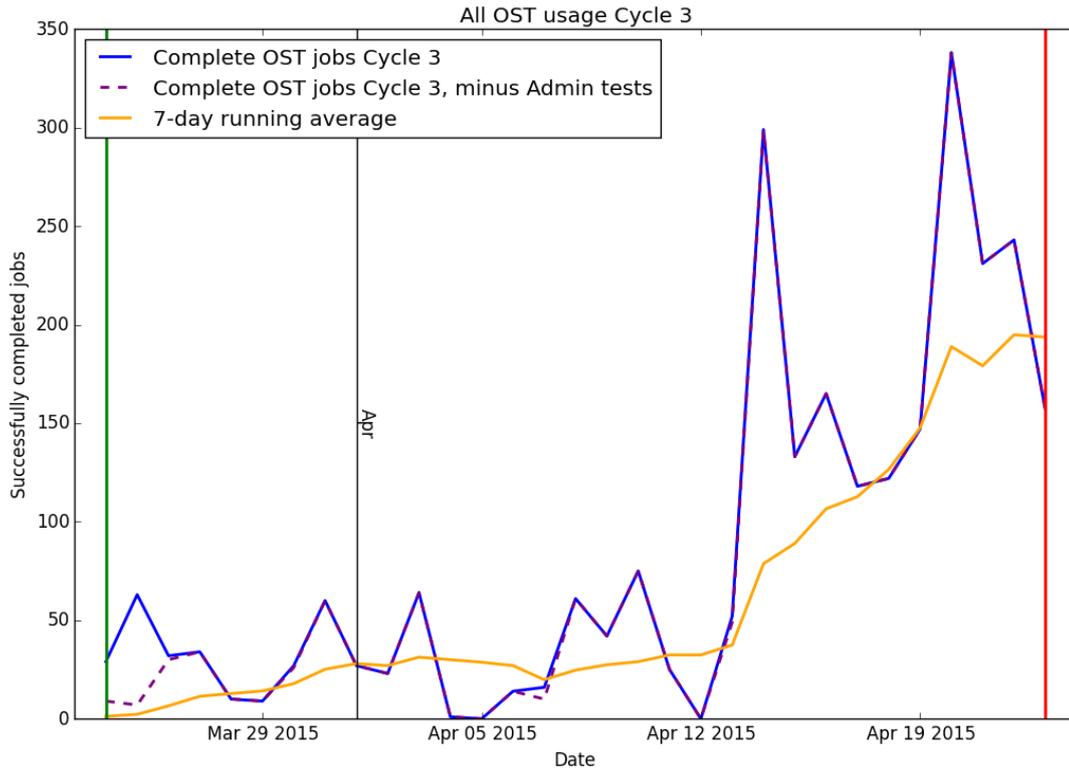


Figure 1: Daily OST usage: *Solid blue* line total number of successfully completed submissions. *Dashed purple* line total minus testing by OST admin. *Solid Orange* seven day running average. *Vertical green* Cycle 3 start, *vertical red* Cycle 3 deadline. *Vertical black* separates months.

Over the 31 day period of the Cycle 3 call for proposals 2617 OST submissions were successfully completed. Removing all submission made by AA to remove those few made for testing purposes the total number is 2529. Testing submission were made as checks that the OST was functioning normally after any system reboots (due to code tweaks or crashes). The average daily usage excluding testing is 81.6 jobs per day, a factor 1.64 increase from Cycle 2 (daily average 49.8) (see Table 1).

3.2 International usage:

Figures 2 present the total number of submissions made per nation/top level domain (TLD) based on user email information for successfully completed submissions to the OST over the Cycle 3 CfP period.

We see that the .com (which is ambiguous as to the origin of the user) TLD makes up the largest fraction of total submissions, followed by .edu from USA higher education institutes. The UK and Germany are the two other nations which exceeded 100 simulations for this CfP. Chile, .org (typically ESO), and Italy all exceed 75 simulations.

3.3 Simulation Processing and Return times:

For the first time the ‘processing’ and ‘return’ times of jobs submitted to the OST have been tracked during this CfP. Processing times are measured from the point a job reaches the head of the OST queue and processing commences and the end of processing. Return times are measured as the time between the user submitting a job to the OST and the end of that jobs processing by the OST script, so includes time

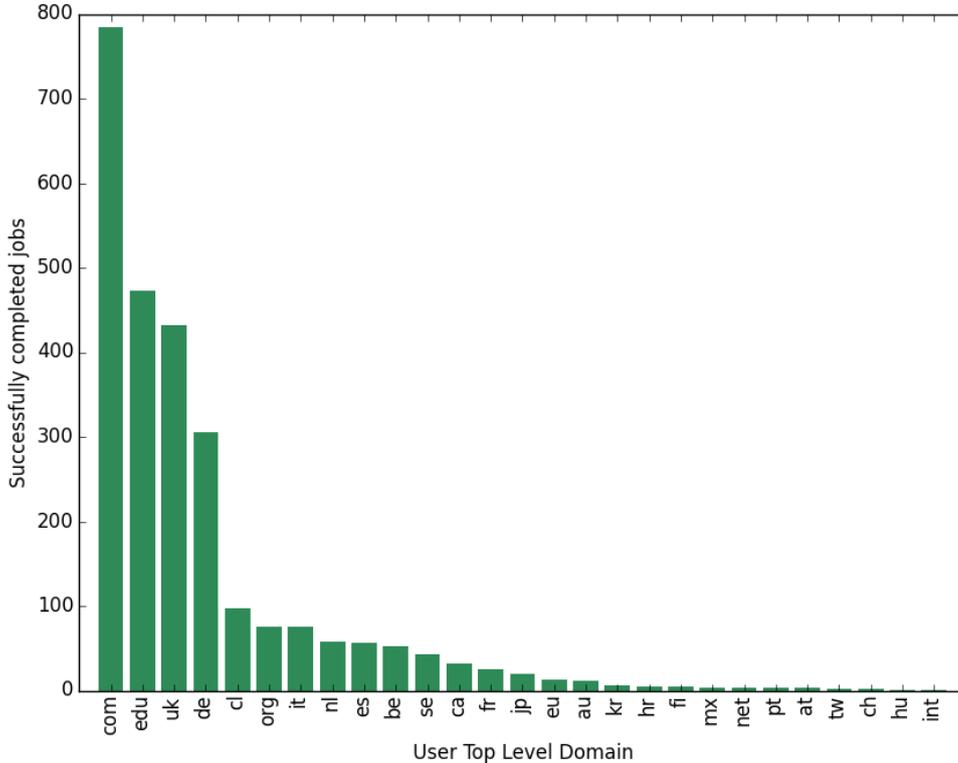


Figure 2: The number of OST submission successfully completed per nation/TLD during the Cycle 3 CFP.

spent in the queue. Figures 3 and 4 show the distributions of processing and return times for submission within the Cycle 3 CFP period.

Our target maximum time for processing an OST simulation is 25 minutes, from Figure 3 it can be seen that only 28 submissions exceeded 15 minutes processing (with 11 of these longer than the target 25 minute maximum). The cause of these long processing times, particularly the longest, were largely due to bugs in the new spectral cube processing. The peak of the distribution is between 0.5 and 1 minute and 95% of simulations this cycle were processed in less than 5.2 minutes.

As the OST is a queue based system the processing time does not tell the full story of how responsive the OST is, as users will have to wait longer than simply the processing time at busy times where many jobs are ahead of theirs in the queue. Figure 4 gives the distribution of return times for OST simulations. The majority (90%) of jobs are returned to the user within 25 minutes (our target maximum *processing* time which does not account for queueing), with only 3.4% of jobs taking longer than 2 hours to return. The explanation for this small number of jobs which took a long time to return to users is a combination of 1) occasions where there was a short queue (thus not triggering the overflow) with simulations which took a significant amount of time to process and 2) the few occasions where the OST failed repeatedly during the UK night (adding time waiting for AA to wake up and fix things).

4 Comparison to previous Cycles

Table 1 gives a series of measures of comparison between previous ALMA CFP Cycles. One point to note is the differing lengths of the Call for Proposal periods with Cycle 3 being the shortest to date (row 1).

It is clear that demand for the OST continues to increase, with all measures increasing from previous cycles despite the shorter CFP period. Figure 5 compares OST usage leading up to the CFP deadline for

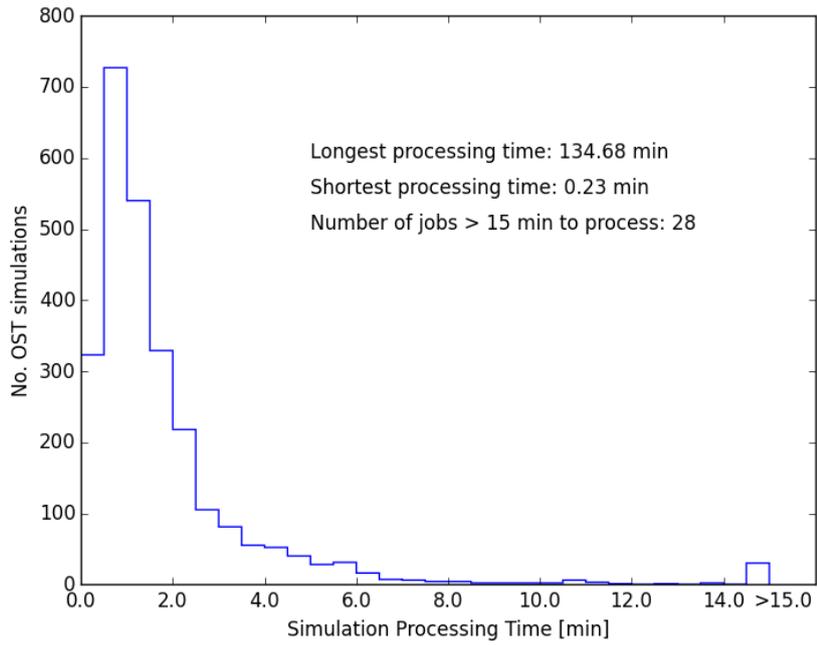


Figure 3: Distribution of OST job processing times in minutes. The x-axis is clipped at 15 mins with all values greater than this in the '>15.0' bin.

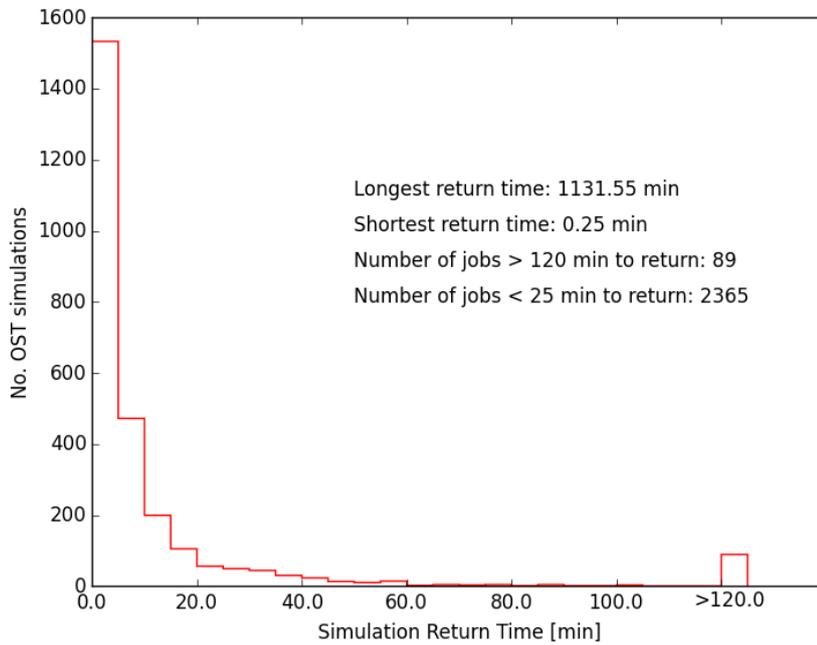


Figure 4: Distribution of OST job return times in minutes. The x-axis is clipped at 120 mins with all values greater than this in the '>120.0' bin.

	Cycle 0	Cycle 1	Cycle 2	Cycle 3
Call for proposal length	92 days	43 days	43 days	31 days
Total usage* (excl. testing)	1842	1710	2143	2617
Total usage (incl. testing)	2031	1741	2154	2529
Average Daily usage (excl. testing)	19.8	39.8	49.8	81.6
Peak usage (single day)	144	266	290	338

Table 1: Comparisons of usage between Cycles 0, 1, 2 and 3. *Usage means successfully completed submissions (see footnote 2).

all previous Cycles. The time range covers the whole of the Cycle 3 CfP length and the last 31 days of all previous Cycles.

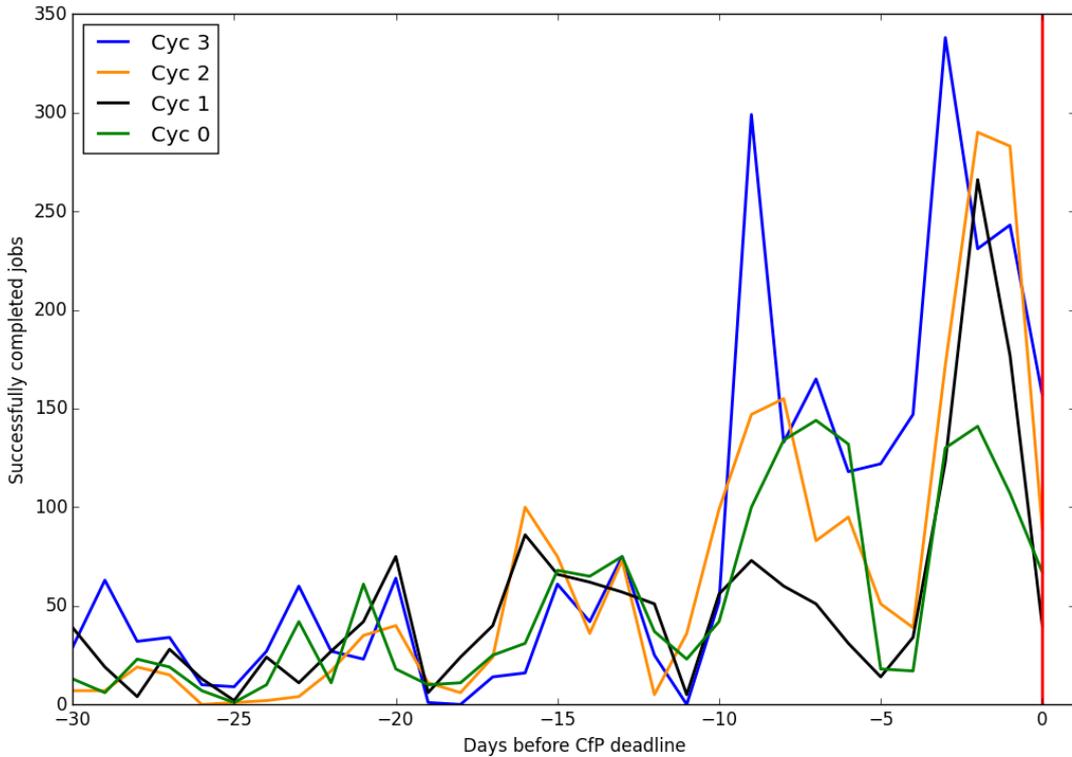


Figure 5: Comparison of daily OST usage for all previous Cycles in the last 31 days. (Note for Cycle 3 this is the entirety of the CfP) *Blue, Orange, Black and Green* represent usage for Cycles 3, 2, 1 and 0 respectively. *Vertical red* CfP deadline.

Figure 6 compares the OST use by nation in the Cycle 3 CfP (seen in Figure 2) with those same nations in all previous Cycle. Clearly there is much CfP to CfP fluctuation, but there is a steady increase in each of the four main user nations (incl. .com) from Cycle 1 onward.

5 Conclusion:

The Cycle 3 CfP has been a successful period for the OST with another increase in usage and relatively few issues (despite significant new features being added).

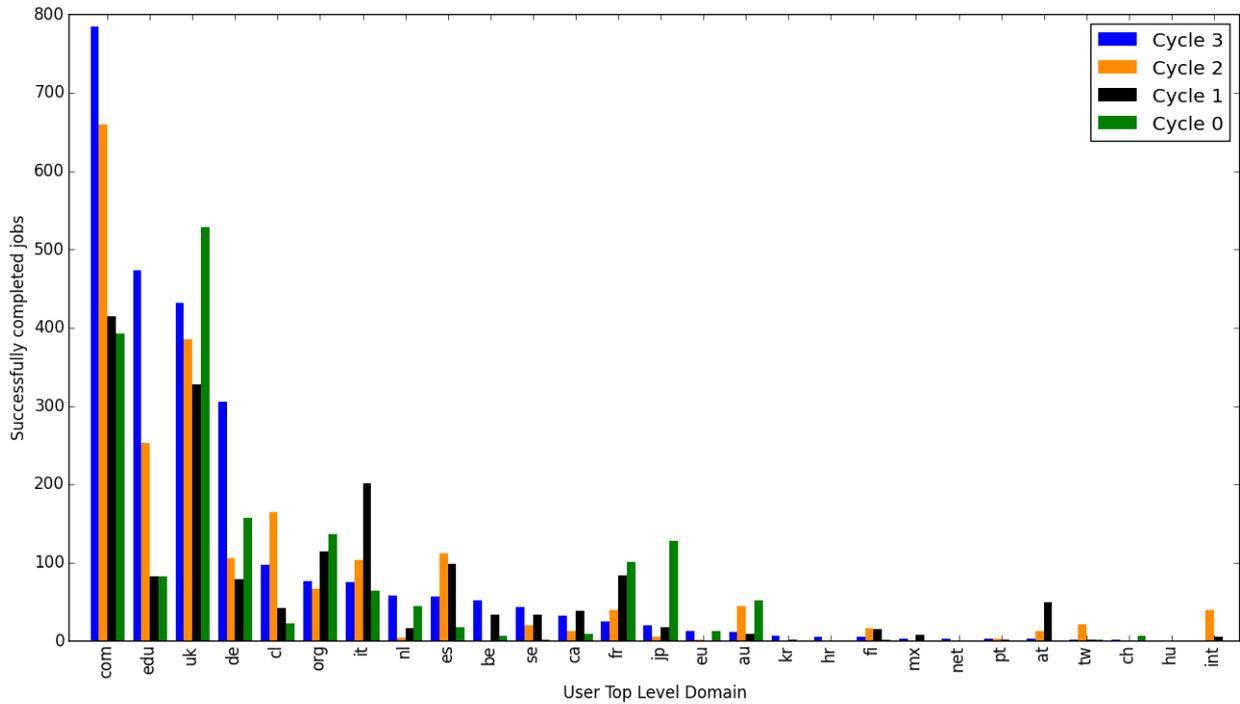


Figure 6: Comparison of OST use by nation during Cycle 3, 2, 1 and 0. Colours as per Figure 5

The issues encountered were dealt with quickly and with as little disruption to the users as possible, leading to a more robust system. The feedback and suggestions provided by OST users during this CfP will be used to fine tune the OST for future CfPs.

Finally, the UK ARC Node would like all users for using the OST and for their comments, feedback and suggestions and wish them all the best of luck with their proposals this round.